

STRATHY SOUTH WIND FARM **SECTION 36C**

EIAR Volume 2:
Main Report



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VOLUME 2: MAIN REPORT – GLOSSARY AND ABBREVIATIONS

The tables below presents general terms that are used in the Environmental Impact Assessment Report. At the end of each technical chapter there are tables of glossaries and abbreviations specific to that chapter.

Term (in alphabetical order)	Definition
1989 Act	the Electricity Act 1989.
1997 Act	Town and Country Planning (Scotland) Act 1997.
2007 ES	The ES which accompanied the application for 77 turbines 'Original 2007 Scheme' and associated works.
2013 ES Addendum	The ES Addendum which presented the 47 turbines 'the Modified 2013 Scheme' layout and associated works.
2013 Regulations	Electricity Generating Stations (Applications for Variation of Consent) (Scotland) Regulations 2013.
2014 Further Information Report	Further Information Report as submitted in November 2014 which presents the 39 turbine layout as consented.
2017 EIA Regulations	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, as amended.
2018 Consent	Refers to the planning consent for the Strathy South Wind Farm and associated works as granted by the Scottish Ministers in 2018.
2019 Scoping Report	The Scoping Report submitted to the Scottish Ministers in May 2019 alongside the with the request for a Scoping Opinion.
Site Access:	
• 'alternative access'	This refers to the eastern bridge crossing of the River Strathy.
• 'preferred access'	This refers to the western bridge crossing of the River Strathy.
Applicant	SSE Generation Ltd.
Borrow pit	An on-site pit from which construction material is taken for use as fill at another location on-site.
Consented Scheme	Strathy South Wind Farm T39 Layout. The wind turbines and all associated works as consented by the Scottish Ministers in 2018.
Consented T39 Layout	Refers to the 39 wind turbine layout as consented by the Scottish Ministers in 2018.
LiDAR	Light Detection and Ranging. A remote sensing method used to examine the surface of the Earth.
Modified 2013 Scheme	Strathy South site layout as updated by the 2013 addendum for in 2013 which comprised of 47 wind turbines, and associated access tracks, sub-station, borrow pits, control building, construction compounds, anemometry masts and switching station.
Original 2007 Scheme	The original layout for the Strathy South Wind Farm which comprised, 77 wind turbines with associated access tracks, sub-station, borrow pits, control building, construction compounds, anemometry masts and switching station.
Proposed Varied Development	The proposed Strathy South Wind Farm comprising 39 turbines at 200 m to tip with associated access tracks, sub-station, borrow pits, control building, construction compounds, anemometry masts and switching station.
S36C application	An application under Section 36C of the Electricity Act 1989.

Term (in alphabetical order)	Definition
Scoping Layout	The layout of the Proposed Varied Development as included in the 2019 Scoping Report.
The 'main site'	This refers to land within the U-shape only (including Yellow Bog Track) (site area 1,616 ha).
The 'site'	This refers to all land within the red line boundary (site area 1,785 ha).
Yellow Bog Road	An existing interlinking road between the eastern and western sides of the main site, known as 'Yellow Bog Road'.

Abbreviation (in alphabetical order)	Expanded Term
2014 FIR	2014 Further Information Report
AEP	Average Energy Production
ANO	Air Navigation Order
CAA	Civil Aviation Authority
CEMP	Construction Environmental Management Plan
CEnv	Chartered Environmentalist
CO2	Carbon dioxide
CRM	Collision Risk Modelling
CTMP	Construction Traffic Management Plan
ECoW	Environmental Clerk of Works
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ES	Environmental Statement
FIR	Further Information Report
GWh/annum	Gigawatt hours per year
HGV	Heavy Goods Vehicle
HMP	Habitat Management Plan
IEMA	Institute of Environmental Management and Assessment
LCT	Landscape Character Type
MIEMA	Full membership of IEMA
MW	Megawatt
NTS	Non-Technical Summary
PLI	Public Local Inquiry
PMP	Peat Management Plan
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
SLA	Special Landscape Area
SNH	Scottish Natural Heritage

Abbreviation (in alphabetical order)	Expanded Term
SPA	Special Protection Area
SWMP	Site Waste Mangement Plan
THC	The Highland Council
VOR	Valued Ornithological Receptor
VP	Viewpoint for LVIA and Vantage Point for Ornithology
WLA	Wild Land Area

1. INTRODUCTION

1.1 Preface

- 1.1.1 SSE Generation Limited (hereafter referred to as ‘the Applicant’) has submitted an application to the Scottish Ministers under Section 36C (‘the S36C application’) of the Electricity Act 1989 (‘the 1989 Act’). The S36C application proposes the variation of the Section 36 consent granted by the Scottish Ministers on 27 April 2018 under the 1989 Act (‘the 2018 Consent’), for the construction and operation of the Strathly South Wind Farm T39 Layout (‘the Consented Scheme’). This environmental impact assessment report (‘EIAR’) has been prepared in accordance with the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), (‘the 2017 EIA Regulations’), to accompany the application for the variations; the principal variation to the Consented Scheme being the increase to the tip height of the 39 turbines to up to 200 m. More detailed information regarding the proposed variations to the 2018 Consent is presented in Section 1.6 and Section 1.7 of this Chapter and detailed in Chapter 2: Description of Development (EIAR Volume 2). The proposed wind farm development that is the subject of the S36C application, which encompasses all of the proposed variations to the Consented Scheme is hereinafter referred to as ‘the Proposed Varied Development’.
- 1.1.2 In addition, the Applicant is seeking a direction under section 57(2) of the Town and Country Planning (Scotland) Act 1997 (‘the 1997 Act’) to the effect that planning permission would be deemed to be granted in respect of the Proposed Varied Development, (‘the s57(2) direction’). References to the S36C application in this EIAR should be read as including the request for the s57(2) direction, as the context requires.
- 1.1.3 The purpose of the application for variation of the 2018 Consent is to vary the Description of the Development to change the specification of the 39 turbines by increasing the maximum tip height from 135 m up to 200 m. The increase in turbine height would lead to a consequent increase in land take to accommodate larger turbine foundations and also the regulatory¹ requirement for turbine lighting, as the turbines would exceed 150 m. The Applicant has also reviewed the on-site access tracks and reduced the track length requirements by up to 0.5 km by removing track loops. In their Scoping Opinion the Scottish Ministers confirm that they “*are of the view that it would be feasible for the Company to apply for these variations under section 36C of the Act.*” The site location is presented on Figure 1.1 and layout of the Consented Scheme is presented on Figure 1.2a (EIAR Volume 3a: Figures).
- 1.1.4 A copy of the S36C application will be served on the planning authority, The Highland Council (‘THC’), and the owner and occupiers of the land to which the S36C application relates, in accordance with Regulation 4(2)(b) and (d) of the Electricity Generating Stations (Applications for Variation of Consent) (Scotland) Regulations 2013, as amended (‘the 2013 Regulations’). The publication requirements of the same Regulation and Part 5 of the 2017 EIA Regulations will be complied with in relation to the EIAR as further explained in paragraph 1.1.7-1.1.10 below.
- 1.1.5 Strathly South Wind Farm has been subject to three principal design iterations over the life of the project and the layout has evolved to respond to feedback from consultees and collection of additional environmental data. The three principal iterations are summarised below under reference to the environmental impact assessment reports relating to each layout:
- Original 2007 Scheme (77 turbines) – 2007 Environmental Statement (ES);
 - Modified 2013 Scheme (47 turbines) – 2013 ES Addendum; and
 - Consented Scheme (39 Turbines) – 2014 Further Information Report (FIR).

¹ The Air Navigation Order 2016, URL: <http://www.legislation.gov.uk/ukxi/2016/765/contents/made>

1.1.6 The EIAR comprises five volumes:

- Volume 1: Non-Technical Summary (NTS);
- Volume 2: Main Report;
- Volume 3a: Figures;
- Volume 3b: Visualisations;
- Volume 4: Technical Appendices; and
- Volume 5: Confidential Documents.

1.1.7 The EIAR and other documents lodged in relation to the S36C application will be available to view on the Scottish Government's portal at www.energyconsents.scot. In accordance with Regulation 4(2)(a) of the 2013 Regulations, application documents, including the EIAR, will also be available to view on an application website: <https://www.sserenewables.com/onshore-wind/in-development/strathy-south>.

1.1.8 The application and this EIAR will be advertised in accordance with the relevant legislative requirements under the 2013 Regulations and the 2017 EIA Regulations as follows:

- On the application website;
- The Herald;
- The Northern Times; and
- Edinburgh Gazette.

1.1.9 A copy of the S36C application and the EIAR would normally be available for public inspection in person. At the time of submission, due to restrictions in place relating to the Covid-19 pandemic, and in accordance with the Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020², it has not been possible to make hard copies of the S36C application and EIAR available for public inspection at a local location.

1.1.10 In addition to the EIAR being available for viewing on the websites noted in paragraph 1.1.7, copies of the EIAR may be obtained from SSE Generation Limited (contact: SSE Generation, FAO Laurie Winter, Inveralmond House, 200 Dunkeld Road, PH1 3AQ) or at a charge of £350 for a hard copy (at the Applicant's discretion), or electronic USB copies are available free of charge.

1.1.11 Any representations in respect of the application may be submitted via the Energy Consents Unit (ECU) website at www.energyconsents.scot/Register.aspx; by email to The Scottish Government, Energy Consents Unit mailbox at representations@gov.scot or by post, to The Scottish Government, Energy Consents Unit, 4th Floor, 5 Atlantic Quay, 150 Broomielaw, Glasgow, G2 8LU, identifying the proposal and specifying the grounds of representation.

1.1.12 Written or emailed representations should be dated, clearly stating the name (in block capitals), full return email and postal address of those making representations. Only representations sent by email to representations@gov.scot will receive acknowledgement.

1.1.13 All representations should be received not later than the date falling 30 days from the date of the last published notice, although Ministers may consider representations received after this date. Any subsequent additional information which is submitted by the Applicant will be subject to further public notice in this manner, and representations to such information will be accepted as per this notice.

1.1.14 This EIAR is available in other formats if required. For details, including costs, contact: SSE Generation, FAO Laurie Winter, Inveralmond House, 200 Dunkeld Road, PH1 3AQ or laurie.winter@sse.com.

² The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020

1.2 Introduction and Background

- 1.2.1 As more fully described in the Preface to this Chapter, the Applicant has submitted a S36C application to Scottish Ministers under the 1989 Act. The S36C application proposes the variation of the 2018 Consent granted by Scottish Ministers on 27 April 2018 under the 1989 Act for the construction and operation of the Consented Scheme. In addition, the Applicant is seeking a direction under section 57(2) of the 1997 Act to the effect that planning permission would be deemed to be granted in respect of the Proposed Varied Development. The site location is presented on Figure 1.1 and the layout of the Consented Scheme is presented on Figure 1.2a (EIAR Volume 3a: Figures).
- 1.2.2 The Applicant is seeking to vary the Description of Development as described in Annex 1 of the 2018 Consent by changing the specification of the proposed turbines as follows: an increase in the maximum tip height from 135 m up to a maximum of 200 m (an increase of 65 m); an increase in the rotor diameter from 104 m to a maximum of 162 m (an increase of up to 58 m); and, an increase in the hub height from 83 m to a maximum of 119 m (an increase of up to 36 m). The increase in the turbine height would lead to a consequent increase in land take to accommodate larger turbine foundations, and, also gives rise to the need for turbine lighting on turbines that exceed 150 m in height. More detailed information regarding the proposed variations to the 2018 Consent is presented in Section 1.6 and Section 1.7 of this Chapter and Chapter 2: Description of Development presents further details on the proposed variations to the Consented Scheme including revisions to the site's infrastructure such as a reduction in track length by up to 0.5 km. It should be noted that the turbine layout for the Proposed Varied Development remains unchanged from the layout of the Consented Scheme. The Proposed Varied Development that is the subject of the S36C application encompasses all of the proposed variations to the Consented Scheme and is illustrated in Figure 2.1 (EIAR Volume 3a: Figures).
- 1.2.3 This EIAR is provided under the 2017 EIA Regulations, with specific regard to the requirements of Regulation 4(2) and (3) of the 2017 EIA Regulations to identify, describe and assess the likely direct and indirect significant effects of the proposed development on the factors specified in paragraph (3) of Regulation 4. In addition, having regard to the terms of Regulation 28(2)(c) of the 2017 EIA Regulations, which are set out in full in paragraph 1.7.2 below, the EIAR identifies the likely significant effects on the environment of the Proposed Varied Development that differ from those predicted to result from the Consented Scheme.
- 1.2.4 This Chapter is supported by the list of figures and technical appendices presented in Table 1.1.

Table 1.1: Supporting Technical Appendices and Figures

EIAR Volume / Document Title	Information Source	Comment
EIAR Volume 3a: Figure 1.1: Site Location	Information reused from the 2014 FIR.	Unchanged as the site location and red line boundary remain unchanged.
EIAR Volume 3a: Figure 1.2a: Design Evolution: Consented Scheme	Information reused from 2014 FIR.	Information reused from 2014 FIR to present the Consented Scheme.
EIAR Volume 3a: Figure 1.2b: Design Evolution: Scoping Layout (2019)	Information reused from the 2019 Scoping Report.	Information reused from the 2019 Scoping Report to present the Scoping Layout.
EIAR Volume 3a: Figure 2.1: Proposed Varied Development	New information	Presents the design freeze layout for the Proposed Varied Development.
EIAR Volume 3a: Figure 4.6b: Cumulative Development Sites includes within the Assessment	New information	Presents the cumulative wind farm developments in the vicinity of the site.

Table 1.1: Supporting Technical Appendices and Figures

EIAR Volume / Document Title	Information Source	Comment
EIAR Volume 4: Technical Appendix 1.1: Consultation Register	New information	Register of consultation responses received as part of the pre-application process for the Proposed Varied Development.
EIAR Volume 4: Technical Appendix 1.2: Technical Team	New Information	In accordance with Regulation 5(5) of the 2017 EIA Regulations, the EIAR has been prepared by 'competent experts' as presented in this appendix.
EIAR Volume 4: Technical Appendix 1.3: Energy and Planning Policy Framework (includes Figure 1.3.1)	New Information	Describes the legislative and policy background of relevance to the Proposed Varied Development and the policy context for the area in which the site is located.

1.3 Purpose of this Report

- 1.3.1 The Applicant confirmed in its Scoping Report³ (the '2019 Scoping Report') its intention to prepare an EIAR to accompany the S36C Application. This is on the basis that the Consented Scheme is EIA development and in terms of paragraph 2 of Schedule 2 to the 2017 EIA Regulations, the changes proposed through the S36C application may have significant adverse effects on the environment. On that basis the Proposed Varied Development is Schedule 2 development for which an environmental impact assessment must be carried out. Regulation 28(1A) of the 2017 EIA Regulations provides that for such variation applications the requirements of the 2017 EIA Regulations shall apply subject to modifications specified in paragraph (2) of Regulation 28 where relevant. As a result, this EIAR is provided to present information on both the direct and indirect significant effects of the Proposed Varied Development on the environment and, in accordance with Regulation 28(2)(c), the main aspects in respect of which it is considered that the likely significant effects on the environment of the Proposed Varied Development would differ from the Consented Scheme.

1.4 Consultation

- 1.4.1 A request for a Scoping Opinion was submitted to the Scottish Ministers on 1st May 2019, in accordance with Regulation 12 of the 2017 EIA Regulations. The request was accompanied by the 2019 Scoping Report, which set out a summary description of the Proposed Varied Development, identified the issues proposed to be included in the EIAR and proposed an approach to the assessment of effects in each case. The Scoping Report was simultaneously issued to a list of statutory and non-statutory consultees. A Scoping Opinion was provided by the Scottish Ministers on 18th July 2019 and a copy of the consultation responses are presented in Technical Appendix 1.1: Consultation Register (EIAR Volume 4: Technical Appendices).
- 1.4.2 Following receipt of the Scoping Opinion, the Applicant and members of its environmental team undertook further consultation with consultees to agree the scope of each of the technical assessments. Each technical chapter in the EIAR presents details of the consultation that was undertaken, and a consultation summary is provided in Technical Appendix 1.1 (EIAR Volume 4: Technical Appendices).
- 1.4.3 The site lies completely within the boundary of Strathy & Armadale Community Council. The Bettyhill, Strathnaver & Altnaharra Community Council boundary lies beyond the west of the site

³ Ramboll (2019) Strathy South Wind Farm 2019 – Scoping Report

and the Melvich Community Council boundary lies beyond the east of the site. These community councils were contacted regarding the Proposed Varied Development in March 2019 and meetings were held with Strathly & Armadale Community Council and Melvich Community Council⁴ in June 2019 to obtain feedback on the proposals.

- 1.4.4 There is no statutory requirement for pre-application consultation on Section 36C variation applications; however, the Applicant held a drop-in public engagement event in Strathly Hall, Strathly on 27th August 2019 to present the Scoping Layout (EIAR Volume 3a: Figure 1.2b), changes to the 2018 Consent and environmental and construction information. A second drop-in public consultation event prior to the S36C application submission was scheduled on 24th March 2020, this had to be postponed due to the Covid-19 pandemic and the exhibition boards were made available online⁵.

1.5 Needs Case

- 1.5.1 Wind turbine technology is continually evolving with more productive and efficient designs coming on to the market place each year. A final turbine for the Proposed Varied Development has not yet been chosen; however, suitable candidate machines which could be accommodated within the maximum tip height of 200 m are currently being considered. For the purposes of the environmental assessment, the Vestas EnVentus V162 5.6 MW model has been identified as a suitable candidate turbine⁶. The increase in tip height and rotor diameter would substantially increase the energy output from the site and associated carbon dioxide (CO₂) emissions reduction from the site as shown in Table 1.2. The results of the carbon calculator are discussed in further detail in Chapter 12: other Issues (EIAR Volume 2) and Technical Appendix 12.1 (EIAR Volume 4).

Table 1.2: Energy Output / Carbon Dioxide Emissions Comparison		
Expected Results	Candidate Turbine 3.4 MW – Consented Scheme	Candidate Turbine 5.6 MW – Proposed Varied Development
CO ₂ emissions saving of the Consented Scheme/Proposed Varied Development versus fossil fuel mix of electricity generation (tCO ₂ /yr)	228,808	387,420
Energy output from the site over its operational lifetime (MWh)	8,160,071	43,046,640 ⁷
Carbon Payback Time (fossil fuel mix of electricity generation) (years)	1.1 (Min -0.5 to Max 4.6)	1.5 (Min 0.7 to Max 2.2)

- 1.5.2 The Scottish Climate Change Plan 2018⁸ outlines a new target of reducing greenhouse gas emissions by 66% by 2032. The Scottish Energy Strategy⁹ also includes a new 2030 'whole system' target for the equivalent of 50% of Scotland's heat, transport and electricity consumption to be supplied by renewable sources.

⁴ Bettyhill, Strathnaver & Altnaharra community council did not consider that an update on the Proposed Varied Development was necessary and declined the meeting offer.

⁵ https://sse.com/media/668124/Strathly-South_compressed.pdf

⁶ Note the Siemens Gamesa-SG 5.0-145, 5.0 MW turbine has been used for the noise assessment as this was the noisiest candidate machine.

⁷ It is acknowledged that the operational life of the Consented Scheme is 25 years, whereas the operational life of the Proposed Varied Development is 50 years.

⁸ Scottish Government (2018) Climate Change Plan - the Third Report on Policies and Proposals 2017-2032 (RPP3) (February, 2018 updated April 2018), URL: <http://www.gov.scot/Publications/2018/02/8867> (accessed 20/01/20)

⁹ Scottish Government (2017) Scottish Energy Strategy: The future of energy in Scotland, URL: <https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/> (accessed 20/01/20)

- 1.5.3 Taking account of the policy context, there are a number of benefits associated with the proposed increase in turbine tip height, as follows:
- the Proposed Varied Development would make a considerably more valuable contribution to the achievement of the UK and Scottish Government 'whole system' targets to decarbonise energy consumption by increasing the zero-carbon energy yield (based on the figures presented in Table 1.2 above the increase in CO₂ emission savings from the Proposed Varied Development compared to the Consented Scheme would be 69% over the operational life);
 - the larger turbine dimensions would improve the viability of the project in commercial terms by increasing the energy yield and alternative turbines available to the Applicant, as the wind farm may need to operate in the absence of subsidies;
 - the increase in energy production would lead to an equivalent increase in homes supplied with clean, renewable energy and an equivalent increase in CO₂ reduction, making a valuable contribution to the Scottish Climate Change Plan targets;
 - the contribution to public finances through non-domestic rates would increase in line with the increased installed capacity, thus increasing the total contribution to funding for public services in Scotland; and
 - the megawatt based community benefit fund would build upon the existing Strathy North Joint Community Fund.
- 1.5.4 This application can draw substantial support from Scottish Government policy in the respect that the Proposed Development would make a valuable contribution to legislated climate change targets and government policy objectives whilst increasing local economic benefits. This is set out in more detail in the Planning Statement.

1.6 Proposed Variation to the Consented Scheme

- 1.6.1 Table 1.3 summarises the key changes proposed to the Consented Scheme. A complete description of the proposed changes is provided in Chapter 2: Description of Development (EIAR Volume 2: Main Report). The site layout is illustrated in Figure 2.1 (EIAR Volume 3a: Figures).
- 1.6.2 It should be noted that the number and location of the turbines in the Proposed Varied Development remains unchanged from the Consented Scheme.

Table 1.3: Summary of Proposed Key Changes between the Consented Scheme and the Proposed Varied Development			
Characteristic	Consented Scheme	Proposed Varied Development	Summary of Variation
Tip Height	Up to 135 m	Up to 200 m	Up to 65 m increase
Turbine Capacity	3.4 MW	5.6 MW (indicative)	Up to 2.2 MW increase
Turbine Lighting	As per Condition 10 of the 2018 Consent aviation infra-red lighting would be fitted to turbines and omni-directional red lighting would be fitted to turbines at the cardinal points.	Aviation lighting requirements for turbines up to 200 m to be agreed with consultees. For the purposes of the EIA a 'worst-case' of all 39 turbines being lit has been presented.	The EIAR prepared in support of the S36C application is for the worst case scenario, but precise requirements for aviation lighting will be subject to the outcome of consultation.

Consideration of Reasonable Alternatives

- 1.6.3 The only reasonable alternative considered in the context of the Proposed Varied Development is the 'do nothing' alternative that would involve implementation of the 2018 Consent, as against the

proposed variation to increase turbine tip height (and the associated hub height and rotor diameter increases).

- 1.6.4 In the 'do nothing' alternative scenario, the 2018 Consent would remain unchanged. The main reasons for deciding to proceed with the Proposed Varied Development are set out in the summary of the Needs Case provided in Section 1.6 above. Based on a range of considerations related to national energy and planning policy, withdrawal of subsidies prior to the grant of the 2018 Consent, and project viability issues the Applicant has rejected the option of implementing the 2018 Consent.
- 1.6.5 A comparison of the predicted residual environmental effects between the Consented Scheme and the Proposed Varied Development is presented in Chapter 3: Comparative Environmental Assessment.
- 1.6.6 On balance, the Applicant considers that the benefits of the Proposed Varied Development outweigh any additional adverse effects associated with the proposed variations.

Design Evolution

- 1.6.7 The design evolution of the Proposed Varied Development is outlined below and is illustrated in Figure 1.2a, 1.2b and Figure 2.1 (EIAR Volume 3a: Figures).

Consented Scheme

- 1.6.8 The design evolution of the Proposed Varied Development began with the Consented Scheme (EIAR Volume 3a: Figure 1.2a), which comprised the following:
- 39 three-bladed horizontal axis wind turbines, with a maximum tip height of up to 135 m;
 - Turbine foundations and hardstandings (temporary infrastructure land take (per turbine): 0.098 ha and permanent land take (per turbine): 0.122 ha);
 - 32 km of access tracks;
 - 15 stream crossings;
 - Three anemometry masts;
 - A single switching station;
 - A construction compound;
 - A 100 m x 100 m concrete batching plant;
 - Two laydown areas; and
 - Four borrow pits.

Scoping Layout

- 1.6.9 The turbine layout presented in the 2019 Scoping Report was the same as that for the Consented Scheme, with proposed increase in tip height up to 200 m and the associated increased turbine foundations to accommodate a larger machine. The Scoping Layout also proposed:
- The removal of some areas of track, such as track loops, which would result in up to 1.2 km¹⁰ being removed from the total consented track length (EIAR Volume 3a: Figure 1.2b);
 - Turbine foundations and hardstandings (temporary infrastructure land take (per turbine): 0.1 ha and permanent land take (per turbine): 0.25 ha); and
 - Aviation lighting requirements for turbines to be agreed with consultees.

¹⁰ Note the figure of 1.2 km of track removal was stated in the 2019 Scoping Report, however this figure came to reduce to 0.5 km for the Proposed Varied Development following further design iterations of the layout.

Proposed Varied Development

- 1.6.10 Consultation responses received as part of the Scoping Opinion and Gatecheck Report were reviewed and a further design review was completed, specifically to address comments raised by SEPA in relation to the peat. The layout of the Proposed Varied Development is presented on Figure 2.1 (EIAR Volume 3a: Figures). Further evolution from the Scoping Layout is as follows:
- Track removal has been carried out to avoid track running through areas of deep peat where possible. Therefore, track has been removed between T13 and T19 and also between T24 and T26¹¹ (a total deletion of up to 0.5 km of on-site track);
 - One of the laydown areas has been relocated to the east of the track between T11 and T17 (previously this was situated east of T8) to allow for more efficient working of the site. The other laydown area to the north of T43 remains unchanged from the Consented Scheme;
 - Additional 0.11 ha land take (combination of temporary and permanent) per turbine. Note this is based on 'worst case' estimates currently available;
 - The Substation (referred to in all previous documentation as the 'Switching Station') has been relocated and now sits to the west of T4 (previously located to the south of the track leading to T9). Due to the increase in turbine capacity, the substation dimensions were required to increase (150 m x 200 m with a temporary 100 m laydown area)¹². Therefore, to ensure an appropriate standoff distance between the substation and the turbines for health and safety reasons, the substation was moved to its proposed location;
 - The Batching Plant has been relocated and now sits adjacent to the laydown area to the east of the track between T11 and T17 (previously situated next to the consented laydown area at T43);
 - The consented construction compound relocated from a location west of the track between T4 and T8 to the east of T4 to allow for more efficient working of the site;
 - The three consented permanent anemometry masts would be replaced by two permanent LiDAR located southeast of T36 and west of T70;
 - Three additional borrow pits have been identified in the north west of the site in the vicinity of T61. This is to accommodate the larger turbine foundations whilst minimising the need to bring material on-site;
 - One new watercourse crossing has been identified on the spur road to T9, increasing the number of watercourse crossings from 15 to 16¹³; and
 - Upgrades to Yellow Bog Road have been proposed¹⁴ for the initial construction phase to allow for mobilisation of plant to the western side of the site. Upgrades would be contained within the non-qualifying habitat either side of the existing track.

1.7 Approach to the Impact Assessment

Legal Requirements and Scottish Government Guidance

- 1.7.1 Regulation 28(1) of the 2017 EIA Regulations provides that for variation applications to EIA development, an environmental impact assessment must be carried out in respect of the proposed variation. In terms of paragraph (1A) of Regulation 28, the 2017 EIA Regulations shall generally apply in relation to a variation application. In that regard Regulation 4(2) requires that the EIAR will

¹¹ Track removal has been carried out to avoid track running through areas of deep peat where possible.

¹² Switching station for the Consented Scheme was 100m x 100m.

¹³ The labelling of watercourse crossings has continued from the previous versions of the layout. Therefore, as watercourse crossings have been removed as the track layout has evolved the numbering has continued hence why the label of 19 is shown on Figure 2.1. There are only 16 watercourse crossings required for the Proposed Varied Development.

¹⁴ 2018 Consent allows for 4 x 4 use across Yellow Bog Road.

identify, describe and assess the likely direct and indirect significant effects of the proposed development on the factors specified in Regulation 4(3).

- 1.7.2 Regulation 28(2)(c) of the 2017 EIA Regulations then provides that an EIA report which accompanies a variation application must include the main respects in which the developer considers that the likely significant effects on the environment of the proposed varied development would differ from those described in the environmental statement that was prepared in connection with the section 36 consent to be varied.
- 1.7.3 Additionally, Scottish Government Guidance on section 36C applications states, *“In respect to the environmental issues affected by the proposed variation, the EIA should present the likely significant effects on the environment of the “proposed varied development” (i.e. the development which would be authorised if varied as requested in a variation application).”* As such in respect of environmental issues affected, likely significant effects of the Proposed Varied Scheme are identified, described and assessed in this EIAR.
- 1.7.4 This Scottish Ministers’ Scoping Report states at paragraph 3.8 that *“The EIA Report therefore should address the likely significant effects on the environment of the proposed development (or proposed varied development – i.e. the whole of the development which would be authorised if varied as requested) against the baseline of the current state of the environment, and in doing so ensure that the main respects in which the likely significant effects of the proposed development as varied can be drawn out from those identified in assessing the consented development.”*
- 1.7.5 The approach taken in the EIAR addresses the requirements of the relevant legislation, guidance and the Scoping Opinion. Professional judgement, based on a review of the previous environmental impact assessment reports listed in paragraph 1.1.5 above, together with updated baseline information where required, has been used to establish the likely significant effects of the Proposed Varied Development.

Methodology

- 1.7.6 The first step is to prepare a summary of the likely significant effects of the Consented Scheme against the baseline conditions at the site. This EIAR has been prepared with reference to baseline information collected and presented as part of the previous environmental impact assessment reports prepared for the site (including the 2013 ES Addendum, 2014 FIR and 2015 PLI reports), subject to updates where this was deemed to be necessary and proportionate as an outcome of the sensitivity analysis.
- 1.7.7 The next step was to undertake a sensitivity analysis of the relevant environmental assessments that were prepared for the Consented Scheme to determine if the results remained appropriate, or if an updated assessment would be required. By way of example, for the purposes of carrying out a like for like comparison, an updated assessment might be required where the changes to the baseline, methodology or cumulative context could result in a change to the likely significant effects of the Consented Scheme.
- 1.7.8 The EIAR then provides an assessment of the effects of the Proposed Varied Development. This is carried out in the context of the same baseline or updated baseline, where appropriate for the purposes of carrying out a like for like comparison.
- 1.7.9 Finally, the EIAR provides a description of the main aspects in which the effects of the Proposed Varied Development differ from those identified for the Consented Scheme.
- 1.7.10 In taking this approach, the EIAR provides an assessment of the proposed development as a whole and describes any additional effects associated with the Proposed Varied Development when compared to the Consented Scheme.
- 1.7.11 Without implementation of the 2018 Consent to construct the Consented Scheme, no significant changes to the baseline are anticipated to have resulted from the passage of time, in the absence

of any interventions in respect of the previously reported baseline environment of the site. The existing land use, condition and management would be expected to continue largely unaltered. The commercial forestry operations across the site and adjoining areas are within privately owned land, and on that basis, it is assumed that commercial forestry practises would continue to take place resulting in areas of clear felling and potential restocking in line with approved forest plans. Other committed development in the surrounding area would alter the baseline context of the site in the future. Operational, under construction and consented (not yet constructed) wind farms have been considered as part of the baseline (see also 'Cumulative Effects' section below). As such, no future baselines, with the exception of considering climate change scenarios in the design¹⁵, are factored into this assessment. Refer to Chapter 12: Other Issues (EIAR Volume 2) for further consideration of climate change effects.

Cumulative Effects

- 1.7.12 The 2017 EIA Regulations require that, in assessing the effects of a particular development proposal, consideration is also given to the cumulative effects which might arise from the proposed variation in conjunction with other development proposals in the vicinity. The methodology in the EIAR follows guidance provided by Scottish Natural Heritage (SNH) for assessing cumulative effects. The cumulative assessments in the technical chapters of the EIAR consider, where appropriate, the cumulative effects arising from the addition of the Proposed Varied Development to cumulative developments which are the subject of a valid planning application where there is sufficient information to enable them to do so. As stated above, operational, under construction and consented (not yet constructed) wind farms have been considered as part of the baseline.
- 1.7.13 The grid connection between the proposed Strathy South on-site substation and existing Strathy North substation is considered within this EIA. The grid connection between the Strathy North Substation and Connagill substation will be via a 132 KV pole and is subject to a separate Section 37 Application. A Section 37 Consent was secured in 2012 for two 132 KV poles from Strathy North substation to Connagill substation for both the operational Strathy North wind farm and the Consented Scheme. Given the time since this consent, a new Section 37 Application for a 132 KV wood pole will be sought to support the Proposed Varied Development. Environmental Surveys carried out for the 2012 Section 27 Consent and Consented Scheme show there were no cumulative impacts associated with the Strathy South wind farm and the grid connection to Connagill.
- 1.7.14 Table 1.4 below shows a list of cumulative developments considered in cumulative assessments and Figure 4.6b (EIAR Volume 3a: Figures) shows their locations. The list of cumulative wind farm developments in Table 1.4 is based on turbines that are greater than 50 m tip height and within 20 km of the site. This list was agreed with the Scottish Government's ECU and THC. Note, developments at Scoping stage are not typically included as cumulative developments; however, THC requested that Ackron Wind Farm and Armadale Wind Farm were included in the list. The study area for cumulative developments is specific to each technical discipline and is stated within the relevant technical chapters of the EIAR. No potential for cumulative effects were identified with other non-wind farm developments.

Table 1.4: Cumulative Developments (wind farms)	
Status	Name
In Planning	Strathy Wood Wind Farm
Consented	Limekiln Wind Farm
Existing	Baillie Wind Farm

¹⁵ For example, with respect to ensuring watercourse crossings and drainage management: measures are designed to accommodate 1:200 year flood events, plus extra allowing for climate change scenarios which envisage an increase in the intensity and volume of precipitation.

Table 1.4: Cumulative Developments (wind farms)	
Status	Name
	Strathy North Wind Farm Bettyhill Wind Farm
Scoping	Ackron Wind Farm Armada Wind Farm

1.8 Factors affected by the Proposed Varied Development

- 1.8.1 The EIAR provides impact assessment chapters for the relevant factors specified in Regulation 4(3) of the 2017 EIA Regulations where they are likely to be significantly affected, taking account of the description of the Proposed Varied Development, the mitigation by design, other mitigation measures and the assessment scope agreed with relevant consultees (as presented in EIAR Volume 4: Technical Appendix 1.1).
- 1.8.2 Each assessment chapter describes the assessment methodology used and the criteria by which a significant effect is defined. This EIAR has been prepared to include the information specified in Regulation 5(2) of, and Schedule 4 to, the 2017 EIA Regulations, having regard to the obligations specified in Regulation 4(2).

1.9 EIA Quality

- 1.9.1 In accordance with Regulation 5(5) of the 2017 EIA Regulations, by appointing Ramboll UK Limited (Ramboll), the Applicant has ensured that the EIAR has been prepared by 'competent experts'. The EIAR has been compiled and approved by professional EIA practitioners at Ramboll, holding relevant undergraduate and post-graduate degrees, full membership of IEMA (MIEMA) and Chartered Environmentalist (CEnv) status with the Society for the Environment.
- 1.9.2 The EIAR meets the requirements of the Institute of Environmental Management and Assessment (IEMA) EIA Quality Mark scheme. This is a voluntary scheme operated by IEMA that allows organisations to make a commitment to excellence in EIA and to have this commitment independently reviewed on an annual basis.
- 1.9.3 Each of the impact assessment chapters provides details of the authors' relevant professional memberships and the code of practice followed in order to confirm relevant competence. A summary of the technical team's qualifications is presented in Technical Appendix 1.2, EIAR Volume 4. The chapters also include details of the assessment methodology used, including the specific criteria for defining the sensitivity of the baseline environment, quantifying the magnitude of change and for assessing whether the effects are deemed significant or not significant under the terms of the EIA Regulations.

1.10 Structure of the EIAR

- 1.10.1 Overall, the EIAR is provided in five volumes:
- Volume 1: Non-Technical Summary;
 - Volume 2: EIA Report;
 - Volume 3a: Figures;
 - Volume 3b: Visualisations;
 - Volume 4: Technical Appendices; and
 - Volume 5: Confidential Documents.
- 1.10.2 A glossary of terms is also included at the front of this EIAR.

1.11 Approach to Habitats Regulations Assessment

- 1.11.1 The potential effects of the Proposed Varied Development to the Caithness and Sutherland Peatlands Special Area of Conservation (SAC) have been considered during the assessment process (Chapter 9: Ecology, EIAR Volume 2 and Technical Appendix 9.4, EIAR Volume 4). As with the Consented Scheme, potential impacts were identified as loss or disturbance to qualifying habitats of the SAC through upgrading of the Common Access. In addition to these, the Proposed Varied Development's application includes the use of the Yellow Bog track; the use of this section of track was previously excluded from construction use of the Consented Scheme. This track will now be widened and impacts from this activity was also identified as potentially affecting qualifying habitats of the SAC.
- 1.11.2 Sensitive design of both tracks, indeed allowing a reduction in the footprint of the Common Access track, coupled to detailed assessments of the condition of the habitats surrounding the existing tracks, identified that habitats have already been affected by previous construction methods and so are no longer classified as qualifying habitats of the SAC. The tracks, where necessary, have been designed to utilise these areas of non-qualifying habitat and so avoid any potential effects to the qualifying habitats of the surrounding SAC. Consequently, it has been concluded that the construction and operation of the Proposed Varied Development will not have a likely significant effect on the qualifying interests of the Caithness and Sutherland Peatlands SAC.

2. DESCRIPTION OF DEVELOPMENT

2.1 Introduction

2.1.1 This Chapter provides a description of the Proposed Varied Development, which would be located 12 km south of the village of Strathy in Sutherland. This Chapter also details the changes to the infrastructure associated with the Proposed Varied Development, from the infrastructure for the consented Strathy South Wind Farm (the Consented Scheme), for the purposes of identifying and assessing likely significant effects, and, identifying any differences in the likely significant effects of the Proposed Varied Development on the environment when compared to the Consented Scheme.

2.1.2 This Chapter is supported by the figures and technical appendices presented in Table 2.1.

Table 2.1: Supporting Technical Appendices and Figures		
Document Title	Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Comment (e.g. to what extent will the information be reused)
EIAR Volume 3a: Figure 2.1: Proposed Varied Development	New Information	Presents the design freeze layout for the Proposed Varied Development.
EIAR Volume 3a: Figure 2.2 Layout Constraints	New Information	Shows the design constraints used for the Proposed Varied Development.
EIAR Volume 3a: Figure 2.3 Typical Turbine Elevation	New Information	Shows indicative turbine dimensions for the Proposed Varied Development.
EIAR Volume 3a: Figure 2.4 Typical Turbine Foundation	New Information	Shows the turbine foundations for the Proposed Varied Development, as they are larger than those for the Consented Scheme.
EIAR Volume 3a: Figure 2.5 Proposed Hardstanding Area and Crane Platform	New Information	New design for the Proposed Varied Development.
EIAR Volume 3a: Figure 2.6 Access Route	New Information	Access route remains unchanged but has been recreated for the purposes of the Section 36C Application, with the exception of the addition on the southern shared access route through Strathy Wood.
EIAR Volume 3a: Figure 2.7 Typical Access Track (Cut and Floating)	New Information	Track design remains unchanged from the consented scheme, but sections of track have been altered as described in Table 2.2.
EIAR Volume 3a: Figure 2.8 Typical Access Track Cross Section	New Information	Indicative access track cross-sections for access tracks within the main site.
EIAR Volume 3a: Figure 2.9 Indicative Substation Layout	New Information	Redesigned to accommodate the larger capacity of the Proposed Varied Development.

Table 2.1: Supporting Technical Appendices and Figures

Document Title	Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Comment (e.g. to what extent will the information be reused)
EIAR Volume 3a: Figure 2.10 Indicative Substation Elevation	New Information	Redesigned to accommodate the larger capacity of the Proposed Varied Development.
EIAR Volume 3a: Figure 2.11 Permanent LiDAR	New Information	New information as LiDAR not previously proposed for the Consented Scheme and would replace the three consented met masts.
EIAR Volume 3a: Figure 2.12 Underground Cable Route	Reused from 2013 Addendum and 2014 FIR.	Figure reproduces the previous routes as Figure A4.1 of 2013 ES Addendum and Figure 1.1 of the 2014 FIR.
EIAR Volume 3a: Figure 2.13 Typical Cable Trench Section	New Information	Cable trench width remains consistent with Consented Scheme but revised to accommodate a single 132KV cable.
EIAR Volume 3a: Figure 2.14 Borrow Pit Design	New Information	Updated borrow pit design to allow for addition material to be won on-site.
EIAR Volume 3a: Figure 2.15 Typical Construction Compound	New Information	Revised construction compound which has been relocated to allow for more efficient construction activities.
EIAR Volume 4: Technical Appendix 2.1: Outline Construction Environmental Management Plan (CEMP)	New Information	The Outline CEMP as agreed for the Consented Scheme has been updated to reflect the Proposed Varied Development.
EIAR Volume 4: Technical Appendix 2.2: Borrow Pit Assessment	New Information	Borrow pit assessment has been updated in 2019 due to additional material being required.

2.1.3 Figures 2.1 – 2.15 and the Technical Appendices 2.1 and 2.2 are referenced in the text where relevant.

2.2 Proposed Varied Development

2.2.1 Chapter 1 of this EIAR explains the basis upon which the Proposed Varied Development is categorised as Schedule 2 development in terms of the 2017 EIA Regulations. In terms of Regulation 5(2) it is a statutory requirement that this EIAR includes as a minimum the information specified in Regulation 5(2), which includes any information specified in Schedule 4 to the 2017 EIA Regulations. In terms of Regulation 5(2)(a), the EIAR must include a description of the development that should comprise of information on the site, design, size and other relevant features of the development as further specified in paragraph 1 of Schedule 4. This Chapter provides the description of the Proposed Varied Development for EIA purposes, as supplemented by more detailed information provided in the relevant technical assessment chapters.

- 2.2.2 The Proposed Varied Development would comprise 39 turbines with internal transformers, associated infrastructure and ancillary development, as shown in Figure 2.1 (EIAR Volume 3a: Figures) and as described in detail throughout this chapter.
- 2.2.3 The Proposed Varied Development would include the following key components:
- Up to 39 turbines, each with a maximum tip height of 200 m and rotor diameter of up to 162 m, and associated crane pads;
 - Turbine foundations and hardstandings;
 - Access tracks;
 - Watercourse crossings;
 - Substation;
 - Up to seven borrow pits;
 - Temporary lay down areas;
 - Temporary Construction compounds;
 - Temporary Batching Plant; and
 - Welfare building.
- 2.2.4 Table 2.2 below provides a summary of the changes between the Consented Scheme and the Proposed Varied Development. The changes have taken into consideration the constraints information as presented on Figure 2.2 (EIAR Volume 3a: Figures).

Table 2.2: Summary of Key Changes between the Consented Scheme and the Proposed Varied Development			
Infrastructure Element	Consented Scheme	Proposed Varied Development	Summary of Key Change
No. of Turbines	39	39	No change
Tip Height	Up to 135 m	Up to 200 m	Up to 65 m increase
Rotor Diameter	Up to 104 m	Up to 162 m	Up to 58 m increase
Hub Height	83 m	119 m	Up to 36 m increase
Access Track Length	32.0 km	31.4 km	Deletion of up to 0.5 km of track ¹ .
Turbine Foundations & Hardstanding	Temporary infrastructure land take (per turbine): 0.098 hectares (ha). Permanent land take (per turbine): 0.122 (ha).	Temporary infrastructure land take (per turbine): 0.080 hectares (ha). Permanent land take (per turbine): 0.250 (ha).	Additional 0.113 ha land take (combination of temporary and permanent) per turbine . Note this is based on 'worst case' estimates currently available.
Borrow Pits	Four borrow pits	Up to seven borrow pits.	Up to three additional borrow pits have been identified in the northwest of the site.

¹ Please note that this is for the Applicant's 'preferred route' the 'alternative route' would result in 32 km of track, so the same as the Consented Scheme.

Table 2.2: Summary of Key Changes between the Consented Scheme and the Proposed Varied Development

Infrastructure Element	Consented Scheme	Proposed Varied Development	Summary of Key Change
Lighting	As per Condition 10 of the 2018 Consent aviation infra-red lighting would be fitted to turbines and omni-directional red lighting would be fitted to turbines at the cardinal points.	Aviation lighting requirements for turbines up to 200 m to be agreed with consultees For the purposes of the EIA a 'worst-case' of all 39 turbines being lit with 2,000 candela visible red lighting has been presented.	The EIAR for the S36C application is based on the worst case scenario, but precise requirements for aviation lighting will be subject to the outcome of consultation and agreement with the Civil Aviation Authority (CAA).
Substation (previously Switching Station on all documentation associated with the Consented Scheme)	The switching station as consented was located to the south of the spur road to T9.	The proposed substation and associated temporary laydown area are now located to the west of T4.	The Consented Scheme's switching station has been replaced by a substation to accommodate the additional capacity. The location has been revised to allow for the increased substation size (150 m x 200 m) and temporary laydown area.
Laydown Areas	Two laydown areas; one located to the north of T43 and one within the borrow pit to the east of T8 ² .	Two laydown areas; one located to the north of T43 and one located to the east of the track between T11 and T17.	The laydown area previously located within the borrow pit to the east of T8 has been relocated to the east of the track between T11 and T17.
Construction Compounds	One construction compound located the west of the track between T4 and T8.	One construction compound located to the east of T4.	Relocated north and east from consented location.
Permanent Met Masts/LiDAR	Three permanent met masts; one located east of the track between T2 and T6, one located on the track between T24 and T26, and one located on the track between T35 and T36.	Two permanent LiDAR; one located southeast of T36 and one located west of T70.	LiDAR equipment and locations would replace the consented met masts.
Concrete Batching Plant	One 100 m x 100 m concrete batching plant to the north of T43.	One 100 m x 100 m batching plant located to the east of the track between T11 and T17.	Dimensions of batching plant remain as consented; location has been revised.
Watercourse Crossings	15 watercourse crossings	16 watercourse crossings	One new watercourse crossing has been identified on the spur road to T9.

² It should be noted that the 2018 Consent plans show two laydown areas, but the written documentation makes reference to one laydown area. Reference to one laydown area is an error and the Consented Scheme always proposed two.

Table 2.2: Summary of Key Changes between the Consented Scheme and the Proposed Varied Development

Infrastructure Element	Consented Scheme	Proposed Varied Development	Summary of Key Change
Yellow Bog Road	Permitted for 4 x 4 vehicle usage.	Proposal to upgrade Yellow Bog Road for initial construction phase.	Upgrades to Yellow Bog Road would be contained within the non-qualifying habitat either side of the existing track to allow for mobilisation of plant to the western side of the site. Full details are provided in Technical Appendix 9.4: Assessment of the Effect of the Construction and use of the Access and Yellow Bog Tracks (EIAR Volume 4).

- 2.2.5 The turbine locations for the Proposed Varied Development remain the same as those for the Consented Scheme. Turbine numbering has also been retained and correspond to the numbering which was presented in the Original 2007 Environmental Statement (ES), 2013 ES Addendum and the 2014 Further Information Report (FIR) as shown in Table 2.3 below.

Table 2.3 Turbine Grid References

Turbine Number	Grid Reference	Turbine Number	Grid Reference
T1	280619 953031	T30	279413 949703
T2	281155 952737	T33	279165 949159
T4	280687 952437	T35	277397 949254
T6	281205 952237	T36	278217 949225
T8	280675 951871	T39	277866 949638
T9	281141 951618	T41	277431 949983
T10	280139 951650	T42	278375 949964
T11	280653 951295	T43	278763 949581
T13	280144 951050	T45	278263 950529
T15	281058 950872	T46	278855 950613
T17	280598 950707	T47	278555 951001
T18	281049 950334	T49	277856 951064
T19	280030 950461	T50	278264 951400
T20	280413 950162	T52	277806 951652
T22	279973 949829	T56	278297 951962
T24	280781 949792	T57	278737 951687
T26	280279 949361	T61	279119 952086
T28	279786 949085	T69	278372 953507
T29	279022 950112	T70	278683 953059
		T72	279165 953538

- 2.2.6 The locations of the proposed turbines and associated infrastructure would be subject to micro-siting to take account of more detailed topographical and geotechnical surveys which would take place prior to construction commencing. Through this S36C application the Applicant will seek to retain the principle of the micro-siting condition attached to the 2018 Consent that permits turbine locations and track routes to be moved by up to 50 m from that shown on the site layout. This would be with the approval of an Environmental Clerk of Works (ECOW), with input from site archaeologists, ecologists and any other relevant specialist supervising construction activities. Through this S36C application the Applicant will seek an addition to that micro-siting condition to allow for an increased micro-siting allowance of 100 m for certain turbines and associated infrastructure, subject to the approval of The Highland Council (THC) in consultation with appropriate consultees. The purpose of the increased micro-siting allowance is that a number of turbines have been identified as being situated on deep peat. Through pre-application consultation with SEPA (summarised in the consultation register presented in EIAR Volume 4: Technical Appendix 1.1), it has been identified that an increased micro-siting allowance of 100 m would be welcomed by SEPA for the following turbines: **T9, T18, T19, T33, T42, T29, T52, T57 and T72**. In addition, the Applicant has identified the following turbines which would benefit from an increased micro-siting allowance of 100 m: **T1, T4, and T69**³. The applicant would adhere to the principle established through the 2018 Consent that no turbine or associated infrastructure would be moved into an area of deeper peat than currently proposed.

2.3 Delivery Route and Site Access

- 2.3.1 The proposed site access remains unchanged from the Consented Scheme. It is anticipated that construction traffic bound for the site would access from the east (with Scrabster Harbour being the port of entry for the turbine components), via the A9, and from the A9 the deliveries would join the A836 westbound for approximately 30 km, from which the existing access for Strathly North wind farm would be utilised (EIAR Volume 3a: Figure 8.1a). The detail of any associated road or junction designs would be agreed with THC's Roads Service. An Abnormal Load Assessment has been undertaken by Mott MacDonald and the results are presented in EIAR Volume 4: Technical Appendix 8.2: Abnormal Load Assessment. Further consultation with THC and Transport Scotland (TS) as local roads authority and trunk roads authority, respectively, would be required to further develop and agree the necessary infrastructure accommodation works. It is proposed that the full extent of all roads improvements works would be agreed through the Construction Traffic Management Plan (CTMP) as a condition of consent. A Framework CTMP is presented in EIAR Volume 4: Technical Appendix 8.1.
- 2.3.2 Turbine towers, blades and nacelles would be transported using specialist vehicles and tower sections and other turbine components would be stored either at a designated laydown area or at each turbine hardstanding until turbine erection commences.

2.4 Operational Phase Components

Wind Turbines

Turbine Specification

- 2.4.1 The Proposed Varied Development would consist of 39 three bladed horizontal axis wind turbines. Based on the candidate turbine, it is anticipated that the proposed turbines would not exceed an installed capacity of 207 MW⁴ for the Proposed Varied Development. The overall rating could change depending on the turbine models available at the time of construction. The maximum turbine parameters selected for the purposes of this EIA is a turbine with a maximum ground to tip

³ Additional micro-siting for T4 would allow for increased safety distance between the turbine and the proposed substation. T1 and T69 have been identified through the Peat Landslide Hazard Risk Assessment of being situated on steep slopes locally.

⁴ Consented Scheme has an installed capacity of 132.6 MW.

height of up to 200 m, maximum blade diameter of up to 162 m and indicative hub height of up to 119 m (EIAR Volume 3a: Figure 2.3).

2.4.2 The turbines would generate electricity from wind speeds between approximately 3 metres per second (m/s) up to between 25 and 30m/s with variable rotor speed and pitch regulation on the blades to control power output and maximise efficiency. The rotor would be mounted upwind of the tower, and all rotors would turn in the same direction. The rotational speeds would be up to 15 revolutions per minute (rpm).

2.4.3 Above ground each turbine would comprise:

- A tubular steel tower with door and internal access systems;
- A nacelle housing generator, gearbox, hydraulic and electrical control systems, and externally mounted anemometry instruments; and
- A rotor comprising a central hub and three blades.

2.4.4 A transformer would be required for each turbine. This would be located internally to each turbine.

Lighting

2.4.5 The Proposed Varied Development, if consented, would be subject to aviation lighting under Article 222 of the Air Navigation Order (ANO). The standard requirement for turbines over 150 m is a steady red light to be installed on the nacelle of all turbines over 150 m at 2,000 candela intensity, with intermediate lights at 52 m on the towers. It is acknowledged that the ANO also contains provisions for reduced or alternative lighting schemes to be approved by the CAA, and in October 2019, in the case of Viking Wind Farm, a scheme providing lights on 16 of the 103 turbines was approved by the CAA.

2.4.6 The Applicant has initiated consultation with the CAA and relevant consultees with the intention of agreeing a draft lighting scheme which would meet the CAA lighting requirements whilst minimising the scale of the lighting. Any draft agreement would be subject to approval from THC. For the purposes of this EIA a 'worst case' scenario has been assumed, where all 39 turbines would be fitted with lighting to the standard requirement.

Turbine Installation

2.4.7 Turbine components including towers, blades, hubs and nacelles would be transported from Scrabster Harbour to site using abnormal loads vehicles. On arrival onto site, the wind turbine components would be delivered and offloaded at the hardstanding of the wind turbine to be erected.

Foundations

2.4.8 The turbines would typically be erected on reinforced concrete foundations, of gravity-based design. Figure 2.4 provides an illustration of a typical turbine foundation (EIAR Volume 3a: Figures). Detailed foundation design would be completed following detailed geotechnical evaluation at each turbine location and final selection of a turbine model at the pre-construction stage.

2.4.9 Construction of the turbine foundations would generally be formed as follows:

- Any peat turfs and peat would be excavated and stored separately. The remaining overburden would then be excavated down to formation level as determined by geotechnical studies. The excavation typically would be 2.5 m to 3.5 m deep by approximately 30 m in diameter;
- A temporary drainage system would be established according to the local gradient of either a pump or temporary ditch;
- The required level would be made up as required with compacted crushed rock placed in the base of the excavation to provide necessary bearing capacity;

- A layer of blinding concrete would be laid;
- A reinforcing steel 'cage' would be assembled (nominally 110 tonnes of steel reinforcement, per foundation);
- Shuttering would be assembled;
- Concrete (nominally 750-850 m³ per foundation) would typically be in two pours: the first pour being the main base, which is approximately 90% of the foundation; the second pour would be the remaining 10% of the foundation and would form the plinth section which sits on top of the main base;
- Once the concrete has cured sufficiently, the shuttering would be removed, and an electrical earthing mat installed;
- Approximately 1-2 m of rock, or soil would be placed over the concrete foundation to provide additional bulk weight to the foundation; and
- Following erection of the turbine, suitable overburden and turves would be used to landscape and reinstate those areas not required for maintenance.

2.4.10 The foundation inserts would then be cast into a central concrete up-stand section, to which the turbine tower would later be bolted. The excavated area would be back-filled with compacted layers of graded material from the original excavation and capped with peat and soil. Locally around the turbines the finished surface would be capped with crushed aggregate to allow for safe personnel access around the base of the turbine.

Crane Hardstanding

2.4.11 During the erection of the turbines, crane hardstanding areas would be required at each turbine's base (EIAR Volume 3a: Figure 2.5). Typically, these would consist of one main area of up to 2,520 m² adjacent to the turbine position where the main turbine erection crane and assist crane would be located. There would be a requirement to use cranes on occasion during the operational phase of the Proposed Varied Development, so the main crane hardstanding (2,520 m²) would be retained. The final size, design and layout of the crane hardstandings would be determined by the turbine supplier according to their preferred erection method, with micro-siting to be exercised under the supervision of an ECoW. In addition to the main hardstanding areas, other areas totalling up to 800 m² per turbine would be formed and used during the assembly of the main crane boom, assembly of the rotor as well as a trestle area for turbine blades and an area for tower storage as shown in Figure 2.5 (EIAR Volume 3a: Figures). The proposed approach complies with current good practice guidance⁵ which recommends crane hardstanding areas are left uncovered for the lifetime of the Proposed Varied Development.

Access Tracks

2.4.12 The access tracks for the Proposed Varied Development are the same as those for the Consented Scheme and are labelled as they are in the 2018 Consent. This is to maintain consistency in terminology with the 2013 ES Addendum, 2014 FIR Report and the 2018 Consent and prevent any confusion in the comparative assessment sections of this EIAR. The access tracks as consented, which are being considered for the Proposed Varied Development, are shown in Figure 2.6 (EIAR Volume 3a Figures) and summarised below:

- Preferred Access Track: Shown by the green dotted line of Figure 2.6 heading south of the Strathly North Access Track before joining the with Common Access Track; and

⁵ Scottish Renewables, Scottish Natural Heritage. Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW (2019) Good Practice Guidance During Wind Farm Construction, 4th Edition.

- Alternative Access Track: Shown by the purple dotted line on Figure 2.6 heading east from the Strathly North Access Track and following a 'coat-hook' like route before moving south and west to join up with the Common Access Track.

2.4.13 It should be noted that at the time of submission the Applicant intends to retain the consent for either option as part of the Proposed Varied Development and is continuing engineering investigations into both options. The use of 'Preferred Access Track' and 'Alternative Access Track' is solely to retain consistency with terminology used in previous planning submissions and should not be read as one route being preferred over the other. Retaining the terminology allows for a clearer comparison of effects between the Consented Scheme and the Proposed Varied Development, as per the requirements of a Section 36C variation Application.

2.4.14 A section of the main 'access' track route, between the A836 public road and the most southerly part of the Strathly North wind farm (NGR NC794 569, consented and operational) is common to both the Proposed Varied Development and the Strathly North wind farm. The preferred access route then travels south where it would cross the River Strathly and meet up with an existing track within Strathly Wood at NGR 813 551. The alternative access route leaves the constructed Strathly North wind farm track at NGR 813 564 and travels in a roughly easterly then southerly direction, crossing the River Strathly in Strathly Wood at approximate NGR 818 558. Shortly after the river crossing, the route reaches the existing track and continues in a south-westerly direction before heading in a southerly direction along an existing track for approximately 2 km to reach the main site. In the event that both the Proposed Varied Development and Strathly Wood wind farm are consented, the Alternative Access Track would be used to ensure a single point of crossing of the River Strathly for access to both projects.

2.4.15 Table 2.4 below details upgrades required to both the preferred and alternative access route options and presents a split between 'cut' and 'float' track construction methods based on the assumption that tracks would be constructed using the cut method where underlying peat is less than 0.5 m and would be constructed using the floating method where peat is deeper. Guidance⁶ suggests that 1 m peat depth determines the need for floating tracks, the 0.5 m commitment was agreed as part of the Public Local Inquiry (PLI) for the Consented Scheme and would be adhered to for the Proposed Varied Development (EIAR Volume 3a: Figure 2.7).

Table 2.4: Access Track and On-Site Track Lengths		
Track Description	Cut or Floating Track	Length of Track Section (km)
Site Track (i.e. tracks within main site)	Cut	12.290
	Existing/Upgrade	7.670
	Floating Track	7.650
Access Track (including preferred bridge crossing of River Strathly)	Cut	1.611
	Upgrade	2.194
Access Track (including alternative bridge crossing of River Strathly)	Cut	1.886
	Existing/Upgrade	3.168
Total Track Length:		
Preferred		31.415
Alternative		32.664

⁶ SNH and FCS (2010) Floating Roads on Peat.

Access Track Construction

- 2.4.16 The proposed access tracks total approximately 31.5 km for the preferred route and 32.7 km for the alternative route. For the purposes of assessment, the alternative track length has been considered, thus there is a slight increase to the proposed access track lengths from the 2018 Consent. Final agreement on the access track would be agreed with THC prior to commencement of construction.
- 2.4.17 Access track width for the Proposed Varied Development remains consistent with what was proposed within the Consented Scheme. Maximum width of tracks would be 6 m with 0.5 m hardstrip on each side as shown in Figure 2.8 (EIA: Volume 3a).

Yellow Bog Road

- 2.4.18 In addition to the tracks listed in Table 2.3, it is proposed to utilise an existing interlinking road between the two sides of the main site, known as 'Yellow Bog Road'. It is proposed to undertake minor upgrades of this track by improving the existing surface with compacted crushed stone. The length of this track is approximately 1.5 km.
- 2.4.19 The 2018 Consent permits the use of Yellow Bog Road, which links the eastern and western legs of the main site, for 4 x 4 vehicles only. Habitat surveys of Yellow Bog Road have been carried out and, given the extent of non-qualifying habitat either side of the existing track, it is proposed that some upgrades to the track would take place to facilitate the initial delivery of plant to the western side of the main site, and two cable circuits would be laid adjacent to the road. Details of the work proposed on Yellow Bog road is presented in Technical Appendix 9.4 (EIA Volume 4). The use of Yellow Bog Road is not proposed to facilitate turbine deliveries.

LiDAR

- 2.4.20 Two permanent LiDARs are proposed for wind measurement and their locations are shown on Figure 2.1 (EIA Volume 3a: Figures). Figure 2.11 (EIA Volume 3a: Figures) presents the LiDAR layout. It is proposed that LiDAR A would be located to south east of T35 and LiDAR B would be located to the west of T70. It is believed that replacing the permanent met masts with LiDAR provides the following benefits:
- LiDAR can measure at higher heights-typically up to 200 m;
 - shallower and smaller concrete plinths typically required when compared to a met mast;
 - less susceptible to icing; and
 - eliminates the requirement for working at height.

2.5 Grid Connection and Wind Farm Array Circuit

- 2.5.1 The grid connection between the Proposed Varied Development and the existing substation at Strathy North wind farm would utilise a 132 kV underground cable connection. The cable, along the Strathy South access track, would be laid within the same footprint as identified for the Consented Scheme. All cabling between the Proposed Varied Development and the substation at Strathy North wind farm would be carried out under permitted development rights but has been considered within this EIA to align with previous information submitted in support of the Consented Scheme.
- 2.5.2 The estimated total length of cable trenches on-site would be approximately 25.2 km. In keeping with the 2018 Consent, it is proposed that open cut trenching would be used where cable ploughing techniques are not deemed to be suitable. Within the Proposed Varied Development these would tend to be installed adjacent to roads, where reasonably practicable.
- 2.5.3 As detailed in the 2013 ES Addendum and agreed at PLI, the required grid connection between the site and Strathy North wind farm substation would run immediately adjacent to the west of the

proposed route between Strathy Wood and Strathy South Forest Plantation. As per the 2018 Consent, wherever possible, this would be restricted to disturbed habitat, to minimise the length of cable passing through qualifying habitats.

- 2.5.4 The grid connection for the Consented Scheme comprised four underground 33 kV cable circuits, installed 1.5 m apart. In order to maintain the same footprint whilst supporting the increased output of the Proposed Varied Development, the grid connection would now comprise one 132 kV underground cable (EIAR Volume 3a: Figure 2.13). Cable burial would be carried out in a manner which minimises disturbance to the qualifying habitats and most of the work would be undertaken using machinery working on the adjacent existing track.
- 2.5.5 An Appropriate Assessment was carried out as part of the 2013 ES Addendum in respect of the cabling that was proposed between Strathy North wind farm and the site, through areas of SPA/SAC designation. This was deemed to be relevant for the Proposed Varied Development as the footprint of the cable works remains unchanged from what is consented. An updated assessment on the impact of the access track and proposed grid connection is contained within Technical Appendix 9.4 (EIAR Volume 4).
- 2.5.6 The Consented Scheme proposed to run two cable circuits within the existing Yellow Bog Road track, following further investigatory works, it has been identified that the habitat adjacent to the existing track is disturbed and could be utilised for the cable circuits. Full details of the assessment to determine the impacts on the Caithness and Sutherland Peatlands SPA are provided in Chapter 9: Ecology (non-avian) and Technical Appendix 9.4 (EIAR Volume 4).

2.6 Enabling Works

- 2.6.1 To facilitate the construction of the Proposed Varied Development, the following enabling works are envisaged to take place prior to the commencement of construction of the main site:
- Construction of approximately 1.3 km of new access track from Strathy North wind farm to the site including a new bridge over the River Strathy;
 - Upgrading of circa 2.3 km of existing forestry track; and
 - Installation of underground wind farm HV cabling required from the site to the existing substation at Strathy North wind farm along the new/upgraded tracks.
- 2.6.2 It is proposed that the enabling works on the main access track would be completed ahead of the site investigation works for the site as a way of avoiding impacts on the adjacent SAC. By completing the main access track the Applicant would remove the need for large numbers of passing places and it would also allow for a smaller working corridor. Refer to Technical Appendix 9.4 (EIAR Volume 4) for the assessment.

2.7 Construction Phase Components

Principal Site Operations

- 2.7.1 Construction on-site would consist of the following principal operations:
- Excavation of aggregates from on-site borrow pits for track, turbine base and hardstanding construction;
 - Construction of site tracks within the site;
 - Construction of temporary hardstanding and temporary office and welfare facilities;
 - Construction of turbine foundations;
 - Construction of permanent crane hardstandings;
 - Excavation of trenches and cable laying within or adjacent to site tracks, as relevant;
 - Connection of distribution and telecommunications cables;

- Erection and commissioning of turbines;
- Reinstatement of borrow pits and the temporary construction compound areas; and
- Construction of substation.

Borrow Pits

- 2.7.2 The number of borrow pits required for the Proposed Varied Development is seven and the most likely locations are shown on Figure 2.1 (EIAR Volume 3a: Figures). Ground investigation would be undertaken to determine that the quantity and quality of stone properties are suitable for use in the construction of proposed access tracks and hard standings. The proposed borrow pit design is shown in Figures 2.14(a) to (g) (EIAR Volume 3a: Figures), and details of the borrow pits required to construct the Proposed Varied Development can be found in Technical Appendix 2.2: Borrow Pit Appraisal (EIAR Volume 4). The Borrow Pit Appraisal provides the initial assessment of the aggregate requirements and identifies potential borrow pits suitable for providing the aggregate required.

Construction Compounds and Laydown Areas

- 2.7.3 One construction compound, located in the eastern area of the site (EIAR Volume 3a: Figure 2.1), has been identified for the Proposed Varied Development and an indicative layout is presented on Figure 2.15 (EIAR Volume 3a). As highlighted in Section 2.3 above, one of the laydown areas remains unchanged from the Consented Scheme, the other has been relocated to the east of the track between T11 and T17 (EIAR Volume 3a: Figure 2.1).

Concrete Batching Plant

- 2.7.4 As for the Consented Scheme, it is likely that concrete would be batched on-site. The batching plant would comprise aggregate and cement hoppers, water bowsers/tanks, a mixer, and control cubicle. Aggregates would be stockpiled adjacent to the plant. The concrete batching plant would have dimensions of approximately 100 m x 100 m. The proposed location for the Concrete Batching Plant is shown in Figure 2.1 (EIAR Volume 3a: Figures).

Construction Programme

- 2.7.5 The proposed construction programme is shown below. It is estimated that at the peak of construction activities, in 2024, the workforce would be approximately 150 individuals, this would include foresters, civils contractors, turbine contractors, electrical contractors and project management staff.

	2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Enabling Works												
Construction												
Turbine Deliveries												
Turbine Installation												
Commissioning												
First Energy												

2.8 Construction Working Practices

Construction Environmental Management Plan

- 2.8.1 An outline Construction Environmental Management Plan (CEMP) has been provided as EIAR Volume 4: Technical Appendix 2.1. The CEMP provides outline information on the proposed working methods to be used during construction to avoid, reduce or control the potential associated adverse environmental effects. The CEMP would form part of the contract of documents between the Applicant and the appointed construction contractor. The CEMP would be updated to provide any additional site-specific information obtained during pre-construction surveys as part of the detailed design stage.

Construction Working Hours

- 2.8.2 Construction activities would be limited to the working hours of 0700 to 1900 Monday to Friday, and 0700 to 1200 on Saturday. However, to ensure that optimal use is made of fair-weather windows and daylight, or at critical periods within the programme, it could be necessary to work out with these hours and on Sundays. In particular it could be necessary to make use of low wind speed weather windows during turbine installation. During turbine erection, it is anticipated that work would progress 24 hours per day, and seven days per week using a shift working pattern.

Site Reinstatement

- 2.8.3 Reinstatement works would take place during construction and immediately post-construction and aim to address any areas of ground disturbance and changes to the landscape as part of the construction works. Reinstatement would be undertaken as soon as possible following the construction works in each area, such as:
- Areas disturbed by turbine foundation excavation;
 - Laydown areas;
 - Site compounds and substation; and
 - Borrow pits.
- 2.8.4 An extensive Habitat Management Plan (HMP) was agreed for the Consented Scheme and would be honoured, as updated, for the Proposed Varied Development. An updated version of the Strathy South HMP can be found in Technical Appendix 9.5: Strathy South Wind Farm Outline Habitat Management Plan (EIAR Volume 4).

2.9 Site Operation and Maintenance

Site Operations

- 2.9.1 The Proposed Varied Development has been designed with an operational life of approximately 50 years. Turbines would operate automatically responding via control systems to changes in wind speed and direction. The Proposed Varied Development would be connected to a remote-control room, as well as an on-site building, from where output and key alarms would be monitored.
- 2.9.2 Routine maintenance and servicing would be carried out on each turbine approximately every six months, in addition to the initial service three months after commissioning. On average two people would take five days to service each turbine.
- 2.9.3 At regular periods, oil and components would require changing, increasing the service time per machine. Gearbox oil changes would be required approximately every 20 months. Blade inspections would be carried out as required. Appropriate maintenance works would be carried out immediately following any unexpected events on site, such as failure of a generator or gearbox.
- 2.9.4 There would be regular safety inspections, maintenance of tracks, fencing and other infrastructure.

2.10 Site Decommissioning

2.10.1 Detailed decommissioning proposals would be established and agreed with the relevant authorities prior to commencement of decommissioning activities.

2.10.2 Decommissioning of the Proposed Varied Development would be undertaken at the end of its 50 year operational lifespan. This is anticipated to involve:

- Decommissioning and removal of the turbines and on-site substation;
- removal to 1m below ground level of the turbine foundations;
- removal of substation building foundations; and
- reinstatement of all land affected, in accordance with the best practise at the time.

2.10.3 It is not anticipated that the access tracks or underground cabling would be removed.

2.11 Waste Management

2.11.1 In accordance with industry best practice, the Applicant requires a Site Waste Management Plan (SWMP) (EIAR Volume 4: Technical Appendix 2.1: CEMP, Section 6).

2.11.2 The SWMP would provide details on how waste reduction would be implemented at the site and also how this is would be monitored throughout the construction phase. The contractor nominates a site representative who would take responsibility for implementation and monitoring of the SWMP.

2.11.3 The contractor would provide details of their proposed waste contractors (carriers, transfer station, waste recipient etc) as part of the SWMP, according to the provisions of the contract.

2.11.4 The requirements of the SWMP would be communicated to all site operatives during their induction. Furthermore, all operatives on-site would attend waste reduction toolbox talks on a monthly basis to increase awareness of recycling/waste reduction.

2.11.5 The contractor would provide adequate numbers of separate bins (e.g. for paper, cans/plastic, kitchen waste etc) and skips / waste containers (e.g. for wood, metal, hazardous waste, general waste) to facilitate waste segregation and recycling. The contractor would also provide a site plan showing all waste disposal and recycling locations.

2.11.6 The contractor's environmental site representative would be responsible for regular checks on compliance with the SWMP and highlight any non-compliance.

Anticipated Waste Streams

2.11.7 A number of different waste streams would be likely to arise during construction of the Proposed Varied Development. The contractor would identify all waste streams and provide an estimate of expected waste volumes for each waste type generated within the waste stream. Possible waste streams arising from the site could include food waste, paper, plastics, glass and other typically domestic refuse and sewage, concrete, waste chemicals, fuel and oils, packaging, e.g. paper, plastics and wood, waste metals, polluted water from plant, vehicle and wheel washes.

2.11.8 The contractor would ensure that all relevant information would be taken into account when preparing the SWMP (for example intrusive ground investigation data, supply chain assessments, options appraisals etc).

2.12 Peat Management

2.12.1 A comprehensive programme of soils and peat probing has been completed across the site, and further peat probing was completed in 2019 and 2020 to inform the updated Stage 1 Peat Management Plan (PMP) for the Proposed Varied Development (EIAR Volume 4: Technical Appendix 10.2). It is anticipated that peat excavation on-site would be reused without creating

surplus materials which would be required to be classified as waste. The PMP would be refined and updated alongside the CEMP and agreed with SEPA and relevant consultees prior to construction commencing.

2.13 Forest Removal

- 2.13.1 Forest felling would be phased, with priority given to removal of those sub-compartments where there is significant remaining peatland vegetation. This early removal is in response to consultation with SNH and aims to halt any further damage to peatland habitats from tree growth/canopy closure in these areas, and initiate restoration as early in the process as possible. Full details of felling proposals are contained in Technical Appendix 9.6: Strathy South Forestry Management Plan (EIAR Volume 4).

3. COMPARATIVE ENVIRONMENTAL ASSESSMENT

3.1 Introduction

- 3.1.1 Regulation 28(2)(c)(i) of the 2017 EIA Regulations requires that this EIAR includes a description of *“the main respects in which the developer considers that the likely significant effects on the environment of the proposed varied development would differ from those described in any EIA report or environmental statement, as the case may be, that was prepared in connection with the relevant section 36 consent.”* This Chapter provides a summary comparative environmental assessment to address the Regulation 28 requirement, drawing together the conclusions from the subsequent technical assessment topic chapters; (EIAR Volume 2: Chapters 4 – 12).
- 3.1.2 While Regulation 28 makes reference to reporting how the effects of the Proposed Varied Development would differ from those reported in previous EIA reports or environmental statements, it is noted that: (i) the 2007 ES reported predicted significant residual effects associated with a 77 turbine layout; (ii) the 2013 ES Addendum reported predicted significant residual effects associated with a 47 turbine layout; and, (iii) the 2014 Further Information Report (FIR) reported predicted significant residual effects associated with the 39 turbine layout (i.e. the Consented Scheme). As a result, this EIAR required the completion of a four-step process which is presented in Section 1.7 of Chapter 1 (EIAR Volume 2) to enable a comparative environmental assessment to be carried out in the most helpful and accurate way by ensuring that it is a like for like comparison.

3.2 Summary of Predicted Significant Effects as a Result of Proposed Changes

- 3.2.1 Table 3.1 provides a summary of the predicted significant residual environmental effects identified for the Consented Scheme. This is based on using either the previously reported predicted significant residual environmental effects from one of the environmental statement reports listed in paragraph 3.1.2 above (which are presented in Column A of Table 3.1), or, an updated assessment of predicted significant residual environmental effects of the Consented Scheme (which are presented in Column B of Table 3.1). The assessed predicted significant residual environmental effects for the Proposed Varied Development, reported in this EIAR, are then summarised in Column C of Table 3.1. The differences in the predicted significant residual effects as a result of the proposed variations to the 2018 Consent (as detailed in Table 2.2 in Chapter 2: Description of Development (EIAR Volume 2), are provided in the ‘conclusion/explanation’ column (Column D). A cross-reference is provided, where relevant, to additional supporting detail.
- 3.2.2 Table 3.1 is structured to provide a summary for each technical assessment chapter and a row for each of the different development phases (the information presented in Table 3.1 is a copy of the comparative assessment tables presented in each of the technical assessment topic chapters i.e. EIAR Volume 2: Chapters 4 – 12). In summary, the comparative assessment concludes that there are no material changes to the following topics:
- Ornithology (all development phases);
 - Noise (all development phases);
 - Cultural Heritage (all development phases);
 - Roads and Traffic (all development phases);
 - Ecology (all development phases);
 - Soils and Water (all development phases);
 - Socio-Economics, Recreation and Tourism (all development phases); and
 - Other Issues: Climate Change (cumulative construction and cumulative operational phases).

- 3.2.3 In addition, it is recognised that the concept of “factors” was introduced under Regulation 4(3) and paragraph 4 of Schedule 4 to, the 2017 EIA Regulations, which was not previously part of environmental impact assessment process under the now revoked Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (“the 2000 EIA Regulations”). The 2000 EIA Regulations governed the information to be included in the 2007 ES, 2013 Addendum and 2014 FIR and as a consequence that EIA work did not include an assessment of direct and indirect significant residual effects on the factors specified in Regulation 4(3) and the interaction between these changes. Consequently, a direct comparison is not possible in this regard. Consideration of this information is presented in Chapter 14 (EIAR Volume 2) in order to describe how this EIAR addresses the factors introduced by the 2017 EIA Regulations.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Chapter 4: Landscape and Visual Amenity¹				
Construction				
Predicted significant residual construction effects on landscape receptors.	N/A	Predicted significant residual construction effects were identified for the following landscape receptors: - Bens Grian and Loch nan Clar Special Landscape Area (SLA) (Moderate); - Localised parts of the Lone Mountains Landscape Character Type (LCT) (138) (Minor (localised Moderate)); and - Sweeping Moorland and Flows LCT (134) (Moderate).	Predicted significant residual construction effects were identified for the following landscape receptors: - Bens Grian and Loch nan Clar SLA (Moderate); - Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate)); - Sweeping Moorland and Flows LCT (134) (Moderate); and - Localised parts of the Wild Land Area (WLA) 39: East Halladale Flows Wild Land Area (Minor (localised Moderate)).	Additional significant effects were identified for very localised parts of WLA 39: East Halladale Flows Wild Land Area. Effects across the wider WLA are considered to be Minor. This would represent a material change. However, it is considered that, whilst limited significant effects would be likely to the strength of wildness and the strength of some of the Key Qualities within WLA 39, the integrity of the WLA would not be affected. Other areas which were identified as experiencing significant effects due to the Consented Scheme would continue to experience these at a similar level as a result of the Proposed Varied Development. This would not represent a material change.

¹ A summary of the findings of the 2013 Addendum and 2014 FIR are not presented in Table 3.1 (Column A). Given the changes to identified receptors, baseline and assessment methodology guidance, the findings are not directly comparable with the assessment of Proposed Varied Development. The Consented Scheme has therefore been assessed against the 2019 baseline (Column B).

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Predicted significant residual construction effects on visual receptors.	N/A	Predicted significant residual construction effects were identified for the following visual receptors: - Viewpoint (VP) 1: Ben Griam Beg (Major); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Major).	Predicted significant residual construction effects were identified for the following visual receptors: - VP1: Ben Griam Beg (Major); - VP3: Loch nan Clach Geala (Moderate); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1) (Negligible (localised Minor-Moderate or localised Moderate)); - Localised parts of the A836 Tongue to Detailed Study Area (Negligible (localised Moderate)); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Major).	Significant effects were identified for four receptors as a result of the Consented Scheme. Additional significant effects resulting from the Proposed Varied Development were identified for one VP and localised parts of two routes. Given the change from not significant to significant for these receptors this would be considered a material change. However, when viewed in the context of the overall scheme they would represent a small change to the overall effects.
Operation				

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Predicted significant residual operational effects on landscape receptors.	N/A	Predicted significant residual operational effects were identified for the following landscape receptors: - Bens Griam and Loch nan Clar SLA (Moderate); - Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate); and - Sweeping Moorland and Flows LCT (134) (Moderate).	Predicted significant residual operational effects were identified for the following landscape receptors: - Bens Griam and Loch nan Clar SLA (Moderate); - Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate)); - Sweeping Moorland and Flows LCT (134) (Moderate); and - Localised parts of the WLA 39: East Halladale Flows Wild Land Area (Minor (localised Moderate))). Predicted significant residual operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development. - The Lone Mountains Landscape Character Type LCT (138) (Moderate);	Additional significant effects were identified for localised parts of WLA 39: East Halladale Flows Wild Land Area. Effects across the wider WLA would be considered to be Minor. This would represent a material change. However, it is considered that, whilst limited significant effects would be likely to the strength of wildness and the strength of some of the Key Qualities within WLA 39, the integrity of the WLA would not be affected. In addition to the Moderate effects identified for the Sweeping Moorland and Flows LCT (134) as a result of the Consented Scheme, it is expected that localised areas of the receptor would experience Major effects as a result of the Proposed Varied Development. This would not represent a material change. Other areas which were identified as experiencing significant effects due to the Consented Scheme would continue to experience these at a similar level as a result of the Proposed Varied Development. This would not represent a material change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
			- The Rounded Hills – Caithness and Sutherland LCT (135) (Moderate); - The Sweeping Moorlands and Flows LCT (134) (Moderate); and - Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA) (Minor (localised Moderate)).	In the absence of an agreed scheme of mitigation, aviation lighting effects would result in significant effects. The Applicant is engaging with aviation stakeholders and the Civil Aviation Authority (CAA) to agree an aviation lighting solution which could result in a reduced visual effect.
Predicted significant residual operational effects on visual receptors.	N/A	Predicted significant residual operational effects were identified for the following visual receptors: - VP1: Ben Griam Beg (Major); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Moderate).	Predicted significant residual operational effects were identified for the following visual receptors: - VP1: Ben Griam Beg (Major); - VP3: Loch nan Clach Geala (Moderate); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1) (Negligible	Significant effects were identified for four receptors as a result of the Consented Scheme. Additional significant effects resulting from the Proposed Varied Development were identified for one VP and localised parts of two routes. Given the change from not significant to significant for these receptors this would be considered a material change. However, when viewed in the context of the overall scheme they would represent a small change to the overall effects. In the absence of an agreed scheme of mitigation, aviation lighting effects would result in significant effects. The Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting

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			(localised Minor-Moderate or localised Moderate); - Localised parts of the A836 Tongue to Detailed Study Area (Negligible (localised Moderate); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Moderate). Predicted significant residual operational effects were identified for the following visual receptors as a result of aviation lighting on the Proposed Varied Development. - VP3: Loch nan Clach Geala (Moderate); - VP4: East of Melvich (Moderate); - VP5: Strathy (Moderate); - VP7: A836 west of B871 (Moderate); - VP10: Beinn Ratha (Moderate); - VP11: Forsinard (Moderate);	solution which could result in a reduced visual effect.

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			- Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Moderate – Major); - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1) (Minor (localised Moderate)); - Localised parts of the A897 (Minor (localised Moderate)); - Localised parts of the B871 (North) (Minor (localised Moderate)); - Localised parts of Strathy (North of the A836 and east of the River Strathy) (Minor (localised Moderate)); and - Localised parts of Strathy (South of the A836 and east of the River Strathy) (Minor (localised Moderate)).	
Decommissioning				
	N/A	N/A	N/A	Decommissioning effects were scoped out of the assessment of the Proposed

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				Varied Development and the Consented Scheme for the reasons discussed in paragraphs 4.7.5, 4.8.6 and 4.9.109 of Chapter 4: LVIA (EIAR Volume 2).
Cumulative Construction				
	N/A	Scoped out, given the improbability that any additional significant effects would be experienced as a result of the smaller sized turbines for the Consented Scheme.	The Cumulative Landscape and Visual Impact Assessment (CLVIA) of the Proposed Varied Development found that potential significant construction effects would be limited to VP1: Ben Griam Beg (Moderate).	Significant construction effects resulting from the Proposed Varied Development were identified for one VP and this would be considered a material change. However, when viewed in the context of the overall scheme this represents a small change to the overall effects.
Cumulative Operation				
	N/A	Scoped out, given the improbability that any additional significant effects would be experienced as a result of the smaller sized turbines for the Consented Scheme.	The CLVIA of the Proposed Varied Development found that potential significant operational effects would be limited to VP1: Ben Griam Beg (Moderate).	Significant operational effects resulting from the Proposed Varied Development were identified for one VP and this would be considered a material change. However, when viewed in the context of the overall scheme this represents a small change to the overall effects.
Chapter 5: Ornithology				
Construction				
Disturbance to breeding birds from noise and other construction activities.	No significant residual effects predicted.	N/A	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as	No material change to the residual effect, taking account of the additional construction activity associated with the

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	A	B	C	D
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			Moderate (not significant) and as Moderate/Minor (not significant) for all other species.	up-grading of the Yellow Bog track, and of previously un-recorded possible breeding or roosting presence of one barn owl pair on site.
Disturbance to non-breeding birds from noise and other construction activities.	No significant residual effects predicted.	N/A	Residual effect of the Proposed Varied Development assessed Minor (not significant) .	No material change to the residual effect, taking account of the additional migratory wildfowl recorded and non-breeding season presence of white-tailed eagle.
Displacement of birds from habitat on-site and adjacent to the site.	No significant residual effects predicted.	N/A	Residual effect of the Proposed Varied Development to protected birds are assessed as Moderate/Minor (not significant) for all species.	No material change to the residual effect.
Operation				
Displacement of birds from habitat on-site and adjacent to the site.	No significant residual effects predicted.	N/A	Long-term effect of the Proposed Varied Development to protected birds are assessed as Minor Beneficial (not Significant) .	The Outline Habitat Management Plan (HMP) (EIAR Volume 4: Technical Appendix 9.5) seeks to implement landscape scale peatland restoration within the Strathy South conifer plantation for the 50-year lifespan of the Proposed Varied Development. This commitment will see improvements to habitats present through substantial increases in their quality and quantity, becoming suitable over time for colonisation by SPA qualifying species,

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				notably waders. Consequently, the residual effects of the Proposed Varied Development to habitats during the Operational Phase are assessed conservatively as Minor Beneficial (not Significant). No material change to the residual effect.
Collision risk to red-throated and black-throated divers during the breeding season.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not Significant) .	No material change to the residual effect.
Collision risk to hen harrier during the breeding season.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed Moderate/Minor (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.
Collision risk to short-eared owl during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as None (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.
Collision risk to merlin during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as None (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.

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	A	B	C	D
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Collision risk to golden eagle during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.
Collision risk to other qualifying species during the breeding season, including greenshank and other waders.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not Significant) .	No material change to the residual effect.
Collision risk to breeding greylag goose.	The 2013 ES Addendum predicted no significant residual effects on breeding greylag goose. SNH's advice post-submission was that the Consented Scheme would have a significant effect on the breeding greylag goose qualifying feature of the Caithness and Sutherland Peatlands Ramsar site. However, SNH also advised that this significant effect would not adversely affect the integrity of the Ramsar site based on the factors/considerations in the	Impact of the Consented Scheme on this species assessed as Negligible Adverse (not Significant) .	Residual effect of the Proposed Varied Development on this species assessed as Moderate (not Significant) . This residual effect applies to the species and to the breeding population as a qualifying feature of the Caithness and Sutherland Peatlands Ramsar site.	No material change to the residual effect.

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	decision letter from the Scottish Ministers.			
Collision risk to breeding season and non-breeding season white-tailed eagle.	Negligible baseline flight activity. No significant residual effects predicted.	Impact of the Consented Scheme on this species assessed as of Moderate magnitude and moderate significance (not significant) .	Residual effect of the Proposed Varied Development on this species assessed as of Moderate magnitude and moderate significance (not significant) .	Flight activity has increased compared to previous baseline as the white-tailed eagle population has expanded in numbers and distribution. The number of flights recorded during all surveys is still very low however, and ‘at risk flights’ are even more infrequent. In 2019 there were too few breeding season flights to justify collision risk modelling (only two VP flights during the whole breeding season). From the four breeding season ‘at risk’ flights in 2018, the modelled breeding season collision risk is very low, the Consented Scheme and Proposed Varied Development being 0.0076 birds a breeding season compared to 0.0140, based on 2018 flight activity. Non-breeding flights generated a higher predicted collision rate for both the Consented Scheme and the Proposed Varied Development (0.5792 birds compared to the Proposed Varied Development 0.8653 birds a non-breeding season). Again, however, the relatively small number of flights mean that Collision Risk Modelling (CRM)

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				outputs are susceptible to relatively large margins of error, being based on a small sample size and the particular characteristics of the flights that did occur. They are not statistically robust, given the small sample or indicative of the actual likelihood of collision. The difference in predicted collision risk values arises because fewer flights are ‘at risk’ with the Consented Scheme’s smaller turbine dimensions than with the Proposed Varied Development, as would be expected. The residual effect of the Consented Scheme and Proposed Varied Development on this species is assessed as Moderate (not significant).
Collision risk to whooper swans over the non-breeding season.	Negligible baseline flight activity. No significant residual effects predicted.	Impact of the Consented Scheme on this species assessed as Moderate/Minor (not significant) .	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not significant) .	No material change to the residual effect.
Collision risk to pink-footed geese over the non-breeding season.	Negligible baseline flight activity. No significant residual effects predicted.	Impact of the Consented Scheme on this species assessed as Moderate/Minor (not significant) .	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not significant) .	No material change to the residual effect.
Displacement to SPA qualifying species.	Impact of the Consented Scheme assessed as	N/A	Residual effect of the Proposed Varied Development on SPA	No material change to the residual effect.

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	Moderate/Minor (not Significant).		species assessed as Moderate (not significant) for hen harrier and merlin, and as Moderate/Minor (not significant) for all other species.	
Decommissioning				
Disturbance and displacement of SPA qualifying species.	Decommissioning impacts were assessed as likely to be similar in nature to those of the Construction Phase. No significant residual effects predicted.	N/A	Decommissioning residual effects were assessed as likely to be similar in nature to those of the Construction Phase.	No material change to the residual effect.
Cumulative Construction				
Cumulative construction effects on disturbance and displacement SPA qualifying species.	Cumulative effects of consented and in planning developments going into construction with the Consented Scheme assessed as Moderate/Minor (not significant) for all species.	N/A	Cumulative effects from construction would realistically only arise if Strathy Wood wind farm's construction overlapped with the construction of Consented Scheme. In such an event, the effect has been assessed as Moderate/Minor (not significant) for all species.	No material change to the residual effect.

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Cumulative Operation				
Cumulative disturbance and displacement of SPA qualifying species.	No significant residual effects predicted.	N/A	Residual cumulative effect assessed as Moderate (not Significant) .	No material change to residual effects. The 50-year HMP for the Proposed Varied Development will, however, provide substantial benefits through longer term delivery of peatland habitat restoration (EIAR Volume 4: Technical Appendix 9.5).
Cumulative collision risk to SPA qualifying species during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual cumulative effects from operation on have been assessed as Moderate/Minor (not significant) or lower for all SPA qualifying species.	No material change to the residual effect.
Chapter 6: Noise				
Operation				
Operational noise effects on noise sensitive receptors	No significant residual effects.	N/A	No significant residual effects.	Predicted noise remains below site specific limits. No significant residual effects. Based on the candidate turbine used in this assessment the predicted operational noise levels at the Noise Assessment Locations are higher than presented in the 2014 FIR for the Consented Scheme, however, this does not change the outcome of the assessment that the Proposed Varied Development would result in no significant effects.

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Cumulative Operation				
Cumulative operational noise effects on noise sensitive receptors.	No significant residual effects.	N/A	No significant residual effects.	Predicted cumulative noise remains below total ETSU-R-97 limits ² . No significant residual effects.
Chapter 7: Cultural Heritage				
Construction				
Direct effects on known heritage assets on-site.	The 2013 ES Addendum concluded that direct effects on known heritage assets would be Negligible. This level of effect is not judged to be Significant in EIA terms.	N/A.	This assessment judged there to be no direct impacts on known heritage assets. This level of effect is not judged to be Significant in EIA terms.	The Proposed Varied Development infrastructure has been designed to avoid all known heritage assets. No material change.
Direct effects on hitherto unknown buried archaeological remains on-site.	The 2013 ES Addendum concluded direct effects on unknown heritage assets would be Negligible. This level of effect is not judged to be Significant in EIA terms.	N/A	This assessment judged there to be Low potential for hitherto unknown remains to survive on-site. The level of effect is not judged be Significant in EIA terms.	No material change.

² The Working Group on Noise from Wind Turbines ETSU for the Department of Trade and Industry (1996) ETSU-R-97 The Assessment and Rating of Noise from Wind Farms.

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Operation				
Setting effects on designated cultural heritage assets.	The 2013 ES Addendum judged there to be a Minor significance of effect on the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is not considered to be Significant in EIA terms.	N/A	This assessment considers there to be a Minor-moderate significance of effect in the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is not considered to be Significant in EIA terms.	No material change. The difference reported is due to terminology and methodology.
Cumulative Operation				
Cumulative operational setting effects.	The 2013 ES Addendum considered there to be a cumulative Minor-Major significance of effect on the setting of the Scheduled Ben Griam Beg (Site 15). The 2013 ES Addendum does not conclude whether this level of effect is Significant or not. A Minor level of effect would not be considered Significant, whereas a Major level of effect would be considered Significant.	N/A	This assessment considers there to be a cumulative Moderate significance of effect on the setting of Ben Griam Beg (Site 15). This level of effect is judged to be Significant in EIA terms.	No material change. The difference reported is due to terminology and methodology; however, there is no change to the overall significant effect.

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Chapter 8: Roads and Traffic				
Construction				
Driver Delay	No significant effects predicted.	No significant effects predicted.	No significant effects predicted.	No material change.
Road Safety	Not considered in the assessment.	No significant effects predicted.	No significant effects predicted.	No material change.
Community Effects	Not considered in the assessment.	No significant effects predicted.	No significant effects predicted..	No material change.
Physical Effects (wear and tear) of Heavy Goods Vehicle (HGV) (including abnormal load) Traffic on the Public Road Infrastructure	No significant effects predicted.	No significant effects predicted.	No significant effects predicted.	No material change.
Cumulative Construction				
Driver Delay	Not considered in the assessment.	No significant effects predicted.	No significant effects predicted.	No material change.
Road Safety	Not considered in the assessment.	No significant effects predicted.	No significant effects predicted.	No material change.
Community Effects	Not considered in the assessment.	No significant effects predicted.	No significant effects predicted.	No material change.
Physical Effects (wear and tear) of HGV (including	Not considered in the assessment.	No significant effects predicted.	No significant effects predicted.	No material change. It should be noted that the A9(T) is a strategic road with substantial residual

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abnormal load) Traffic on the Public Road Infrastructure.				capacity and designed to carry high level of HGV traffic. Based on site observations and professional judgement, the current standard of the A836 public road infrastructure is considered adequate to withstand the predicted 'wear and tear' of the construction traffic generated cumulatively by the developments. Nevertheless, practical precautions would be implemented to prevent damage to the public road network caused by construction related activities. Damage to the public road infrastructure which is agreed (between THC and the Developer) to be as a result of the Proposed Varied Development's construction activities would be made good; with the repairs implemented and/or funded by the Applicant.
Chapter 9: Ecology (non-avian)				
Construction				
Habitats Outwith the Caithness and Sutherlands Special Area of Conservation (SAC).	Direct and indirect impacts on non-designated habitats through installation of wind farm infrastructure (this includes all aspects of the	N/A	Impact of the Proposed Varied Development assessed as Negligible / Minor Beneficial (Not Significant)..	No material change. A small increase in habitat loss to blanket bog, wet heath and wet modified bog habitats has been identified. The effect of these impacts to such habitats continue to be similar to

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	Consented Scheme as assessed in the 2014 FIR). Likely Neutral / Minor Beneficial (Not Significant)			those identified for the Consented Scheme. The HMP for the Proposed Varied Development seeks to restore all current afforested peatland within the main wind farm area; consequently, the effect of any impact are assessed as Negligible / Minor Beneficial (not Significant). Residual effects assessed as Negligible / Minor Beneficial (Not Significant).
Habitats Within the Caithness and Sutherlands SAC.	Direct and indirect impacts on SAC- designated habitat through upgrading of the access track and installation of cable jointing areas along the grid connection between Strathy South Wind Farm and Strathy Wood. Neutral/Minor Beneficial (Not Significant).	N/A	Impact of the Proposed Varied Development is assessed as Negligible / Minor Beneficial (Not Significant).	No material change identified. Construction methods have been updated as detailed in Technical Appendix 9.4 (EIAR Volume 4) to reduce the potential impact of any identified effect from upgrading of the access track, in particular the Common Access passing through the SAC. The Yellow Bog track is included within the assessment of the potential effects to the SAC. A comparative assessment of both the proposed methods of construction for the Consented Scheme and the Proposed Varied Development has been completed, indicating a substantial decrease in the potential effects from the updated methods of construction even with the inclusion of the Yellow Bog access track.

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				Residual effects of the upgrade of the Common Access and Yellow Bog tracks to qualifying habitats of the SAC were assessed as Negligible/Minor Beneficial (not Significant) .
Protected Species	Disruption to protected fauna from: noise, habitat fragmentation, road related mortality, decrease in prey resources, changes to water quality, and habitat loss/change and disturbance during arising from construction activities. Predicted residual effects range from Neutral to Minor Adverse (Not Significant).	N/A	Predicted residual effects of the Proposed Varied Development to protected fauna are assessed Minor Adverse (Not Significant) .	No material change to the residual effect.
Aquatic Species	Effects to Aquatic Species are potentially from pollution events associated with construction of peat slides into watercourses. With mitigation predicted residual effects are Minor Adverse (Not Significant) .	N/A	Predicted residual effects of the Proposed Varied Development assessed Minor Adverse (Not Significant) .	No material change to the residual effect.

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Bats	Effects to bat species from the construction of the Consented Scheme were scoped out of the 2013 ES Addendum and 2014 FIR. The 2007 ES stated there would be no Significant negative residual effects on protected species .	N/A	Effects scoped in include disturbance to the Croft House bat roost, disruption, alteration and removal of foraging and commuting flight lines, and increased lighting to these flight lines during night-time working. Residual effects are assessed as Minor Adverse (Not Significant) .	Effects to bats were scoped out of the 2013 ES Addendum following assessments completed for the 2007 ES which found limited activity by bat species and low habitat suitability. Updated SNH Guidance and increased knowledge of the potential effects of wind farm development to bat species required impacts and the likely significant effects to be scoped in to this 2020 EIAR. Bats were found to be present on site utilising forestry edges, rides and watercourses across the site for foraging and commuting, with a roost identified at the Croft House in the south of the main wind farm area. Mitigation was identified including the sensitive design of the Phased Felling Plan to ensure forest edges are created a suitable distance from construction works, the potential reduction in night-time working, and the use of light deflectors to reduce lighting of suitable habitats if night time working is required. These measures would reduce the level of predicted significant construction effect to a Minor adverse (not Significant) .

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				Residual effects assessed as Minor adverse (Not Significant) .
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC.	Predicted residual effects from construction of the Consented Scheme were assessed as Not Significant if appropriate deer management activities are implemented prior to and during construction operations. Adverse (Not Significant) .	Residual effects would remain the same as deer populations have not altered in the intervening time period between assessments of the baseline.	With the implementation of a Deer Management Plan (DMP) the residual effects would be Negligible (Not Significant) .	No material change effects assessed as Negligible (Not Significant) with the implementation of appropriate mitigation.
Operation				
Habitats	Direct and indirect impact on both non-qualifying habitats and those associated with the SAC would be limited to ongoing operational and maintenance activities e.g. upgrading tracks & drainage works. Negligible adverse (Not Significant) .	N/A	Effects assessed as Minor Beneficial (Not Significant) .	Residual effects from the operation of the Proposed Varied Development would be similar in nature and magnitude as to those of the Consented Scheme and limited to small scale pollution incidents associated with maintenance activities. The residual effect for the Proposed Varied Development is assessed as Minor Beneficial (Not Significant) with the ongoing implementation of the Strathy South Outline HMP . This is not considered to be a material change.

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	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Protected Species	Operational effects to protected species from the Consented Scheme were determined to be Not Significant .	N/A	Effects to protected species are assessed as Negligible (Not Significant) .	No further surveys for protected species were completed for the Proposed Varied Development as no alterations to the protected species use of the main site have occurred since the submission of the Consented Development. Residual effects continue to be assessed as Not Significant .
Bats	Operational effects to bat species were scoped out of the Consented Scheme's assessment based on the limited habitat suitability and the 2007 assessment of their use of the site and surrounding area.	N/A	Residual effects of the operation of the Proposed Varied Development following the implementation of appropriate mitigation are assessed as Minor Adverse (Not Significant) .	Residual effects to bat species from the operation of the Proposed Varied Development were assessed following the latest SNH Guidance (2019) ¹ . Assessments found predicted likely significant effects for four of the five species of bats using the site. With the implementation of appropriate mitigation, the residual effects to these bat species are assessed as Minor Adverse (Not Significant) .
Aquatic Species	Operational effects following the implementation of suitable mitigation were assessed as Not Significant .	N/A	Operational effects of the Proposed Varied Development are assessed as Negligible (Not Significant) .	No material change.
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC.	Residual indirect effects on SAC-designated habitat by displaced deer from Strathy	Residual Indirect effects on SAC-designated habitat by displaced deer from Strathy South Forest based on	Residual effects are assessed as Negligible (Not Significant) .	No material change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
	South conifer plantation. Minor Adverse (Not Significant).	the 2019 baseline reported on in Technical Appendix 9.3 Minor Adverse (Not Significant).		
Decommissioning				
	Decommissioning residual effects were assessed as likely to be similar in nature to those of the Construction Phase.	N/A	Decommissioning residual effects were assessed as likely to be similar in nature to those of the Construction Phase.	No material change. The residual effects between both developments were assessed to remain unchanged. However, it should be noted that habitats and the use of the main site by protected species would alter substantially during the 50-year lifespan of the Proposed Varied Development (more markedly so than for the 25-year Consented Scheme) with restored peatland habitats being substantially more established through implementation of the 50-year HMP (EIAR Volume 4: Technical Appendix 9.5). Whilst no material changes to the effects of the Proposed Varied Development and the Consented Scheme are predicted, the true baseline of either development is unknown although residual effects would likely be similar to those as for the Construction Phase of each development.
Cumulative Construction				

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Habitats	Residual cumulative effects to habitats of the Caithness and Sutherland Peatlands SAC between the proposed Strathy Wood development and the grid connection for the Consented Scheme. Cumulative effects were not considered for the Consented Scheme.	N/A	Residual cumulative effects assessed as Negligible adverse (Not Significant) .	No material change. Reduced predicted effects from the different design of the grid connection and upgrading of the access track (see EIAR Volume 4: Technical Appendix 9.4), coupled with positive habitat restoration measures implemented by surrounding developments is likely to have a minor positive influence on habitats associated with the SAC. However, the management and timelines for construction of the Strathy Wood development are currently unknown, consequently residual cumulative effects remain as previously assessed for the Consented Scheme; Negligible adverse (Not Significant) .
	Cumulative direct and indirect residual effects on non-designated habitats through installation of wind farm infrastructure for those developments included in the cumulative assessment was not assessed for the Consented Scheme .	N/A	Residual cumulative effects assessed as Negligible (Not Significant) .	The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.4) would mitigate predicted effects on non-designated habitats for the Proposed Varied Development or Consented Scheme. Similarly, other developments within the 20 km cumulative assessment buffer, where effects to habitats have been predicted, would be required to implement suitable mitigation to reduce any likely significant effect. Consequently, the significance of the

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
				cumulative residual effect is likely to be Negligible (Not Significant) .
Protected Species	Effects to protected species including wildcat, otter, water vole, and pine marten. Residual cumulative effects are assessed as Minor Adverse (Not Significant) .	N/A	Residual cumulative effects are assessed as Minor Adverse (Not Significant) .	No material change.
Aquatic Species	Effects to fish species were assessed and it was noted that the potential for cumulative effects to these species existed, however no level of effect was attributed for the Consented Scheme.	N/A	Residual cumulative effects are assessed as Not Significant .	Although there exists the potential for cumulative effects from the developments within the Strathy catchment, the likelihood of large-scale pollution events occurring at the same time from a number of developments is low. Consequently, whilst the level of effect cannot be predicted, with appropriate mitigation implemented for all developments the residual effect is assessed as Not Significant .
Bats	Effects to bat species during construction of developments included in the cumulative assessment were not assessed for the Consented Scheme .	N/A	Residual effects assessed as Minor Adverse (Not Significant) .	Minor effects to bats within the local area are likely to be attributed to all developments within the cumulative assessment study area during their construction. Similarly, operational wind farms will continue to have an effect on bat species whilst the Proposed Varied

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
				Development is in construction. Although suitable mitigation would be implemented for new windfarm development where likely significant effects have been identified, there would still be effects to the local bat population; these cumulative residual effects are assessed as Minor Adverse (Not Significant) .
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC.	Effects of cumulative deer dispersal on the surrounding Caithness and Sutherland Peatlands SAC were not considered for the Consented Scheme.	N/A	Residual cumulative effects have been assessed as Not Significant .	Construction and operation of all developments within the cumulative assessment study area will cause dispersal of deer to surrounding habitats. Where deer are present a DMP for each development will have been produced to identify how such effects will be reduced. As such the cumulative effects during the construction phase of the Proposed Varied Development is assessed as Not Significant .
Cumulative Operation				
Habitats	Cumulative effects to habitats during the operational phase of the Consented Scheme were not assessed.	N/A	Residual cumulative effects are assessed as Negligible (Not Significant) .	Residual operational effects to habitats from all developments within the 20 km cumulative assessment boundary are likely to be limited to small scale operation maintenance and localised pollution incidents. The effects of these

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
				would be small either alone or in combination with one another were this to occur. As such the residual effect is assessed as Negligible (Not Significant) .
Protected Species	Cumulative residual effects to protected species including wildcat, otter, water vole and pine marten were assessed as Minor Adverse (Not Significant) .	N/A	Cumulative residual effects assessed as Minor Adverse (Not Significant) .	No material change.
Aquatic Species	Effects to fish species were assessed and it was noted that the potential for cumulative effects to these species existed, however no level of effect was attributed for the Consented Scheme.	N/A	Residual effects are assessed as Negligible (Not Significant) .	Cumulative operational effects are unlikely to occur between developments within the Strathy catchment. As such residual cumulative effects are assessed as Negligible (Not Significant) .
Bats	Effects to bat species during operation of developments included in the cumulative assessment were not considered for the Consented Scheme.	N/A	Residual cumulative effects assessed as Minor Adverse (Not Significant) .	Technical Appendix 9.2 (EIAR Volume 4) details the residual effects of the Proposed Varied Development in combination with surrounding developments taking into account data from these using the Ecobat tool. Mitigation includes both the design of the Phased Felling Plan EIAR Volume 4: Technical Appendix 9.6), the

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
				implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.4), and the sensitive design of turbine layout for the Consented Scheme and now Proposed Varied Development, to ensure suitable habitats for bat species are appropriately buffered. Full details of this assessment are included within Technical Appendix 9.2 (EIAR Volume 4). It is assumed that where bats are present in proximity to developments within a cumulative effect range, these developments would implement similar mitigation measures to reduce any effect to based species. Residual effects are therefore assessed as Minor Adverse (Not Significant) .
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC.	Effects of cumulative deer dispersal on the surrounding Caithness and Sutherland Peatlands SAC were not considered for the Consented Scheme.	N/A	Residual effects assessed as Minor Adverse for the first two years of operation, then Negligible (Not Significant) for the remaining lifespan of the Proposed Varied Development.	Construction and operation of all developments within the cumulative assessment study area will cause dispersal of deer to surrounding habitats. Where deer are present a DMP for each development will have been produced to identify how such effects will be reduced. Operational cumulative effects to the SAC would be greatest during the first two years of operation of the Proposed Varied Development as felling of the conifer

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
				plantation is completed and deer continue to disperse from the main site; effects through this period are assessed as Minor Adverse (Not Significant) . Following this initial two-year period effects are predicted to be Negligible (Not Significant) for the remainder of the Proposed Varied Development's lifespan.
Chapter 10: Soil and Water				
Construction				
Detrimental impacts on water quality onsite and downstream.	Minor Adverse (not significant).	N/A	Minor Adverse to No Significance.	No material change.
Detrimental impacts to fisheries onsite and downstream as a result of changes to water quality.	Minor Adverse (not significant).	N/A	Minor Adverse to No Significance.	No material change.
Increase to on-site and downstream flood risk as a result of poor construction practises (including poor construction of watercourse crossings).	Minor Adverse (not significant).	N/A	Minor Adverse to No Significance.	No material change.
Increase risk of peat slide risk as a result of poor construction and	Minor Adverse (not significant)..	N/A	Minor Adverse to No Significance.	No material change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
management of peat stockpiles.				
Increase risk of peat slide as a result of desiccation or wetting of peat.	Minor Adverse (not significant).	N/A	Minor Adverse to No Significance.	No material change.
Long-term degradation of peat as a result of interrupting surface and sub-surface drainage pathways. Disruption of drainage patterns can cause pooling and / or desiccation of peat.	Minor Adverse (not significant).	N/A	Minor Adverse to No Significance.	No material change.
Peat slide hazard rating of access tracks.	Not significant.	N/A	Not significant.	No material change.
Operation				
Peat slide hazard rating of access tracks.	Not significant.	N/A	Not significant.	No material change.
Detrimental impacts to onsite and downstream water quality through degradation of site infrastructure and poor storage of materials.	Minor Adverse (not significant).	N/A	Minor Adverse (not significant).	No material change.
Detrimental effects to onsite and downstream fisheries as a	Minor Adverse (not significant).	N/A	Minor Adverse (not significant).	No material change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
result of changes to water quality.				
Increases to on-site and downstream flood risk as a result of degradation of infrastructure and / or poor maintenance / monitoring of infrastructure.	Minor Adverse (not significant).	N/A	Minor Adverse (not significant).	No material change.
Decommissioning				
Detrimental impacts on water quality onsite and downstream.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant).	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Detrimental impacts to fisheries onsite and downstream as a result of changes to water quality.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant).	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Increase to on-site and downstream flood risk as a result of poor construction practises (including poor construction of watercourse crossings).	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant).	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Increase risk of peat slide risk as a result of poor construction and	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant).	Decommissioning effects were not previously assessed. However, the

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
management of peat stockpiles.				Proposed Varied Development would not result in significant effects.
Increase risk of peat slide as a result of desiccation or wetting of peat.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant).	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Long-term degradation of peat as a result of interrupting surface and sub-surface drainage pathways. Disruption of drainage patterns can cause pooling and / or desiccation of peat.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant).	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Cumulative Construction				
Generation of pollution.	Not significant.	N/A	Not significant.	No material change.
Erosion and sedimentation.	Not significant.	N/A	Not significant.	No material change.
Drainage and dewatering.	Not significant.	N/A	Not significant.	No material change.
Cumulative Operation				
Generation of pollution.	Not significant.	N/A	Not significant.	No material change.
Erosion and sedimentation.	Not significant.	N/A	Not significant.	No material change.
Drainage and dewatering.	Not significant.	N/A	Not significant.	No material change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Chapter 11: Socioeconomics, Recreation and Tourism				
Construction				
Tourism and Recreation.	Negligible (not significant).	Not Assessed	Negligible (not significant).	No Material Change.
Economic Impact in Caithness and Sutherland.	Temporary beneficial (not significant).	Temporary minor beneficial (not significant).	Temporary minor beneficial (not significant).	No Material Change.
Economic Impact in Highland.	Not Assessed.	Temporary minor beneficial (not significant).	Temporary minor beneficial (not significant).	No Material Change.
Economic Impact in Scotland.	Not Assessed.	Temporary negligible beneficial (not significant).	Temporary negligible beneficial (not significant).	No Material Change.
Operation				
Tourism	Negligible (not significant).	Not Assessed	Negligible (not significant).	No Material Change.
Economic Impact in Caithness and Sutherland.	Negligible (not significant).	Minor beneficial (not significant).	Minor beneficial (not significant).	No Material Change.
Economic Impact in Highland.	Not Assessed.	Negligible Beneficial (not significant).	Negligible Beneficial (not significant).	No Material Change.
Economic Impact in Scotland.	Not Assessed.	Negligible Beneficial (not significant).	Negligible Beneficial (not significant)..	No Material Change.
Payment of Non-Domestic Rates.	Not Assessed.	Negligible Beneficial (not significant).	Negligible Beneficial (not significant)	No Material Change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Decommissioning				
Economic Impact in Caithness and Sutherland.	Not Assessed.	Temporary minor beneficial (not significant).	Temporary minor beneficial (not significant).	No Material Change.
Economic Impact in Highland.	Not Assessed.	Temporary negligible beneficial (not significant).	Temporary negligible beneficial (not significant).	No Material Change.
Economic Impact in Scotland.	Not Assessed.	Temporary negligible beneficial (not significant).	Temporary negligible beneficial (not significant).	No Material Change.
Cumulative Construction				
Economic Impact in Caithness and Sutherland.	Not Assessed.	Temporary minor beneficial (not significant).	Temporary minor beneficial (not significant).	No Material Change.
Economic Impact in Highland.	Not Assessed.	Temporary minor beneficial (not significant).	Temporary minor beneficial (not significant).	No Material Change.
Economic Impact in Scotland.	Not Assessed.	Temporary negligible beneficial (not significant).	Temporary negligible beneficial (not significant).	No Material Change.
Cumulative Operation				
Economic Impact in Caithness and Sutherland.	Not Assessed.	Minor beneficial (not significant).	Minor beneficial (not significant).	No Material Change.
Economic Impact in Highland.	Not Assessed.	Negligible Beneficial (not significant).	Negligible Beneficial (not significant).	No Material Change.
Economic Impact in Scotland.	Not Assessed.	Negligible Beneficial (not significant).	Negligible Beneficial (not significant).	No Material Change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Chapter 12: Other Issues				
Construction				
Climate Change Resilience.	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate Climate Change Resilience assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
In-Combination Climate Change Impacts.	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate ICCI assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
Influence of the Proposed Development on Climate Change.	The results of the carbon calculator for the Consented Scheme concluded that the carbon payback period would be expected to be 1.1 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 228,808 tonnes of carbon dioxide per year (tCO ₂ yr ⁻¹).	A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line with the current guidance using the latest version of the carbon calculator tool. An updated carbon calculator assessment has been undertaken to assess the impact on carbon payback	The results of the carbon calculator for the Proposed Varied Development concluded that the carbon payback period would be expected to be 1.5 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 387,420 tCO ₂ yr ⁻¹ .	The main difference in the carbon payback period is due to the increase in losses of carbon dioxide associated with the Proposed Varied Development compared to the Consented Scheme. However, estimated expected carbon dioxide savings for the Proposed Varied Development are 69% more than those for the Consented Scheme. This difference in carbon dioxide savings between the two schemes is considered to be a material change.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
		time for the Proposed Varied Development.		
Operation				
Climate Change Resilience.	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate Climate Change Resilience assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
In-Combination Climate Change Impacts.	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate In-Combination Climate Change Impacts (ICCI) assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
Influence of the Proposed Development on Climate Change.	The results of the carbon calculator for the Consented Scheme concluded that the carbon payback period would be expected to be 1.1 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 228,808 tCO ₂ yr ⁻¹ .	A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line with the current guidance using the latest version of the carbon calculator tool. An updated carbon calculator assessment has been undertaken to	The results of the carbon calculator for the Proposed Varied Development concluded that the carbon payback period would be expected to be 1.5 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 387,420 tCO ₂ yr ⁻¹ .	The main difference in the carbon payback period is due to the increase in losses of carbon dioxide associated with the Proposed Varied Development compared to the Consented Scheme. However, estimated expected carbon dioxide savings for the Proposed Varied Development are 69% more than those for the Consented Scheme. This difference in carbon dioxide savings

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
		assess the impact on carbon payback time for the Proposed Varied Development.		between the two schemes is considered to be a material change.
Decommissioning				
Climate Change Resilience.	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate Climate Change Resilience assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
In-Combination Climate Change Impacts.	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate ICCI assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
Influence of the Proposed Development on Climate Change.	The results of the carbon calculator for the Consented Scheme concluded that the carbon payback period would be expected to be 1.1 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity	A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line with the current guidance using the latest version of the carbon calculator tool.	The results of the carbon calculator for the Proposed Varied Development concluded that the carbon payback period would be expected to be 1.5 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 387,420 tCO ₂ yr ⁻¹ .	The main difference in the carbon payback period is due to the increase in losses of carbon dioxide associated with the Proposed Varied Development compared to the Consented Scheme. However, estimated expected carbon dioxide savings for the Proposed Varied Development are 69% more than those for the Consented Scheme.

Table 3.1: Summary Comparison of Predicted Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Technical Chapter and Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
	generation would be 228,808 tCO ₂ yr ⁻¹ .	An updated carbon calculator assessment has been undertaken to assess the impact on carbon payback time for the Proposed Varied Development.		
Cumulative Construction				
Climate Change Resilience.	Previously not assessed.	N/A	No significant residual effects identified.	N/A
In-Combination Climate Change Impacts	Previously not assessed.	N/A	No significant residual effects identified.	N/A
Influence of the Proposed Development on Climate Change.	N/A	N/A	No significant residual effects identified.	N/A
Cumulative Operation				
Climate Change Resilience.	Previously not assessed.	N/A	No significant residual effects identified.	N/A
In-Combination Climate Change Impacts.	Previously not assessed.	N/A	No significant residual effects identified.	N/A
Influence of the Proposed Development on Climate Change.	N/A	N/A	No significant residual effects identified.	N/A

4. LANDSCAPE AND VISUAL AMENITY

4.1 Executive Summary

Introduction

- 4.1.1 A landscape and visual impact assessment (LVIA) has been undertaken for the Proposed Varied Development by ASH design + assessment Ltd (ASH), Chartered Landscape Architects, in accordance with best practice guidance including the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3)¹. This has assessed the predicted residual effects of the Proposed Varied Development within a 45 km Wider Study Area and a 20 km Detailed Study Area on designated and protected landscapes, landscape character, and also on the visual amenity of those present within the landscape from residential areas, routes and recreational areas. It also gives full consideration to the cumulative landscape and visual effects of the Proposed Varied Development when considered in addition to other existing and proposed wind farm developments (cumulative developments).

Baseline Conditions

- 4.1.2 The site is located in an area of sweeping moorland to the south of the A836 and Scotland's northern coastline. The area is characterised by a flat, gently undulating and generally smooth landscape. It forms part of the setting to the surrounding summits, particularly the nearby Bens Grian, the distinctive form and prominence of which is accentuated by the simple, open and expansive nature of the low-lying moorland. Although the immediate area is sparsely settled, it is strongly influenced by the turbines and access tracks of the operational Strathy North wind farm. Dispersed crofts, farms and small settlements are present along the coast and in the nearby straths closely related to the transportation and infrastructure corridors running through wider area.
- 4.1.3 The Wider Study Area is characterised by the peatlands and bogs that make up the Flow Country that stretches across Caithness and Sutherland. These areas are largely uninhabited adding to the sense of remoteness and isolation experienced across much of the area. The flows are interrupted by iconic hills that can be seen from much of the area. To the west the distinctive summits of Ben Hope and Ben Loyal act as landmarks for much of the Wider Study Area. To the south Ben Klibreck, Ben Armine, Morven and Scaraben define the skyline. To the north, the dramatic coastline and views out to sea, including to distant Orkney, characterise the area.
- 4.1.4 Major infrastructure is frequently present within this wider landscape including the 275 kV overhead line through Strath Halladale, past Connagill substation, and connecting into Dounreay Nuclear Power Station. Existing wind farms are also characteristic of the Wider Study Area particularly through the farmed lowlands of Caithness where they are a relatively regular feature. Nevertheless, the Wider Study Area also features areas where there are few contemporary features, and impressions of wildness and remoteness are therefore stronger.

Landscape Effects

- 4.1.5 The vast majority of effects to landscape character, landscape designations and other protected landscapes resulting from the Proposed Varied Development would not be significant. This is largely due to the proximity of the Proposed Varied Development to Strathy North wind farm which provides a precedent in most areas for the types of effects which would be experienced, and the natural screening provided by the surrounding rolling landform. Significant landscape effects

¹ Landscape Institute (LI) / Institute of Environmental Management and Assessment (IEMA), (2013), *Guidelines for Landscape and Visual Impact Assessment, Third Edition*.

(excluding the effects of aviation lighting, which are discussed separately below) would be limited to:

- Ben Griam and Loch nan Clar Special Landscape Area (SLA);
- Localised parts of the Lone Mountains Landscape Character Type LCT (138);
- Localised Parts of the Sweeping Moorlands and Flows LCT (134); and
- Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA).

- 4.1.6 These effects would occur within the Detailed Study Area, largely within 5 km of the Proposed Varied Development turbines and not more than 15 km away, generally affecting discrete parts of the landscape.
- 4.1.7 Significant effects during construction would relate to temporary disturbance and activity within a localised area from construction activities. During operation, significant effects would occur in the form of direct effects from the presence of turbines, associated tracks and other infrastructure. Indirect effects would occur within a small number of localised areas due to the appearance of turbines within close proximity, where other similar development is not already influential, thereby locally affecting qualities of remoteness and wildness.

Visual Effects

- 4.1.8 The majority of visual effects anticipated to result from the Proposed Varied Development would not be significant, including viewpoints, routes, settlements and residential groupings. This is generally due to the natural screening provided by the surrounding landform and the proximity of the Proposed Varied Development to Strathy North wind farm which leads to an existing similar appearance of wind turbines in most views. The presence of Strathy North wind farm often reduces the sensitivity of the part of the view affected, and also reduces the perceptibility of changes that would result from the Proposed Varied Development.
- 4.1.9 Significant effects (excluding the effects of aviation lighting, which are discussed separately below) would be limited to changes in the views from:
- VP 1: Ben Griam Beg;
 - VP3: Loch nan Clach Geala;
 - VP6: Bettyhill Viewpoint;
 - VP7: A836 west of B871;
 - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy;
 - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1); and
 - Localised parts of the A836 Tongue to Detailed Study Area.
- 4.1.10 The visual assessment has demonstrated that of the few residential areas where views would be theoretically obtained, no significant visual effects would occur.
- 4.1.11 Long term predicted significant visual effects (excluding the effects of aviation lighting, which are discussed separately below) are therefore anticipated to be limited to those experienced by recreational users in the hills and moorland around the Proposed Varied Development of which VP1: Ben Griam Beg and VP3: Loch nan Clach Geala, are representative, and to a lesser extent travellers along small localised parts of the A836, of which VP6: Bettyhill viewpoint and VP7: A836 west of the B871, are representative.

Cumulative Effects

- 4.1.12 No significant cumulative landscape effects have been identified when considering the addition of the Proposed Varied Development to the cumulative development baseline (existing and proposed

wind farm sites). This would mainly due to the position of the Proposed Varied Development adjacent to the operational site of Strathy North wind farm and the proposed Strathy Wood wind farm, leading to the appearance of a largely cohesive cluster of baseline development which would strongly define the character of the landscape in which it would be located. In adjacent areas, where the more notable landscape effects of the Proposed Varied Development alone would be experienced, the effect of the cumulative development baseline would be such that the addition of the Proposed Varied Development would be unlikely to increase the prominence of wind turbines as a feature of the landscape.

- 4.1.13 The CLVIA has identified that the addition of the Proposed Varied Development to the cumulative development baseline would result in a significant cumulative effect to one viewpoint, VP1: Ben Griam Beg, located approximately 8.6 km to the south of the turbines of the Proposed Varied Development, where they would appear closer, larger and more prominent than the cumulative developments leading to an increased prominence of wind turbines within northward views. All other cumulative effects to viewpoints, routes and residential receptors would be not significant.

Effects of Aviation Lighting

- 4.1.14 Due to the height of Proposed Varied Development (turbines being above 150 m to tip), aviation lighting would be required in line with the Civil Aviation Authority (CAA) Policy Statement². Discussions between the Applicant and the CAA on a reduced aviation lighting scheme are currently taking place, however, as an aviation lighting design had not been agreed at the time of finalising the aviation lighting assessment, assumptions have been made with regard to the worst-case scenario on the extent and type of aviation lighting, as noted above. The assessment of the potential effects of aviation lighting on each of the 39 turbines, (as required by CAA guidelines²), found that effects would be significant from:

- The Lone Mountains Landscape Character Type LCT (138);
- The Rounded Hills – Caithness and Sutherland LCT (135);
- The Sweeping Moorlands and Flows LCT (134);
- Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA);
- VP3: Loch nan Clach Geala;
- VP4: East of Melvich;
- VP5: Strathy;
- VP7: A836 west of B871;
- VP10: Beinn Ratha;
- VP11: Forsinard;
- Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy;
- Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1);
- Localised parts of the A897;
- Localised parts of the B871 (North);
- Localised parts of Strathy (North of the A836 and east of the River Strathy); and
- Localised parts of Strathy (South of the A836 and east of the River Strathy).

- 4.1.15 This is largely due to the absence of existing artificial light within the Detailed Study Area. Receptors would therefore generally be more sensitive to this type of change. It was concluded that when taking into consideration aviation lighting on the Proposed Varied Development ,

² Safety and Airspace Regulation Group, 2017. *Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level*. Civil Aviation Authority

significant effects would result during low light conditions and the hours of darkness. However, the Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in a reduced visual effect. Discussions would include consideration of the following:

- Potential reduction of aviation lighting intensity during good meteorological visibility;
- Radar activated aviation lighting (should this be approved for use); and
- Potential for cardinal or strategic aviation lighting on selected turbines.

Conclusions

- 4.1.16 The vast majority of landscape, visual and cumulative effects of the Proposed Varied Development (excluding the effects of turbine lighting) would be not significant. Significant landscape and visual effects would be limited to an area within close proximity of the site, affecting relatively discrete parts of the landscape within 15 km of the turbines of the Proposed Varied Development and occasional views obtained by recreational users of the landscape, and travellers along small parts of the A836.
- 4.1.17 There could be very localised significant effects to wild land characteristics within WLA39: East Halladale Flows, however, there would be no significant effects to any nationally designated landscapes and the integrity of these areas would not be affected.
- 4.1.18 Significant cumulative effects of the Proposed Varied Development would be limited to one viewpoint. There would be no significant cumulative visual effects to other visual receptors and no significant cumulative effects to landscape receptors.
- 4.1.19 Although the Proposed Varied Development's turbines would be 65 m taller than those of the Consented Scheme, with the exception of one landscape receptor, one viewpoint and localised parts of two routes, the identified receptors in the Wider Study Area would experience very similar effects from the two schemes (excluding aviation lighting). This is largely due to the unique position of the site within the wider large scale landscape, set back from the majority of key receptors and often partially screened by topography and this means that the increased height of the turbines, while perceptible, would be unlikely to be fully recognised.
- 4.1.20 When taking turbine lighting into consideration, it was concluded that aviation lighting on every turbine of the Proposed Varied Development would result in significant effects during low light conditions and the hours of darkness above those experienced as a result of the Consented Scheme. However, the Applicant is engaging with aviation stakeholders to agree a lighting solution which could result in a reduced effect.

4.2 Introduction

- 4.2.1 This Chapter presents the findings of the LVIA for the Proposed Varied Development. The purpose of the LVIA is to identify and describe predicted significant effects which could occur as a result of the Proposed Varied Development to views obtained by those living, working and visiting in the area, and the wider landscape resource. It considers the likely significant effects on landscape and visual amenity associated with the construction, operation and decommissioning of the Proposed Varied Development. The specific objectives of the chapter are to:
- describe the landscape and visual amenity baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects;
 - assess the residual effects remaining following the implementation of mitigation;

- provide a summary of the predicted effects of the Consented Scheme; and
- provide a comparison of predicted effects between the Consented Scheme and the Proposed Varied Development.

4.2.2 This Chapter is supported by the figures and technical appendices described in Table 4.1.

Table 4.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figures: Figure 4.1a: Study Area and Zone of Theoretical Visibility (A3)	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun.
EIAR Volume 3a: Figure 4.1b: Study Area and Zone of Theoretical Visibility (A1)	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. Prepared at large scale for ease of reference.
EIAR Volume 3a: Figure 4.2a: Comparative ZTV of the Consented Scheme and Proposed Varied Development (A3)	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. The figure also presents a comparison between the theoretical visibility of Consented Scheme and the Proposed Varied Development.
EIAR Volume 3a: Figure 4.2b: Comparative ZTV of the Consented Scheme and Proposed Varied Development(A1)	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. The figure also presents a comparison between the theoretical visibility of Consented Scheme and the Proposed Varied Development. Prepared at large scale for ease of reference.
EIAR Volume 3a: Figure 4.3a: Designated and Protected Landscapes with ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. The landscape designation boundaries have been updated since the 2014 Further Information Report (FIR).
EIAR Volume 3a: Figure 4.3b: Map of Relative Wildness	New information generated for the 2020 EIA.	Methodologies and guidance for assessing Wild Land Areas have been updated since the 2014 FIR.
EIAR Volume 3a: Figure 4.3c: Wildness Attribute: Absence of Modern Artefacts	New information generated for the 2020 EIA.	Methodologies and guidance for assessing Wild Land Areas have been updated since the 2014 FIR.
EIAR Volume 3a: Figure 4.4a: Landscape Character Types	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. The landscape character type boundaries were updated in 2019 by SNH.
EIAR Volume 3a: Figure 4.4b: Landscape Character Types with ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. The landscape character type boundaries were updated in 2019 by SNH.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 4.5a: Viewpoints with ZTV (A3)	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. New viewpoints were identified to reflect changes in the visual amenity baseline since the 2014 FIR.
EIAR Volume 3a: Figure 4.5b: Viewpoints with ZTV (A1)	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. New viewpoints were identified to reflect changes in the visual amenity baseline since the 2014 FIR. Prepared at large scale for ease of reference.
EIAR Volume 3a: Figure 4.5c: Visual Receptors with ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. New receptors were identified to reflect changes in the visual amenity baseline since the 2014 FIR.
EIAR Volume 3a: Figure 4.6a: 60 km Cumulative Search Area	New information generated for the 2020 EIA.	The cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.6b: Cumulative Developments Included in the Assessment	New information generated for the 2020 EIA.	The cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7a: Ackron Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7b: Armadale Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7c: Baillie Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7d: Bettyhill Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7e: Limekiln Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7f: Strathy North Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 4.7g: Strathy Wood Wind Farm Cumulative ZTV	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3a: Figure 4.7h: Cumulative ZTV - Proposed Varied Development and Cumulative Developments	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun and the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 3b: Visualisations (SNH): 4.8a.i-ii: VP1 Ben Griam Beg Baseline Photo and Cumulative Wireline 4.8b: VP1 Ben Griam Beg Wireline 4.8c: VP1 Ben Griam Beg Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.9a.i-ii: VP2: Cnoc Riabhach Baseline Photo and Cumulative Wireline Figure 4.9b: VP2: Cnoc Riabhach Wireline Figure 4.9c: VP2: Cnoc Riabhach Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.10a.i-iii: VP3: Loch nan Clach Geala Baseline Photo and Cumulative Wireline Figure 4.10b: VP3: Loch nan Clach Geala Wireline Figure 4.10c: VP3: Loch nan Clach Geala Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.11a.i-ii: VP4: East of Melvich Baseline Photo and Cumulative Wireline Figure 4.11b: VP4: East of Melvich Wireline Figure 4.11c: VP4: East of Melvich Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH):	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.12a.i-ii: VP5: Strathy Baseline Photo and Cumulative Wireline Figure 4.12b: VP5: Strathy Wireline Figure 4.12c: VP5: Strathy Photomontage		
EIAR Volume 3b: Visualisations (SNH): Figure 4.13a.i-ii: VP6: Bettyhill Viewpoint Baseline Photo and Cumulative Wireline Figure 4.13b: VP6: Bettyhill Viewpoint Wireline Figure 4.13c: VP6: Bettyhill Viewpoint Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.14a.i-ii: VP7: A836 west of the B871 Baseline Photo and Cumulative Wireline Figure 4.14b: VP7: A836 west of the B871 Wireline Figure 4.14c: VP7: A836 west of the B871 Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.15a: VP8: Sgor Chaonasaid Baseline Photo and Cumulative Wireline Figure 4.15b: VP8: Sgor Chaonasaid Wireline Figure 4.15c: VP8: Sgor Chaonasaid Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.16a: VP9: Creag na h-lolaire Baseline Photo and Cumulative Wireline Figure 4.16b: VP9: Creag na h-lolaire Wireline Figure 4.16c: VP9: Creag na h-lolaire Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH):	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.17a.i-iv: VP10: Beinn Ratha Baseline Photo and Cumulative Wireline Figure 4.17b: VP10: Beinn Ratha Wireline Figure 4.17c: VP10: Beinn Ratha Photomontage		
EIAR Volume 3b: Visualisations (SNH): Figure 4.18a.i-ii: VP11: Forsinard Baseline Photo and Cumulative Wireline Figure 4.18b: VP11: Forsinard Wireline Figure 4.18c: VP11: Forsinard Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.19a: VP12 – Moine House Baseline Photo and Cumulative Wireline Figure 4.19b: VP12 – Moine House Wireline Figure 4.19c: VP12 – Moine House Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.20a: VP13 – A836 near Middleton Baseline Photo and Cumulative Wireline Figure 4.20b: VP13 – A836 near Middleton Wireline Figure 4.20c: VP13 – A836 near Middleton Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (SNH): Figure 4.21a: VP14 – Dunnet Head Baseline Photo and Cumulative Wireline Figure 4.21b: VP14 – Dunnet Head Wireline	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations: Figure 4.22: Viewpoint Location Plan (THC)	New information generated for the 2020 EIA.	Figure identifies the viewpoint locations used for the LVIA of the Proposed Varied Development.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3b: Visualisations (THC): Figure 4.23a: VP1: Ben Griam Beg Detailed Viewpoint Location Plan Figure 4.23b: VP1: Ben Griam Beg Photomontage Figure 4.23c: VP1: Ben Griam Beg Baseline Photo and Wireline Figure 4.23d: VP1: Ben Griam Beg 50mm Single Frame Photomontage Figure 4.23e: VP1: Ben Griam Beg 75mm Single Frame Photomontage Figure 4.23f - VP 1: Ben Griam Beg Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.24a: VP2: Cnoc Riabhach Detailed Viewpoint Location Plan Figure 4.24b: VP2: Cnoc Riabhach Photomontage Figure 4.24c: VP2: Cnoc Riabhach Baseline Photo and Wireline Figure 4.24d: VP2: Cnoc Riabhach 50mm Single Frame Photomontage Figure 4.24e: VP2: Cnoc Riabhach 75mm Single Frame Photomontage Figure 4.24f: VP2: Cnoc Riabhach Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.25a: VP3: Loch nan Clach Geala Detailed Viewpoint Location Plan Figure 4.25b: VP3: Loch nan Clach Geala Photomontage Figure 4.25c: VP3: Loch nan Clach Geala Baseline Photo and Wireline Figure 4.25d: VP3: Loch nan Clach Geala 50mm Single Frame Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.25e: VP3: Loch nan Clach Geala 75mm Single Frame Photomontage Figure 4.25f: VP 3: Loch nan Clach Geala Monochrome Analysis		
EIAR Volume 3b: Visualisations (THC): Figure 4.26a: VP4: East of Melvich Detailed Viewpoint Location Plan Figure 4.26b: VP4: East of Melvich Photomontage Figure 4.26c: VP4: East of Melvich Baseline Photo and Wireline Figure 4.26d: VP4: East of Melvich 50mm Single Frame Photomontage Figure 4.26e: VP4: East of Melvich 75mm Single Frame Photomontage Figure 4.26f: VP 4: East of Melvich Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.27a: VP5: Strathly Detailed Viewpoint Location Plan Figure 4.27b: VP5: Strathly Photomontage Figure 4.27c: VP5: Strathly Baseline Photo and Wireline Figure 4.27d: VP5: Strathly 50mm Single Frame Photomontage Figure 4.27e: VP5: Strathly 75mm Single Frame Photomontage Figure 4.27f: VP 5: Strathly Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.28a: VP6: Bettyhill Viewpoint Detailed Viewpoint Location Plan Figure 4.28b: VP6: Bettyhill Viewpoint Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.28c: VP6: Bettyhill Viewpoint Baseline Photo and Wireline Figure 4.28d: VP6: Bettyhill Viewpoint 50mm Single Frame Photomontage Figure 4.28e: VP6: Bettyhill Viewpoint 75mm Single Frame Photomontage Figure 4.28f: VP 6: Bettyhill viewpoint Monochrome Analysis		
EIAR Volume 3b: Visualisations (THC): Figure 4.29a: VP7: A836 west of the B871 Detailed Viewpoint Location Plan Figure 4.29b: VP7: A836 west of the B871 Photomontage Figure 4.29c: VP7: A836 west of the B871 Baseline Photo and Wireline Figure 4.29d: VP7: A836 west of the B871 50mm Single Frame Photomontage Figure 4.29e: VP7: A836 west of the B871 75mm Single Frame Photomontage Figure 4.29f: VP 7: A836 west of the B871 Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.30a: VP8: Sgor Chaonasaid Detailed Viewpoint Location Plan Figure 4.30b: VP8: Sgor Chaonasaid Photomontage Figure 4.30c: VP8: Sgor Chaonasaid Baseline Photo and Wireline Figure 4.30d: VP8: Sgor Chaonasaid 50mm Single Frame Photomontage Figure 4.30e: VP8: Sgor Chaonasaid 75mm Single Frame Photomontage	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.30f: VP 8: Sgor Chaonasaid Monochrome Analysis		
EIAR Volume 3b: Visualisations (THC): Figure 4.31a: VP9: Creag na h-lolaire Detailed Viewpoint Location Plan Figure 4.31b: VP9: Creag na h-lolaire Photomontage Figure 4.31c: VP9: Creag na h-lolaire Baseline Photo and Wireline Figure 4.31d: VP9: Creag na h-lolaire 50mm Single Frame Photomontage Figure 4.31e: VP9: Creag na h-lolaire 75mm Single Frame Photomontage Figure 4.31f: VP 9: Creag na h-lolaire Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.32a: VP10: Beinn Ratha Detailed Viewpoint Location Plan Figure 4.32b: VP10: Beinn Ratha Photomontage Figure 4.32c: VP10: Beinn Ratha Baseline Photo and Wireline Figure 4.32d: VP10: Beinn Ratha 50mm Single Frame Photomontage Figure 4.32e: VP10: Beinn Ratha 75mm Single Frame Photomontage Figure 4.32f - VP 10: Beinn Ratha Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.33a: VP11: Forsinard Detailed Viewpoint Location Plan Figure 4.33b: VP11: Forsinard Photomontage Figure 4.33c: VP11: Forsinard Baseline Photo and Wireline	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.33d: VP11: Forsinard 50mm Single Frame Photomontage Figure 4.33e: VP11: Forsinard 75mm Single Frame Photomontage Figure 4.33f: VP 11: Forsinard Monochrome Analysis		
EIAR Volume 3b: Visualisations (THC): Figure 4.34a: VP12: Moine House Detailed Viewpoint Location Plan Figure 4.34b: VP12: Moine House Photomontage Figure 4.34c: VP12: Moine House Baseline Photo and Wireline Figure 4.34d: VP12: Moine House 50mm Single Frame Photomontage Figure 4.34e: VP12: Moine House 75mm Single Frame Photomontage Figure 4.34f: VP 12: Moine House Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC): Figure 4.35a: VP13: A836 near Middleton Detailed Viewpoint Location Plan Figure 4.35b: VP13: A836 near Middleton Photomontage Figure 4.35c: VP13: A836 near Middleton Baseline Photo and Wireline Figure 4.35d: VP13: A836 near Middleton 50mm Single Frame Photomontage Figure 4.35e: VP13: A836 near Middleton 75mm Single Frame Photomontage Figure 4.35f: VP 13: A836 near Middleton Monochrome Analysis	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.
EIAR Volume 3b: Visualisations (THC):	New information generated for the 2020 EIA.	Visualisations reflect the Proposed Varied Development and revised visualisation guidance.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Figure 4.36a: VP14a: Dunnet Head Detailed Viewpoint Location Plan Figure 4.36b: VP14b: Dunnet Head Baseline Photo and Wireline		
EIAR Volume 4: Technical Appendices: Technical Appendix 4.1: Technical Methodologies for Visual Representation	New information generated for the 2020 EIA.	Best practice technical methodologies have been updated since the 2014 FIR.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.2: Landscape and Visual Scoping Appraisal	New information generated for the 2020 EIA.	Due to the increase in turbine size the ZTV has been rerun. New landscape and visual receptors were identified to reflect changes to the respective baselines since the 2014 FIR.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.3: Landscape Assessment Tables	New information generated for the 2020 EIA. Presentation of assessment of Landscape Receptors.	Due to the increase in turbine size the ZTV has been rerun. The landscape character type and designation boundaries have been updated since the 2014 FIR.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.4: Visual Assessment Tables	New information generated for the 2020 EIA. Presentation of assessment of Visual Receptors.	Due to the increase in turbine size the ZTV has been rerun. New receptors were identified to reflect changes in the visual amenity baseline since the 2014 FIR.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.5: Cumulative Developments included in the Assessment	New information generated for the 2020 EIA. Presentation of cumulative sites to be considered in detailed cumulative assessment.	New information necessary as the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.6: Cumulative Landscape Assessment Tables	New information generated for the 2020 EIA. Presentation of cumulative assessment of Landscape Receptors.	New information necessary as the cumulative baseline has changed since the 2014 FIR.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.7: Cumulative Visual Assessment Tables	New information generated for the 2020 EIA. Presentation of cumulative assessment of Visual Receptors.	As above.
EIAR Volume 4: Technical Appendices: Technical Appendix 4.8: Consented Scheme LVIA	New information generated for the 2020 EIA. Presentation of assessment of Consented Scheme based on the current baseline for	As part of the S36C application an appreciation of the predicted effects of the Consented Scheme is required.

Table 4.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
	comparison with the Proposed Varied Development	
EIAR Volume 4: Technical Appendices: Technical Appendix 4.9: Wild Land Assessment for East Halladale Flows Wild Land Area (WLA39)	New information generated for the 2020 EIA. Presentation of assessment of predicted effects on the East Halladale Flows Wild Land Area.	Due to the increase in turbine size SNH has request a wild land assessment be undertaken to identify potential effects on the East Halladale Flows
EIAR Volume 4: Technical Appendices: Technical Appendix 4.10: Lighting Assessment	New information generated for the 2020 EIA. Presentation of assessment of predicted effects resulting from the introduction of turbine aviation lighting.	Due to the increase in turbine size, above 150 m to tip, aviation lighting would now be required. An assessment of the predicted effects that would result from this lighting is necessary.

Competent Expert Summary

- 4.2.3 The LVIA has been carried out by Chartered Landscape Architects, ASH design + assessment (ASH), a registered practice with the Landscape Institute, the Chartered body for professional landscape architects, under the direction of Managing Director, Jennifer Skrynka. Jennifer is a Chartered Landscape Architect with over 35 years of experience working across a wide range of sectors including renewable energy. Jennifer has extensive experience managing and undertaking landscape and visual impact assessments (LVIA), and cumulative assessments (CLVIA) and has prepared and presented LVIA evidence as an Expert Witness at Public Inquiry. Jennifer has also provided expert advice and support at Judicial Review and Appeal. A table presenting relevant qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).

4.3 Summary of Effects of Consented Scheme

- 4.3.1 The LVIA assessment of the Consented Scheme was undertaken using GLVIA2³, the then current best practice guidance when the 2007 Environmental Statement (ES) was undertaken. It remained current while the assessment was undertaken of the Modified 2013 Scheme reported in support the 2013 ES Addendum. Although GLVIA3, was published in 2013 it was agreed with consultees that GLVIA2 should continue to be used, for consistency. This was reiterated when the work was undertaken to assess the Consented T39 Layout as reported in the 2014 Further Information Report (FIR). Given the time that has passed since 2014 and the acceptance of GLVIA3 as recognised best practice, it was determined that the assessment of the Proposed Varied Development should utilise the updated guidance. In order to allow for comparison of the predicted significant residual effects of the Consented Scheme and the Proposed Varied Development, a landscape and visual assessment of the Consented Scheme has been undertaken using GLVIA3. The detailed findings of this assessment are presented in Technical Appendix 4.8 (EIAR Volume 4).
- 4.3.2 The assessment of the potential effects of the Consented Scheme on landscape receptors considered 12 separate landscape receptors. Of these, almost all were identified as likely to have

³ Landscape Institute (LI) / Institute of Environmental Management and Assessment (IEMA), (2002), *Guidelines for Landscape and Visual Impact Assessment, Second Edition*.

effects which would be not significant. Predicted significant residual effects were identified for the Bens Griam and Loch nan Clar SLA, Sweeping Moorland and Flows LCT and localised parts of the Lone Mountains LCT. These effects are identified in the detailed landscape assessment tables (Technical Appendix 4.8 Annex 2 (EIAR Volume 4)) and are summarised in Technical Appendix 4.8 (EIAR Volume 4).

- 4.3.3 Of the 14 representative viewpoints (VPs), 11 settlements and residential groupings, and 14 routes selected for inclusion within the visual assessment of the Consented Scheme, the majority were identified as likely to have effects to the views which would be not significant. Predicted significant effects were identified for VP1: Ben Griam Beg, VP6: Bettyhill Viewpoint, VP7: A836 west of B871, and Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathly. These effects are detailed in Technical Appendices 4.8 Annex 3 (EIAR Volume 4).
- 4.3.4 The CLVIA of the Proposed Varied Development found that the significant effects would be limited to VP1 Ben Griam Beg. Given the improbability that any additional significant effects would be experienced as a result of the smaller sized turbines for the Consented Scheme, an updated CLVIA of the Consented Scheme against the 2019 cumulative development baseline was scoped out.
- 4.3.5 In summary, while the Consented Scheme would result in some significant effects, which would largely be confined to a few particular areas, as represented by the overlap of the above receptors (see TA Figures 4.8.1 – 4.8.4 (EIAR Volume 4, Technical Appendix 4.8, Annex 1)). The Consented Scheme would not result in significant effects on any nationally designated landscape or settlement. The limited overall effects of the Consented Scheme demonstrate that the site is uniquely positioned to accommodate wind development.

4.4 Methodology

Scope of the Assessment

- 4.4.1 The LVIA has been prepared with reference to GLVIA3 and Landscape Character Assessment: Guidance for England and Scotland.⁴ The scope has been informed by best practice guidance and the consultation process (see Table 4.2 below and EIAR Volume 4: Technical Appendix 1.1).
- 4.4.2 The LVIA considers all aspects of the Proposed Varied Development during the construction phase and during operation, as described in Chapter 2: Description of Development of this EIAR. It gives consideration to potential effects on the character of the landscape and also the visual amenity of those present within the landscape. It also gives full consideration to the potential effects of the Proposed Varied Development on designated and protected landscapes, and to the cumulative landscape and visual effects of the Proposed Varied Development when considered in addition to other cumulative developments (both existing and proposed wind farms).
- 4.4.3 In addition to the above, a separate Lighting Assessment considering the potential effects of aviation lighting on each turbine was undertaken and is presented in Technical Appendix 4.10 (EIAR Volume 4). A description of the methodology used to undertake the assessment is presented in Technical Appendix 4.10 (EIAR Volume 4). The findings of the Lighting Assessment are presented in Section 4.9: Assessment of Residual Effects of this Chapter.

Study Area

- 4.4.4 In line with current guidance, the Wider Study Area for the LVIA has been set as a 45 km radius from the outermost turbines of the Proposed Varied Development. This is considered to be the maximum distance within which any significant landscape or visual effect could be experienced. A smaller study area of 20 km (the Detailed Study Area) has been defined for the more targeted and fine-grained assessment.

⁴ Scottish Natural Heritage, The Countryside Agency. (2002). *Landscape Character Assessment: Guidance for England and Scotland*.

4.4.5 The study areas have been applied as follows:

LANDSCAPE ASSESSMENT

4.4.6 All designated and protected landscapes within the Wider Study Area have been given consideration within the assessment and are shown on Figure 4.3a (EIAR Volume 3a). However, following an initial review, where effects were identified as unlikely, these areas have been scoped out of more detailed assessment as explained in Technical Appendix 4.2.

4.4.7 Following an initial appraisal of the Proposed Varied Development, it was considered that any predicted significant effects on landscape character would be limited to the Detailed Study Area. For this reason, the detailed assessment of effects on landscape character has been concentrated within this area.

VISUAL ASSESSMENT

4.4.8 Within the Wider Study Area, a series of 14 VPs (see Figure 4.5a (EIAR Volume 3a)) have been selected in consultation with Scottish Natural Heritage (SNH) and The Highland Council (THC). These VPs form the basis of the visual assessment.

4.4.9 In addition to the viewpoint-based assessment, a more targeted assessment of potential visual receptors within the Detailed Study Area has taken place. This has considered views from settlements and residential areas and routes. The scoping appraisal in relation to the visual assessment is explained in Technical Appendix 4.2.

CUMULATIVE LANDSCAPE AND VISUAL IMPACT ASSESSMENT

4.4.10 Following best practice⁵, the cumulative landscape and visual impact assessment (CLVIA) identified all operational consented, application wind farm sites, and those which are the subject of a valid planning application or appeal within a search area of 60 km radius from the Proposed Varied Development using THC's Renewable Energy: Wind Turbine List (January, 2020). The cumulative development within the 60 km search area are shown on Figure 4.6a (EIAR Volume 3a).

4.4.11 All wind energy schemes with a tip height in excess of 50 m have been considered in the assessment. Smaller wind turbines have not been included in the search as it is considered that turbines of this scale are usually of a domestic nature and are unlikely to be considered by the viewer in parallel to commercial scale structures.

4.4.12 The number of wind farm applications made or withdrawn changes frequently. Therefore, in order to inform the cumulative baseline scenario, a cut-off date of the 21st January 2020 has been used for the assessment. All new applications, applications withdrawn or refused, and addendums to current projects taken place since the cut-off date, have therefore not been considered in this assessment.

4.4.13 In consultation with THC a total of seven cumulative developments were identified within this search area as most likely to combine with the Proposed Varied Development to result in potential cumulative landscape and visual effects (see Figure 4.6b (EIAR Volume 3a)). These cumulative developments are listed below and in EIAR Volume 4: Technical Appendix 4.5.

- Baillie wind farm (Operational);
- Bettyhill wind farm (Operational);
- Strathy North wind farm (Operational);
- Strathy Wood wind farm (Application);
- Limekiln wind farm (Consented);
- Ackron wind farm (Scoping); and

⁵ Scottish Natural Heritage, (2012), *Assessing the Cumulative Impact of Onshore Wind Energy Developments*.

- Armadale wind farm (Scoping).

- 4.4.14 In line with best practice⁵, scoping applications are not generally included in cumulative landscape and visual assessments due to the uncertainty surrounding how the proposal may evolve prior to the final submission. However, THC requested that Ackron and Armadale wind farms be included in the CLVIA for the Proposed Varied Development due to their proximity.
- 4.4.15 The CLVIA has considered the potential for effects to all landscape designations, and viewpoints within the Wider Study Area and landscape character types, settlements and routes within the Detailed Study Area.
- 4.4.16 As the focus of the CLVIA is on identifying and assessing predicted significant residual effects, receptors which were identified as experiencing a less than Minor landscape or visual effect were scoped out of the CLVIA as it is considered that these would not contribute to a significant cumulative effect.

Consultation

- 4.4.17 A summary of the relevant LVIA consultation undertaken is presented in Table 4.2. Full details of consultation responses can be found in EIAR Volume 4: Technical Appendix 1.1.

Table 4.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
Energy Consents Unit (ECU) (18/07/2019)	Scoping	ECU proposed that the LVIA should consider impacts arising from the process of decommissioning.	The decommissioning effects would be similar to those arising from the construction phase and therefore a separate assessment has been scoped out.
		As the maximum blade tip height of turbines exceeds 150 m the landscape and visual impact assessment must include a robust Night Time Assessment with agreed viewpoints to consider the effects of aviation lighting and how the chosen lighting mitigates the effects.	A lighting assessment is included in the EIAR (see EIAR Volume 4: Technical Appendix 4.10).
THC (07/06/2019)	Scoping	The scoping report identified viewpoints to be assessed within the landscape and visual impact assessment. These viewpoints are agreed. The Company should present the assessment and findings in accordance with the wishes of the Highland Council as stated in their response to the consultation.	The viewpoints have been agreed with THC and the visualisations are presented in accordance with THC guidance (see Figures 4.23a-f to 4.36a-b (EIAR Volume 3b)).
		The purpose of the viewpoints shall be clearly identified and stated in the supporting information. For example, if the VP has been chosen for landscape assessment, or visual impact assessment, etc.	Consultation has been undertaken with SNH and THC to agree the final list of LVIA viewpoints (see below).
		The LVIA should make specific reference to, and assess the proposal against the criteria detailed in the adopted Highland Council Onshore Wind Energy Guidance and Addendum (December 2017)).	This is addressed in the Planning Statement.

Table 4.2: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		As there is a requirement for turbines over 150 m to utilise aviation lighting, we would request that the LVIA also assesses night-time impact and includes some visualisations to demonstrate visual impact during hours of darkness.	A lighting assessment is included in the EIAR (see EIAR Volume 4: Technical Appendix 4.10).
THC (18/09/2019)	Consultation Meeting with THC Planning and Landscape Officers	Following discussion with THC, a list of 14 viewpoints was agreed, which included two new viewpoints requested by THC (one at Dunnet Head and the other to the west of Thurso along the A836).	The results of the VP assessments are presented in Section 4.9 of the EIAR and the detailed assessments are produced in Technical Appendix 4.4 (EIAR Volume 4).
		Agreed to use the THC database to identify cumulative wind farm sites within 60 km of the site with the assessment focusing on 5 key cumulative sites that were either in planning, consented, or operational, comprising: Strathy North Wind Farm; Bettyhill Wind Farm; Baillie Wind Farm; Strathy Wood Wind Farm; and Limekiln Wind Farm. During subsequent consultation with THC in January 2020 it was agreed that Ackron Wind Farm and Armadale Wind Farm (both at Scoping) should be included in the cumulative assessment.	The results of the CLVIA are presented in Section 4.9 of the EIAR and the detailed assessments are produced in Technical Appendices 4.5 and 4.6 (EIAR Volume 4).
		The potential significant effects of turbine lighting on both landscape and visual receptors are to be assessed and the results of this assessment included within the LVIA Chapter as appropriate, to ensure that the predicted effects are captured in the main report, with the turbine lighting assessment included in a Technical Appendix to the LVIA Chapter. As the SNH guidance on lighting assessment is emerging, consultation with SNH regarding the methodology for the lighting assessment has been undertaken, and confirmed with THC. During ASH's discussions with SNH it was confirmed night-time photography would be taken from 3 viewpoints. These were VP 7: A836 West of B871 near Borgie, VP5: Strathy and VP4: East of Melvich	A lighting assessment is included in the EIAR (see EIAR Volume 4: Technical Appendix 4.10). Consultation with SNH regarding night-time VPs is summarised below.
SNH (31/05/2019)	Scoping	To date (in 2007, 2013, 2014 and 2015) SNH have advised that the Strathy South Wind Farm would be unlikely to significantly adversely affect the qualities of the East Halladale Flows Wild Land Area (WLA). The variation to raise the turbine heights to 200 m, and the subsequent introduction of turbine lighting, has however raised new effects which have not previously been considered. Although SNH	Subsequent consultation was undertaken with SNH regarding Wild Land and lighting. This is discussed below.

Table 4.2: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		recognise that the extent of the intervisibility of the WLA with the proposed turbines would be generally limited to areas already affected by the consented T39 Layout, the effects as a result of the introduction of lighting would extend adverse effects beyond the hours of daylight.	
		SNH consulted on draft guidance on how to assess repowering applications last year (2018). SNH now recommends that the baseline for assessment should be the 'current state of the environment' as set out in the EIA regulations. SNH is currently working through the implications of this for the rest of the guidance and hope to share a revised version soon.	ECU confirmed via email (20/06/19) that the EIA baseline for the Proposed Varied Development should be the physical condition at the time of the assessment. This is the basis for the assessment.
		SNH advised that the following information should be included within the EIAR to aid consultees and decision makers on this evolving issue: • a narrative about the existing lighting within the landscape to understand the baseline; • a narrative describing the effects of any lighting proposed; • a consideration of available mitigation; • a small number of visualisations demonstrating the effects of the lighting proposed; • all wireframes should show the locations of the proposed lights; and • a ZTV showing the extent of visibility of the lighting. It should be noted that effects of turbine lighting in this location has the potential to result in significant adverse effects on the experience of wildness and ultimately the qualities of WLAs.	Subsequent consultation has been undertaken with SNH regarding Wild Land and lighting. This is discussed below.
SNH (28/10/2019)	Meeting held with SNH Area and Landscape Officers	It was agreed that an LVIA chapter would be prepared along with associated figures. A cumulative LVIA would also be prepared (focused on sites within approximately 20 km most likely to result in predicted significant residual cumulative effects).	The results of the LVIA and CLVIA are presented in Section 4.8 of this Chapter. Detailed assessment tables are included in EIAR Volume 4: Technical Appendices 4.3, 4.4, 4.6 and 4.7.
		It was agreed that a wild land assessment of East Halladale Flows Wild Land Area would be prepared in line with SNH's Assessing Impacts	The wild land assessment is included in the EIAR (see EIAR

Table 4.2: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		on Wild Land Areas: Technical Guidance – Consultation Draft (2017). This would be included as technical appendix to the LVIA Chapter. It was also agreed that the lighting assessment would assess potential effects of any proposed turbine lighting on the special qualities of the East Halladale Flows Wild Land Area.	Volume 4: Technical Appendix 4.9). The lighting assessment is included in the EIAR (see EIAR Volume 4: Technical Appendix 4.10).
		It was agreed that a turbine lighting assessment would be prepared and included as a technical appendix to the EIAR. The assessment should include a hub height ZTV, night-time visualisations from VP4 – Melvich, VP5 – Strathy and VP7 – A836 west of B871 and an illustration of potential visibility from within the East Halladale Flows Wild Land Area. It was agreed that day time photography could be manipulated for this purpose.	The lighting assessment is included in the EIAR (see EIAR Volume 4: Technical Appendix 4.10).

Baseline Conditions

Desk Study

4.4.18 Establishment of the baseline conditions has been undertaken through combination of desk study and site appraisal. The following specific desk-based tasks have been undertaken:

- review of the relevant development plans as described in Section 4.5;
- review of the Special Qualities of the National Scenic Areas⁶;
- review of Highland Special Landscape Areas⁷;
- review of SNH National Landscape Character Types (LCTs) and Descriptions⁸;
- review of SNH Map of Relative Wildness and Attribute Mapping datasets⁹;
- review of SNH Wild Land Area Maps and Descriptions^{10,11,12,13} ;
- review of Inventory of Gardens and Designed Landscapes¹⁴;
- OS mapping resources and aerial photography;
- other web-based tourism, recreation and information resources; and
- generation and review of ZTV diagrams.

⁶ Scottish Natural Heritage, (2010), *SNH Commissioned Report 374 – The Special Qualities of the National Scenic Areas*

⁷ Horner + MacLennan and Mike Wood, (2011), *Assessment of Highland Special Landscape Areas*. The Highland Council

⁸ Scottish Natural Heritage (2019) *Scottish Landscape Character Types Map and Descriptions*. Available at: <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions> [accessed March 2020]

⁹ Scottish Natural Heritage, Natural Spaces. Available at: <https://gateway.snh.gov.uk/natural-spaces/> [accessed March 2020]

¹⁰ Scottish Natural Heritage, (2017), *WLA 35: Ben Klibreck - Armine Forest Wild Land Area Description*.

¹¹ Scottish Natural Heritage, (2017), *WLA 36: Causeymire Knockfin Flows Wild Land Area Description*.

¹² Scottish Natural Heritage, (2017), *WLA 38: Ben Hope – Ben Loyal Wild Land Area Description*.

¹³ Scottish Natural Heritage, (2017), *WLA 39: East Halladale Flows Wild Land Area Description*.

¹⁴ Historic Environment Scotland Data Services. Available at: <http://data.historic-scotland.gov.uk/pls/htmldb/f?p=2000:10:0> [accessed March 2020]

Field Study

- 4.4.19 Site visits were undertaken in August and October 2019 by a team of Chartered Landscape Professionals to verify the landscape and visual receptors identified through desk study, identify any further potential receptors which may be of relevance, and collate information on baseline landscape and visual amenity. Site recording involved the completion of standardised recording forms and annotation of 1:25,000 and 1:50,000 Ordnance Survey plans, supported by a photographic record of views from key receptor locations. True View Visuals augmented reality software was also used to verify visibility on site (see EIAR Volume 4: Technical Appendix 4.1 for further details).

Cumulative Baseline

- 4.4.20 The THC wind farm database¹⁵ was used to identify cumulative developments within 60 km of the turbines of the Proposed Varied Development (see Figure 4.6.1, EIAR Volume 3a). Based on this information and as agreed with statutory consultees the cumulative landscape and visual assessment (CLVIA) focuses on the three operational, one consented, one application and two scoping cumulative developments identified as most likely to result in cumulative impacts when experienced in combination with the Proposed Varied Development as listed above (see paragraph 4.4.13). Although scoping sites are not typically included in CLVIAs due to the associated uncertainty, THC requested the inclusion of two specific cumulative developments due to their proximity: Ackron wind farm and Armadale wind farm. With the exception of one, these cumulative developments are within the 20 km Detailed Study Area as shown on Figure 4.6.2 (EIAR Volume 3a). As such, although Baillie wind farm is beyond the Detailed Study Area, its influence is considered as part of the assessment.
- 4.4.21 As can be seen from Figure 4.6a (EIAR Volume 3a), there are numerous operational cumulative developments within 60 km of the Proposed Varied Development that are not included in the detailed CLVIA. As agreed with consultees, for the purposes of this assessment it is assumed that these will be captured within the baseline landscape and visual receptor descriptions, as appropriate. While they influence the character of the area and receptors, they are unlikely to result in significant cumulative impacts when experienced in combination with the Proposed Varied Development.

Identification of Potential Effects

- 4.4.22 The second step in the assessment process involves the identification of potential effects which could occur as a result of the interaction of the impacts of the Proposed Varied Development with the identified landscape and visual receptors.
- 4.4.23 The assessment takes into account direct effects upon existing landscape elements, features and key characteristics and also indirect effects which could occur secondary to changes affecting another landscape component or area. The ZTV is used as a tool to gauge the extent of potential indirect change, supported by targeted field surveys.
- 4.4.24 Consideration is given to effects on visual receptors that could arise from aspects of the Proposed Varied Development, and how these changes could be accommodated in the existing baseline view. The likely perceived value of a particular view to the viewer is considered, taking into account the nature of the receptor and the potential activity they might be involved in, and factors such as elevation, extent and key features or attractions which might feature in the view.

¹⁵ The Highland Council (2020) *Renewable Energy: Wind Turbine Map and Database* - https://www.highland.gov.uk/info/198/planning_-_long_term_and_area_policies/152/renewable_energy/4 [accessed January 2020]

Assessment of Residual Effects

Professional Judgement

- 4.4.25 GLVIA3¹ places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. As part of this assessment, professional judgement has been used in combination with structured methods and criteria to evaluate landscape value and landscape and visual sensitivity, magnitude and significance of effect. The assessment has been undertaken and verified by two Chartered Landscape Professionals to provide a robust and consistent approach.

Key Stages of the Assessment

- 4.4.26 GLVIA3 suggests that landscape and visual effects are assessed from a clear understanding of the development proposed and any mitigation measures which are being adopted.
- 4.4.27 The GLVIA3 methodology for landscape assessment involves an appreciation of the existing landscape resource, the susceptibility of its key components to accept the change proposed, and an understanding of the potential effects which could occur and how these could affect these key components.
- 4.4.28 Familiarity with the site and the extent, nature and expectation of existing views is a key factor in establishing the visual sensitivity in terms of the development proposed. The guidelines require evaluation of magnitude of change to views experienced by sensitive receptors, comprising individuals living, working, travelling and carrying out other activities within the landscape, and subsequent evaluation of effect significance.
- 4.4.29 The potential to mitigate adverse effects should also be considered for both landscape and visual assessment.
- 4.4.30 There are five key stages to the assessment:
- establishment of the baseline;
 - appreciation of the Proposed Varied Development;
 - identification of key landscape and visual receptors;
 - identification of potential landscape and visual effects; and
 - assessment of landscape and visual effect significance (residual effects).
- 4.4.31 Detailed methods and criteria for the above key stages are included under the relevant methodology sections for landscape and visual amenity below.

APPRECIATION OF THE PROPOSED VARIED DEVELOPMENT

- 4.4.32 Appreciation of the Proposed Varied Development involves the accumulation of a thorough knowledge of the proposal, its nature, scale and location within the baseline landscape or visual context, and any peripheral or ancillary features proposed. Analysis of the proposed activities and changes which would take place leads to an understanding of the potential effects that could occur. As part of this process, the ZTV diagram has been used to identify the potential range of effects.

IDENTIFICATION OF KEY RECEPTORS

- 4.4.33 The identification of landscape receptors is the first step in the analysis of the potential for significant landscape effects to take place. Landscape receptors comprise key characteristics or individual features which contribute to the value of the landscape and have the potential to be affected by the Proposed Varied Development. Landscape receptors are identified through analysis of baseline characteristics when considered in relation to the impacts which might result from a development of the type proposed.

- 4.4.34 For there to be a visual effect there is the need for a viewer. Those experiencing views are referred to as visual receptors. Potential visual receptors have been identified through analysis of the ZTV in combination with targeted field survey. Individuals experiencing views from locations such as buildings, recognised routeways and popular viewpoints used by the public have been included in the assessment.

Criteria for Assessing Sensitivity of Receptors

LANDSCAPE SENSITIVITY

- 4.4.35 Landscape sensitivity considers the nature of the landscape and its ability to accommodate development of the type proposed without compromising its key characteristics and components. The appraisal of landscape sensitivity involves consideration of the sensitivity of individual landscape receptors. There are two aspects which are considered when establishing the landscape sensitivity:
- Value: the baseline value of the landscape and the contributory value of individual landscape receptors to the landscape as a whole; and
 - Susceptibility to change: the ability of landscape receptors to accommodate development of the type proposed without changing the intrinsic qualities of the landscape as a whole.
- 4.4.36 The relative value of the landscape is an important consideration in informing later judgement of the significance of effects. Value concerns the perceived importance of the landscape, when considered as a whole and within the context of the study area. Landscape value is established through consideration of the following factors:
- presence of landscape designations, other inventory or registered landscapes / landscape features or identified planning constraints;
 - the scenic quality of the landscape;
 - perceptual aspects, such as wildness or tranquillity;
 - conservation interests such as cultural heritage features or associations, or if the landscape supports notable habitats or species;
 - recreational value; and
 - rarity, either in the national or local context or if it is considered to be a particularly important example of a specific landscape type.
- 4.4.37 It should be noted that absence of a designation does not necessarily mean that a landscape or component is not highly valued, as factors such as accessibility and local scarcity can render areas of nationally unremarkable quality highly valuable as a local resource. Criteria for the allocation of perceived landscape value are outlined below:
- High:
 - the landscape is closely associated with features of international or national importance which are rare within the wider context;
 - the landscape is of high scenic quality and forms a key part of an important designated landscape or planning constraint; and / or
 - the landscape is an example of a scarce resource within the local context and is of considerable local importance for its, scenic quality, recreational opportunities or cultural heritage associations.
 - Medium:
 - the landscape is associated with features of national or regional importance which are relatively common within the wider context;
 - the landscape forms part of a designated landscape or is associated with other features of importance but is not rare or distinctive within the local context; and / or

- the landscape is one of a number within the local context appreciated for its scenic quality, recreational opportunities or cultural heritage associations.
- Low:
 - the landscape characteristics are common within the local and regional context and the landscape is not associated with any particular features or attributes considered to be important; and / or
 - the landscape is of poor scenic quality and is not appreciated for any recreational or cultural associations.

4.4.38 Landscape sensitivity has been evaluated with reference to the subject areas above. A three-point scale is used as follows:

- **High** – a highly valued landscape of particularly distinctive character susceptible to relatively small changes of the type proposed;
- **Medium** – a reasonably valued landscape with a composition and characteristics tolerant of some degree of change of the type proposed; and
- **Low** – a relatively unimportant landscape which is potentially tolerant of a large degree of change of the type proposed.

VISUAL RECEPTOR SENSITIVITY

4.4.39 The evaluation of visual sensitivity considers both the perceived value of the existing view and the susceptibility of the visual receptor to change. It is important to note that the judgement of visual sensitivity is considered in relation to an understanding of both the existing view obtained by the viewer and the development proposed. Consideration is given to the likely perceived value of a particular view to the viewer, taking into account the nature of the receptor and the potential activity they might be involved in, and factors such as elevation, extent and key features or attractions which may feature in the view. The perceived value of the area of change as a part of the wider view obtained by the viewer therefore contributes to the sensitivity evaluation.

4.4.40 Visual sensitivity to the change proposed has been evaluated using a three-point scale as follows:

- **High**
 - dwellings and publicly accessible buildings where the changed aspect is an important element in the view obtained and there are no detracting features present; and
 - recreational routes and locations where the changed aspect is an important element in the view obtained and there are no detracting features present.
- **Medium**
 - dwellings and publicly accessible buildings where the changed aspect is a less important element in the view obtained and / or where some detracting features are present;
 - recreational routes and locations where the changed aspect is a less important element in the view obtained and / or where some detracting features are present;
 - roads and transport routes where the changed aspect is an important element in the view obtained and there are no detracting features present; and
 - workplaces where the changed aspect is an important element of the view obtained and there are no detracting features present.
- **Low**
 - dwellings and publicly accessible buildings where the changed aspect is an unimportant element in the view obtained and / or numerous detracting features are present;
 - recreational routes and locations where the changed aspect is an unimportant element in the view obtained and / or where numerous detracting features are present;

- roads and transport routes where the changed aspect is a less important element in the view obtained and / or where some detracting features are present; and
- workplaces where the changed aspect is a less important element in the view obtained and / or where some detracting features are present.

Criteria for Assessing Magnitude of Change

IDENTIFICATION OF POTENTIAL EFFECTS

- 4.4.41 The second step in the assessment process involves the identification of potential effects which could occur as a result of the interaction of the impacts of the Proposed Varied Development with the identified receptors.
- 4.4.42 The assessment takes into account direct effects upon existing landscape elements, features and key characteristics and also indirect effects which could occur secondary to changes affecting another landscape component or area. The ZTV is used as a tool to gauge the extent of potential indirect change, supported by targeted field surveys.
- 4.4.43 Identification of likely effects on the potential visual receptors is a two-fold process, giving consideration to how effects could arise from aspects of the Proposed Varied Development, and how these changes may be accommodated in the existing baseline view obtained by the viewer.

LANDSCAPE MAGNITUDE OF CHANGE

- 4.4.44 Magnitude of change concerns the degree to which the Proposed Varied Development would alter the existing characteristics of the landscape. The appraisal of magnitude involves consideration of the nature and scale of the change which would occur in relation to the identified potential effects and also the duration and potential reversibility of the effect. These changes are then combined to evaluate a magnitude rating for the LCT as a whole.
- 4.4.45 Magnitude is categorised on a four-point scale as follows:
- **High** – where the Proposed Varied Development would cause a notable change in landscape characteristics over an extensive area ranging to a very intensive change over a more limited area;
 - **Medium** – where the Proposed Varied Development would cause a perceptible change in landscape characteristics over an extensive area ranging to notable change in a localised area;
 - **Low** – where the Proposed Varied Development would cause a virtually imperceptible change in landscape characteristics over an extensive area or perceptible change in a localised area; and
 - **Negligible** – where the Proposed Varied Development would cause no discernible change in any landscape characteristics or components.
- 4.4.46 In recognition of the differing changes that would occur during construction works and in the longer term, two ratings for magnitude of change have been included: during the construction of the Proposed Varied Development and during operation, once construction and reinstatement works have been completed.

VISUAL MAGNITUDE OF CHANGE

- 4.4.47 Magnitude of change concerns the extent to which the existing view obtained by the viewer would be altered by the Proposed Varied Development. The evaluation of magnitude gives consideration to factors such as the scale or extent of the changes within the view obtained, the extent to which this could alter the composition or focus of the view obtained and the duration and reversibility of these changes.
- 4.4.48 Magnitude of change has been evaluated using a four-point scale comprising the following criteria:

- **High** – where the Proposed Varied Development would cause a very noticeable change in the existing view obtained by the viewer;
- **Medium** – where the Proposed Varied Development would cause a noticeable change in the existing view obtained by the viewer;
- **Low** – where the Proposed Varied Development would cause a perceptible change in the existing view obtained by the viewer; and
- **Negligible** – where the Proposed Varied Development would cause a largely imperceptible change in the existing view obtained by the viewer.

4.4.49 In recognition of the differing changes that would occur during construction works and in the longer term, two ratings for magnitude of change have been included: during the construction of the Proposed Varied Development and during operation, once construction and reinstatement works have been completed.

Criteria for Assessing Significance

ASSESSMENT OF LANDSCAPE EFFECT SIGNIFICANCE

4.4.50 Evaluation of the predicted significance of effect has been carried out through analysis of the anticipated magnitude of change in relation to the identified landscape sensitivity and using a degree of professional judgement. The assessment takes into account identified effects upon existing landscape receptors and assesses the extent to which these would be lost or modified in the context of their importance in determining the existing baseline character.

4.4.51 Effect significance has been evaluated using a four-point scale and using the following criteria:

- **Major** – the Proposed Varied Development is at considerable variance with the landform, scale and pattern of the landscape and would be a dominant feature, resulting in considerable reduction in scenic quality and large-scale change to the intrinsic landscape character of the area;
- **Moderate** – the Proposed Varied Development is out of scale with the landscape, or inconsistent with the local pattern and landform and would be locally dominant and / or result in a noticeable reduction in scenic quality and a degree of change to the intrinsic landscape character of the area;
- **Minor** – the Proposed Varied Development does not quite fit with the scale, landform or local pattern of the landscape and would be locally intrusive but would result in an inappreciable reduction in scenic quality or change to the intrinsic landscape character of the area; and
- **Negligible** – the Proposed Varied Development sits well within the scale, landform and pattern of the landscape and would not result in any discernible reduction in scenic quality or change to the intrinsic landscape character of the area.

4.4.52 As for magnitude of change, the differing potential effects have been considered during the construction of the Proposed Varied Development during operation, following completion of construction works and reinstatement.

4.4.53 For the purposes of the assessment, effects with a rating of **Moderate** or above are considered to be significant.

ASSESSMENT OF VISUAL EFFECT SIGNIFICANCE

4.4.54 The level of effect identified concerns the importance of changes resulting from the introduction of the Proposed Varied Development. Evaluation of the visual effect is based on consideration of the magnitude of change in relation to visual sensitivity, taking into account proposed mitigation measures, and is established using professional judgement. The assessment takes into account likely changes to the visual composition, including the extent to which new features would distract,

screen existing elements, or disrupt the scale, structure or focus of the existing view obtained by the viewer.

4.4.55 Effect significance has been evaluated using a four-point scale and using the following criteria:

- **Major** – the Proposed Varied Development would become a prominent and very detracting feature and would result in a very noticeable deterioration to an existing highly valued and well composed view;
- **Moderate** – The Proposed Varied Development would introduce some detracting features to an existing highly valued view or would be more prominent within a pleasing or less well composed view, resulting in a noticeable deterioration of the quality of view;
- **Minor** – the Proposed Varied Development would form a perceptible but not detracting feature within a pleasing or valued view or would be a prominent feature within a poorly composed view of limited value, resulting in a small deterioration to the existing view; and
- **Negligible** – the Proposed Varied Development would form a barely perceptible feature within the existing view and would not result in any discernible deterioration to the view.

4.4.56 As for magnitude of change, the predicted effects have been considered during the construction of the Proposed Varied Development and following completion.

4.4.57 For the purposes of the assessment effects with a rating of **Moderate** or above are considered to be significant.

Assessment of Residual Cumulative Effects

4.4.58 Cumulative landscape effects may result where a number of wind energy developments combine, increasing the prevalence of wind turbines to an extent where they might become a defining characteristic within a landscape or view obtained. The likely significance of these effects relates to the number of wind developments, their scale, the inter-relationship between their respective visual envelopes and the sensitivity and capacity of the particular receptor to accommodate this type of development.

4.4.59 The methodology for the CLVIA is based on the SNH guidance: Assessing the Cumulative Impact of Onshore Wind Energy Proposed Development (SNH, 2012)¹⁶. The assessment considers the potential for combined effects on designated and protected landscapes, LCTs and visual receptors resulting from the addition of the Proposed Varied Development to the cumulative development baseline. Combined views of cumulative developments are expressed as either ‘in combination’ (where turbines from different cumulative developments would be observable at the same time) or ‘in succession’ (where an observer would be required to turn to experience multiple cumulative developments).

4.4.60 The assessment also considers the potential for sequential effects experienced from receptors on routes where different wind developments become visible whilst the viewer moves through the landscape. Sequential effects may be occasional, frequent or constant.

4.4.61 The CLVIA considers designated and protected landscapes, LCTs and visual receptors identified for inclusion in the detailed landscape assessment. However, areas identified as likely to have a negligible effect on the landscape assessment have not been included, as a negligible effect would not contribute to a significant cumulative effect.

Evaluation of Landscape Capacity

4.4.62 SNH guidance on cumulative landscape assessment¹⁶ describes the need for an understanding of whether a proposed wind farm crosses the threshold of acceptability for the total number of wind farms in a landscape area. The capacity of the landscape to accommodate multiple wind farms has

¹⁶ Scottish Natural Heritage, (2014), *Assessing the Impacts on Wild Land Interim Guidance Note (with note added October 2014)*.

been evaluated using baseline landscape data. Consideration has been given to the scenic quality, value and sensitivity to change of the relevant designated or protected area or LCT. A cumulative value has been attributed to each area based on a three-point scale from High to Low as follows:

- **High** – the landscape has the potential to accommodate multiple wind farms / wind turbines without significant loss of key characteristics or features;
- **Medium** – the landscape has the potential to accommodate some wind farms / wind turbines but there is potential for key characteristics or features to be locally dominated or eroded by the presence of wind turbines; and
- **Low** – the landscape would have few opportunities for wind farm / wind turbine development which would not dominate or erode key characteristics or features.

Appraisal of the Baseline Wind Energy Development Scenario

- 4.4.63 Baseline information on cumulative developments within the 60 km search area is gathered to develop an understanding of the wider cumulative baseline scenario. This is then refined in consultation with statutory consultees to identify those cumulative developments considered to have greater potential to result in significant effects in combination with the Proposed Varied Development.
- 4.4.64 The cumulative development baseline is described for each landscape area and considers wind farms / turbines which affect the landscape both directly and indirectly. The identification of the cumulative visual context involves consideration of the scale, location and nature of the cumulative developments within the view obtained, the proportion of the view which would be occupied by wind turbines and the potential importance of this part of the view to the viewer.

Criteria for Assessing Cumulative Sensitivity of Receptors

EVALUATION OF CUMULATIVE LANDSCAPE SENSITIVITY TO CHANGE

- 4.4.65 An evaluation of landscape sensitivity to change has been attributed to each designated and protected landscape and LCT based on analysis of the cumulative development baseline in relation to the identified capacity value of the landscape to accommodate wind farm development. This is based on a three-point scale from High to Low as follows:
- **High** – the cumulative development baseline is very close to or achieves the identified capacity of the area resulting in little opportunity for additional development without significant effects occurring;
 - **Medium** – the cumulative development baseline leaves some opportunity for additional development within the landscape without significant effects resulting; and
 - **Low** – the cumulative development baseline leaves considerable opportunity for additional development within the landscape without significant effects resulting.

EVALUATION OF CUMULATIVE VISUAL SENSITIVITY TO CHANGE

- 4.4.66 The evaluation of visual sensitivity to change concerns the nature of the existing view obtained by the viewer in the context of the cumulative development baseline, the potential for further wind turbines to be accommodated within that view without significantly altering, obstructing or dominating it. An evaluation of visual sensitivity to change has been attributed to each receptor based on a three-point scale as follows:
- **High** – where cumulative developments would be well accommodated within an existing valued or well composed view obtained by the viewer and / or the proposed changed landscape forms an important part of it;
 - **Medium** – where cumulative developments would be present but not prominent in the existing view obtained by the viewer, and / or the proposed changed landscape forms a less important part of it; and

- **Low** – where cumulative developments would be prominent in an existing view obtained by the viewer / or the changed landscape forms an unimportant part of it.

Criteria for Assessing Cumulative Magnitude of Change

- 4.4.67 Magnitude of change concerns the degree of change which would occur as a result of the addition of the Proposed Varied Development to the cumulative development baseline. This is based on the consideration of the potential nature, size, scale and location of the Proposed Varied Development within the context of the cumulative development baseline. The evaluation of magnitude of change is based on the criterial outline in the main landscape and visual assessment (see paragraphs 4.4.45 and 4.4.48).

Criteria for Assessing Cumulative Significance

- 4.4.68 Assessment of predicted cumulative effects is based on analysis of the relationship between cumulative sensitivity to change and the magnitude of change and is made using a degree of professional judgement. It should be noted that the cumulative effect assessed is the result of the addition of the Proposed Varied Development to the cumulative development baseline.
- 4.4.69 The cumulative landscape assessment is based upon a four-point scale as follows:
- **Major** – the addition of the Proposed Varied Development to the cumulative development baseline would result in the capacity of the landscape to accommodate wind energy development being overreached and the combined appearance of wind turbines in the landscape becoming a dominant and character defining feature;
 - **Moderate** – the addition of the Proposed Varied Development to the cumulative development baseline would increase the appearance of wind turbines in the landscape to the extent that they may become locally dominant, but the Proposed Varied Development would not exceed the overall capacity of the landscape to accommodate wind energy development;
 - **Minor** – the addition of the Proposed Varied Development to the cumulative development baseline would add to the appearance of wind turbines in the landscape but would not result in a noticeable change to key landscape characteristics; and
 - **Negligible** – the addition of the Proposed Varied Development to the cumulative development baseline would not result in any discernible increase to the appearance or dominance of wind turbines in the landscape.
- 4.4.70 The cumulative visual assessment is based upon a four-point scale as follows:
- **Major** – the addition of the Proposed Varied Development to views obtained of the cumulative development baseline would result in a very noticeable increase in wind turbines to the extent whereby they would become a dominating or obstructive feature within the view;
 - **Moderate** – the addition of the Proposed Varied Development to views obtained of the cumulative development baseline would result in a noticeable increase in wind turbines to the extent whereby they would become prominent but would not dominate or obstruct the view;
 - **Minor** – the addition of the Proposed Varied Development to views obtained of the cumulative development baseline would result in a perceptible increase in wind turbines but would not increase the prominence of wind farms / turbines as a feature in the view; and
 - **Negligible** – the addition of the Proposed Varied Development to views obtained of the cumulative development baseline would not result in any discernible increase in the appearance of wind turbines in the view.

Assessment of Residual Aviation Lighting Effects

- 4.4.71 The methodology for the aviation lighting assessment is presented in Technical Appendix 4.10 (EIAR Volume 4).

Assumptions and Limitations

- 4.4.72 The LVIA and CLVIA have been subject to the following assumptions and limitations:
- 4.4.73 The prominence of the Proposed Varied Development in the landscape would vary according to the prevailing weather conditions. The assessment has been carried out, as is best practice, by assuming the 'worst case' scenario i.e. on a clear, bright day in winter, when neither foreground deciduous foliage nor haze would interfere with the clarity of the view obtained.
- 4.4.74 The assessment of operational effects assumes that all disturbed areas not required for the operation of the Proposed Varied Development (laydown areas, temporary construction compounds, excavations for wind turbine foundations and borrow pits) would be successfully reinstated in line with the Habitat Management Plan as outlined in Technical Appendix 9.5 (EIAR Volume 4).
- 4.4.75 ZTVs are used to inform the landscape, visual and cumulative assessments. The limitations and technical specifications for production of ZTVs are included in Technical Appendix 4.1 (EIAR Volume 4).
- 4.4.76 The field assessment of visual effects has been undertaken from public roads, footpaths or open spaces. For residential receptors, assumptions have been made about the types of rooms and about the types and importance of views from these rooms. For there to be a visual effect, there is the need for a viewer and therefore only buildings that are in use have been considered in the visual assessment.
- 4.4.77 A number of existing wind farms are operational within the Wider Study Area. It should be noted that the baseline for the LVIA considers all operational wind farms, as identified on Figure 4.6a (EIAR Volume 3a), but it does not include consented, application or scoping sites which are considered within the cumulative development baseline for the CLVIA.
- 4.4.78 In line with best practice, the CLVIA considers cumulative developments which are operational, consented, or the subject of a current valid planning application or appeal as identified and agreed with THC; these are shown on Figure 4.6b (EIAR Volume 3a). With the exception of Ackron wind farm and Armadale wind farm, sites at scoping stage have not been considered due to the uncertainty as to whether these sites would progress and their likely nature and scale. The inclusion of Ackron wind farm and Armadale wind farm was specifically requested by THC due to their close proximity to the Proposed Varied Development.
- 4.4.79 Due to the uncertainty of construction activity timing for the Proposed Varied Development and other such activity, temporary structures, tracks and activity relating to construction have not been considered within the cumulative assessment. The cumulative assessment therefore focusses on the predicted effects relating to the operation of the Proposed Varied Development.
- 4.4.80 Since the number of cumulative development applications made or withdrawn changes frequently, a cumulative cut-off date of 21st January 2020 was agreed with THC and has been applied to the collection of data. All new applications, applications withdrawn and addendums to current projects that have taken place since this period have therefore not been considered in this assessment.
- 4.4.81 The cumulative search has considered only those cumulative developments of 50 m tip height or greater as it is considered that smaller turbines would be unlikely to result in significant cumulative effects in association with the Proposed Varied Development.

4.5 Policy and Guidance

- 4.5.1 The assessment has taken account of national, regional and local policy and guidance relating to landscape character and visual amenity relevant to the Proposed Varied Development. Detailed information on planning policy is contained within the accompanying Planning Statement (which is

submitted as a standalone document with the application for consent). The following provides a summary of the policy documents and statements that have been referred to in carrying out this assessment:

National

4.5.2 National planning policy and guidance relevant to landscape and renewable energy includes:

- National Planning Framework for Scotland 3 (NPF3)¹⁷;
- Scottish Planning Policy (SPP)¹⁸;
- Scottish Government Online Planning Guidance for Onshore Wind Turbines (last updated May 2014);¹⁹
- Planning Advice Note 60 – Planning for Natural Heritage (PAN 60)²⁰;
- Scottish Energy Strategy: The future of energy in Scotland²¹;
- Renewable Energy and the Natural Heritage, SNH Policy Document²²; and
- Wildness in Scotland's Countryside, SNH Policy Statement 02/03²³.

Regional

- The Highland-wide Local Development Plan, 2012 (HwLDP)²⁴;
- Caithness and Sutherland Local Development Plan (CaSPlan)²⁵; and
- The Highland Council Onshore Wind Energy Supplementary Guidance²⁶ (OWESG).

Highland-wide Local Development Plan (HwLDP)

4.5.3 As the site falls within the THC Planning Authority area, the HwLDP forms the key element of spatial planning policy for the Proposed Varied Development. Policy 61: Landscape concerns the protection of landscape qualities. This states that:

*"New developments should be designed to reflect the landscape characteristics and special qualities identified in the Landscape Character Assessment of the area in which they are proposed. This will include consideration of the appropriate scale, form, pattern and construction materials, as well as the potential cumulative effect of developments where this may be an issue. The Council would wish to encourage those undertaking development to include measures to enhance the landscape characteristics of the area. This will apply particularly where the condition of the landscape characteristics has deteriorated to such an extent that there has been a loss of landscape quality or distinctive sense of place. In the assessment of new developments, the Council will take account of Landscape Character Assessments, Landscape Capacity Studies and its supplementary guidance on Siting and Design and Sustainable Design, together with any other relevant design guidance."*²⁴

4.5.4 Policy 57: Natural, Built and Cultural Heritage²⁴ is also of relevance in relation to the protection of designated areas. With respect to areas of national importance (such as National Scenic Areas (NSAs) and Wild Land Areas (WLAs)), Part 2 of the policy states:

"...we will allow developments that can be shown not to compromise the natural environment, amenity and heritage resource. Where there may be any significant adverse effects, these must be

¹⁷ Scottish Government, (2014), *National Planning Framework 3: A Plan for Scotland: Ambition, Opportunity, Place*.

¹⁸ Scottish Government, (2014), *Scottish Planning Policy*.

¹⁹ Scottish Government, (2014), *Online Planning Guidance for Onshore Wind Turbines (last updated May 2014)*.

²⁰ Scottish Government, (2002, updated 2008), *Planning Advice Note 60: Planning for Natural Heritage*.

²¹ Scottish Government, (2017), *Scottish Energy Strategy: The future of energy in Scotland*.

²² Scottish Natural Heritage, (2010), *Renewable Energy and the Natural Heritage*.

²³ Scottish Natural Heritage, (2002), *Wildness in Scotland's Countryside: Policy Statement 02/03*.

²⁴ The Highland Council, (2012), *Highland-wide Local Development Plan*.

²⁵ The Highland Council, (2018), *Caithness and Sutherland Local Development Plan*.

²⁶ The Highland Council (November 2016 (with addendum, December 2017)) *Onshore Wind Energy Supplementary Guidance*.

clearly outweighed by social or economic benefits of national importance. It must also be shown that the development will support communities in fragile areas who are having difficulties in keeping their population and services".²⁴

- 4.5.5 With respect to areas of local/regional importance (e.g. Special Landscape Area (SLA)) Part 1 of this policy states:

"...we will allow developments if it can be satisfactorily demonstrated that they will not have an unacceptable impact on the natural environment, amenity and heritage resource."²⁴

The Highland Council Onshore Wind Energy Supplementary Guidance (OWESG)

- 4.5.6 The OWESG²⁶ provides further guidance on measures to be considered for the design and assessment of onshore wind farms. In relation to landscape and visual amenity it identifies ten criteria to be used by THC as a framework and focus for assessing proposals. An analysis of the Proposed Varied Development in relation to these criteria is presented in the Planning Statement.
- 4.5.7 Onshore Wind Energy Supplementary Guidance: Part 2b Highland Strategic Capacity (OWESG: Part 2b) identifies sensitivities of landscapes in the area to wind farm development and provides guidance for their siting. It identifies Key Views, Key Routes and Key Gateways for the area. Although the Proposed Varied Development would be located outwith the OWESG: Part 2b study area and any effects experienced would be indirect, these Key Receptors have also been given consideration in the Planning Statement.

4.6 Baseline Conditions

Current Baseline

Site Description and Context

- 4.6.1 The site is located in an area of sweeping moorland to the south of the A836 and Scotland's northern coastline. The area is characterised by a flat, gently undulating and generally smooth landscape. It forms part of the setting to the surrounding summits, particularly the nearby Bens Grian, the distinctive form and prominence of which are accentuated by the simple, open and expansive nature of the low-lying moorland. Although the immediate area is sparsely settled, it is strongly influenced by turbines and access tracks of the operational Strathy North wind farm. Dispersed crofts, farms and small settlements are present along the coast and in the nearby straths, closely related to the transportation and infrastructure corridors running through the wider area.
- 4.6.2 The Wider Study Area, particularly to the east of the site, is characterised by the peatlands and bogs that make up the Flow Country that stretches across Caithness and Sutherland. These areas are largely uninhabited and add to the sense of remoteness and isolation experienced across much of the area. The flows are interrupted by iconic hills that can be seen from much of the area due to the flat nature of the low-lying moorland. To the west, the Kyle of Tongue NSA and the distinctive summits of Ben Hope and Ben Loyal characterise the area and act as landmarks for much of the Wider Study Area. To the south, Ben Klibreck, Ben Armine, Morven, and Scaraben define the skyline. To the north, the dramatic coastline and views out to sea, including to distant Orkney, characterise the area.
- 4.6.3 Major infrastructure is frequently present within this wider landscape including the 275 kV overhead transmission line through Strath Halladale, past Connagill substation and connecting into Dounreay Nuclear Power Station. Existing wind farms are also characteristic of the Wider Study Area particularly through the farmed lowlands of Caithness where they are a relatively regular feature (see Figure 4.6a (EIAR Volume 3a). Nevertheless, the Wider Study Area also features areas where there are few contemporary features and impressions of wildness and remoteness are

therefore stronger as demonstrated by the identification of a number of Wild Land Areas by SNH (see Figure 4.3a (EIAR Volume 3a)).

Landscape Designations

- 4.6.4 Landscapes can be recognised for their importance and scenic qualities and attractiveness through international, national, regional or local designations. These designated areas are protected through planning policy at either the national, regional or local level. Designated areas within the Wider Study Area are illustrated on Figure 4.3a (EIAR Volume 3a) and described in Technical Appendix 4.3 (EIAR Volume 4).

Landscape Character

- 4.6.5 SNH, in conjunction with partner Councils, has undertaken detailed review and classification of various landscape areas and types of Scotland. This process subdivides the landscape into particular units which are considered to have a consistent and recognisable landscape character, known as Landscape Character Types (LCTs). This study was originally undertaken at a regional level in the 1990s but was updated through the identification of new LCTs at a national scale in January 2019⁸. The revised Scottish LCT dataset (2019) amalgamates some of the original LCTs included in the 1998 Caithness and Sutherland Landscape Character Assessment²⁷ leading to a broader characterisation of the landscape. It breaks the Detailed Study Area into 10 LCTs where it is considered that a recognisable distinction in landform, land-cover and features leads to a unique sense of character. These are illustrated on Figure 4.4a (EIAR Volume 3a) and described in Technical Appendix 4.3 (EIAR Volume 4).

Visual Amenity: Baseline

- 4.6.6 As outlined in Technical Appendix 4.1 (EIAR Volume 4), a ZTV for the Proposed Varied Development (calculated at maximum blade tip height of 200 m) was established to identify areas of potential visibility. A review of the ZTV, in conjunction with an initial site appraisal led to the identification of visual receptors within the 45 km Wider Study Area:
- at Viewpoints;
 - in Settlements; and
 - on Routes.

Cumulative: Baseline

- 4.6.7 The THC wind farm database¹⁵ was used to identify potential cumulative developments within 60 km of the turbines of the Proposed Varied Development (see Figure 4.6a, EIAR Volume 3a). Based on this information and as agreed with statutory consultees the cumulative landscape and visual assessment (CLVIA) focuses on the seven cumulative developments identified as most likely to result in significant cumulative impacts when experienced in combination with the Proposed Varied Development. Of these, six cumulative developments are within 20 km of the Proposed Varied Development and one (Baillie wind farm) sits just outwith this buffer. The seven cumulative developments included in the detailed CLVIA are shown on Figure 4.6b (EIAR Volume 3a) and are as follows (further information is provided on each in Technical Appendix 4.5 (EIAR Volume 4)):
- Baillie wind farm (Operational);
 - Bettyhill wind farm (Operational);
 - Strathy North wind farm (Operational);
 - Strathy Wood wind farm (Application);
 - Limekiln wind farm (Consented);

²⁷ Stanton, C., (1998), *Caithness and Sutherland Landscape Character Assessment: Scottish Natural Heritage Review No. 103*. Perth: Scottish Natural Heritage.

- Ackron wind farm (Scoping); and
- Armadale wind farm (Scoping).

4.6.8 For the purposes of this assessment it is assumed that operational cumulative developments beyond the 20 km buffer are captured within the baseline landscape and visual receptor descriptions as appropriate. While they influence the character of the area and receptors, they would be unlikely to result in significant cumulative impacts when experienced in combination with the Proposed Varied Development.

Future Baseline

4.6.9 Historically the Detailed Study Area has experienced limited changes in terms of land cover and land use. The more significant adjustments surrounded the change from crofting to sheep farming that took place with the clearances, and the introduction of commercial forest. In more recent years, road improvements have taken place largely associated with commercial forestry operations and wind farm developments. Peatland restoration is also taking place across the Detailed Study Area as part of wider ecological improvement initiatives. Wind farm developments are becoming an increasingly common feature within both the Detailed and Wider Study Areas. Given the available information on cumulative developments in the planning process, it can be assumed that this trend will continue in the future whether the Proposed Varied Development proceeds or not.

Identified Sensitive Receptors

- 4.6.10 The following section summarises the receptors identified as being sensitive to the Proposed Varied Development and which have been 'scoped-in' to the assessment. This exercise is summarised in Technical Appendix 4.2 (EIAR Volume 4).
- 4.6.11 A ZTV diagram was used to establish areas of potential visibility / intervisibility and therefore identify sensitive receptors. The ZTV shows that theoretical visibility of the Proposed Varied Development would be largely concentrated within the Detailed Study Area, becoming more fragmented beyond 20 km (see Figure 4.1a, EIAR Volume 3a). The greatest concentration of potential visibility shown would be within approximately 4 km to the west 6 km to the south, 8 km to the east and 11 km to the north of the turbines. Beyond this distance ZTV coverage becomes patchier, limited to higher ground and facing slopes. There would also be scattered visibility to the north of the site from the A836 and the communities along it. There would be a secondary concentration of theoretical visibility in the eastern part of the Detailed Study Area focused within 16 km of the turbines along the west facing slopes of Strath Halladale.
- 4.6.12 As noted in Technical Appendix 4.1 (EIAR Volume 4), the ZTV is based on a bare ground model. This means that it is likely that the visibility of the Proposed Varied Development would be somewhat less than that shown by the ZTV. Localised scrub and other vegetation would partially screen or filter views from some locations; particularly where the theoretical visibility indicates that only a small part of the blade tips would be seen over the horizon.

LANDSCAPE DESIGNATIONS

- 4.6.13 An initial scoping exercise was undertaken to review all designated and protected landscapes within the Wider Study Area and to identify those where there could be potential for significant effects. Those areas identified as having the potential to be affected by the Proposed Varied Development and therefore included in the detailed assessment are listed in Table 4.3 below.
- 4.6.14 Areas scoped out of further assessment were considered very unlikely to receive significant effects as a result of the Proposed Varied Development due to distance from the turbines or limited theoretical visibility.

Table 4.3: Designated and Protected Landscapes within the Wider Study Area		
	Scoped into the Assessment	Scoped out of the Assessment
National Context		
National Scenic Areas (NSA)	Kyle of Tongue NSA	North – West Sutherland NSA
Gardens and Design Designated Landscapes (GDL)		- Tongue House GDL - Dunbeath Castle GDL
Wild Land Areas (WLA)	- WLA 39: East Halladale Flows - WLA 35: Ben Klibreck – Armine Forest - WLA 36: Causeymire – Knockfin Flows - WLA 38: Ben Hope – Ben Loyal	- WLA 37: Fonaven – Ben Hee - WLA 34: Reay – Cassley - WLA 40: Cape Wrath
Regional / Local Context		
Special Landscape Areas (SLA)	- Farr Bay, Strathly and Portskerra SLA - Ben Klibreck and Loch Choire SLA - Bens Griam and Loch nan Clar SLA - The Flow Country and Berriedale Coast SLA - Dunnet Head SLA	- Eriboll East and Whiten Head SLA - Oldshoremore Cape Wrath and Durness SLA - Loch Fleet, Loch Brora and Glen Loth SLA

- 4.6.15 Detailed baseline descriptions for those areas which have been scoped into the assessment are included in Technical Appendix 4.3 (EIAR Volume 4).

LANDSCAPE CHARACTER AREAS

- 4.6.16 The LCTs within the Detailed Study Area were reviewed to identify those where there could be potential for significant effects. Of the nine LCTs within the Detailed Study Area six were identified as being potentially sensitive to the Proposed Varied Development. The High Cliffs and Sheltered Bays LCT (141), Sandy Beaches and Dunes LCT (140) and Farmed Lowland Plain LCT (143) have minimal ZTV coverage on the periphery of the Detailed Study Area. As such it is considered very unlikely that the Proposed Varied Development would result in any significant effect to either of these LCTs and therefore they have been scoped out of further assessment. The LCTs identified for inclusion in the assessment were as follows:
- Coastal Crofts and Small Farms LCT (144);
 - Lone Mountains LCT (138);
 - Rocky Hills and Moorland LCT (136);
 - Rounded Hills – Caithness and Sutherland LCT (135);
 - Strath – Caithness & Sutherland LCT (142); and
 - Sweeping Moorland and Flows LCT (134).

- 4.6.17 These LCTs are illustrated on Figure 4.4a (EIAR Volume 3a) and described fully in Technical Appendix 4.3 (EIAR Volume 4).

VIEWPOINTS

- 4.6.18 Thirteen viewpoints were identified for inclusion in the assessment within the 45 km Wider Study Area. At the request of THC an additional viewpoint outside of the 45 km Wider Study Area was included at Dunnet Head to reflect the importance of the area as the most northerly point of

mainland Britain, and a popular tourist stop. These viewpoints are intended to be representative of the views obtained by receptors in the area within which they are located or illustrative of worst-case views from the locality. Details on the selection process for each is included in Technical Appendix 4.2 (EIAR Volume 4). Key information for all 14 viewpoints is provided in Table 4.4 below. These viewpoints are illustrated on Figure 4.5a (EIAR Volume 3a) and described fully in Technical Appendix 4.4 (EIAR Volume 4). The table also identifies the viewpoints for which turbine lighting visualisations are provided as part of Technical Appendix 4.10 (EIAR Volume 4).

Table 4.4: Viewpoint List

LVIA Viewpoint Number	Location	Grid Reference	Receptor Type
VP1*	Ben Griam Beg	283185, 941167	SLA / Viewpoint
VP2*	Cnoc Riabhach	292003, 937695	WLA 36
VP3* / **	Loch nan Clach Geala	295343, 957116	WLA 39
VP4* / **	East of Melvich	291737, 964451	Route
VP5* / **	Strathly	284158, 965040	Settlement
VP6*	Bettyhill Viewpoint	274862, 961925	Route / Viewpoint
VP7* / **	A836 west of the B871 (nr Borgie)	269437, 957272	Route
VP8*	Sgor Chaonasaid	257961, 949822	NSA / WLA 38
VP9*	Creag na h-Iolaire	267353, 928879	WLA 35
VP10*	Beinn Ratha	294954, 960923	WLA 39
VP11*	Forsinard (Far North Line)	288982, 942360	Settlement / Route
VP12*	A'Mhoine House	251844, 960034	Route / Viewpoint
VP13*	A836 near Middleton	305958, 969490	Route
VP14	Dunnet Head	320519, 976504	SLA / Viewpoint
* Photomontage provided: Photographs taken as per current good practice, Visual Representation of Wind Farms Guidance (Version 2.2)²⁸ **Turbine lighting visualisation provided. These have been located as close as possible to those for the main LVIA. However, some have been slightly relocated for safety reasons.			

ROUTES

- 4.6.19 The visual assessment considers receptors on major routes (A-Roads and B-Roads) and recreational routes identified within the 20 km Detailed Study Area. The majority of unclassified minor roads within the Detailed Study Area are local access roads to residential properties, as such they are covered by the settlements listed below and are therefore scoped out of the detailed route receptor assessment. There are numerous core paths within the Detailed Study Area, however, visibility on the majority of these is limited or is covered by one of the settlements listed below and they have therefore been scoped out.
- 4.6.20 Receptors on the following routes are included in the visual assessment (see EIAR Volume 4: Technical Appendix 4.4 for full descriptions):
- A836 - Between Tongue and the eastern edge of Detailed Study Area (NC500/ Cycle Route 1);
 - A836 - From Tongue south to the edge of the Detailed Study Area;
 - A897;

²⁸ Scottish Natural Heritage, (2017), *Visual Representation of Wind Farms (Version 2.2)*.

- B871 (north);
- B871 (south);
- B873;
- Far North Railway Line;
- Scottish Hill Track 344 – Strath Halladale (Trantlebeg) to Strathly;
- Scottish Hill Track 342 – Crask Inn to Badanloch Lodge;
- Scottish Hill Track 343 – Halkirk to Forsinain or Braemore (Forsinain to Altnabrec section);
- Core Path SU04.02 – Torrisdale – Invernaver, Coast Route;
- Core Path SU04.04 – Clachan Burn (Bettyhill to Bettyhill Community Turbines Loop);
- Core Path SU04.05 – Kirtomy – Cnoc Mor Circuit; and
- Core Path SU24.05 – Ben Tongue Circuit.

SETTLEMENTS

4.6.21 The visual assessment also considers receptors in settlements and rural groupings identified within the 20 km Detailed Study Area where the ZTV indicates theoretical visibility. These are identified below using the names reflected on the 1:50,000 Ordinance Survey Map. Receptors at the following settlements are included in the visual assessment (see Technical Appendix 4.4 (EIAR Volume 4) for full descriptions).

- Strathly (north of the A836 and east of the River Strathly);
- Strathly (south of the A836 and east of the River Strathly);
- Strathly (west of the River Strathly);
- Strathly Point;
- Baligill;
- Brawl;
- Lednagullin;
- Crask / Farr;
- Modsary / Skerray;
- Skelpick; and
- Forsinard.

CUMULATIVE ASSESSMENT RECEPTORS

4.6.22 Receptors identified for inclusion in the CLVIA are described in detail in Technical Appendix 4.6 and Technical Appendix 4.7 (EIAR Volume 4). These have been selected through analysis of the cumulative ZTVs and review of the main landscape and visual assessment. The assessment has been limited to those receptors where the cumulative ZTV indicates that the Proposed Varied Development would have combined and / or sequential visibility within another cumulative development. The cumulative assessment excludes those receptors which were identified as experiencing a less than Minor effect (see EIAR Volume 4: Technical Appendices 4.3 and 4.4) as it is considered that these would not contribute to a significant cumulative effect.

4.7 Potential Significant Effects

4.7.1 This section describes the potential significant effects which could occur as a result of the Proposed Varied Development.

Potential Construction Effects

- 4.7.2 The proposed construction methods and timescale are described in Chapter 2: Description of Development (EIAR Volume 2). The following construction activities have the potential to result in effects on landscape and visual receptors:
- construction of the turbines and foundations and crane pads;
 - construction of new access tracks;
 - construction of the on-site substation and associated infrastructure including installation of underground cables;
 - construction of temporary site compounds and laydown areas;
 - excavation of borrow pits; and
 - reinstatement works.
- 4.7.3 Potential construction effects are inherently temporary in nature, but construction works have the potential to result in long term changes to the character and visual amenity of the surrounding area if poorly managed. To ensure these effects are reversible on completion of construction and reinstatement, they would be managed and mitigated through good practice construction management (see EIAR Volume 4: Technical Appendix 2.1 CEMP).

Potential Operational Effects

- 4.7.4 As outlined in Chapter 2: Description of Development (EIAR Volume 2) the operational life of the Proposed Varied Development would be 50 years. Potential landscape and visual effects that would be associated with the operation of the Proposed Varied Development include:
- the wind turbines;
 - turbine lighting;
 - access tracks;
 - on-site substation and associated infrastructure; and
 - restored temporary construction areas including borrow pits and laydown areas.

Potential Decommissioning Effects

- 4.7.5 Any decommissioning proposals would be developed in consultation with statutory consultees at the time. It is assumed that the focus of these would be to reduce potential effects. As a result, effects arising from the process of decommissioning the Proposed Varied Development have been scoped out since they would be of a similar nature to construction effects, but of a smaller scale and shorter duration. Where the assessment refers to potential construction effects these are also considered representative of potential decommissioning effects.

Potential Cumulative Operational Effects

- 4.7.6 Cumulative effects are those that would occur as a result of the construction of more than one development of similar type within the landscape. In terms of landscape character, cumulative landscape effects may result where a number of wind energy developments combine, increasing the prevalence of wind turbines within a landscape to an extent where they may become a defining characteristic. In terms of visual amenity, cumulative effects may result where a number of wind energy developments combine within a particular view obtained from a receptor, increasing the prominence of wind turbines.

4.8 Mitigation

Mitigation during Construction

- 4.8.1 Landscape and visual mitigation measures relating to the construction and successful reinstatement of disturbed ground associated with the Proposed Varied Development would be managed through good practice and construction management (see Sections 15 and 22 of the Outline CEMP in EIAR Volume 4: Technical Appendix 2.1).

Mitigation during Operation

- 4.8.2 Landscape and visual mitigation measures relating to the operation of the Proposed Varied Development have been incorporated into the design of the scheme. The design of the Proposed Varied Development has gone through numerous iterations since this site was first explored for development as a wind farm in 2007. The siting and design of turbines and associated tracks and other infrastructure resulted from a constraints exercise which included consideration of potential impacts from an LVIA perspective. It was also influenced by national and local policy and/or guidance from SNH, THC and SEPA that is referenced where relevant in the EIAR. Further discussions through consultations with SNH, THC and SEPA also informed the final design. Where the national and local guidance documents have been updated during the design iterations, they have been reviewed to ensure that the Proposed Varied Development aligns with them. In addition, and most recently, consideration of increasing the height of turbines recognised that the location of the site, set back from the coast, coastal settlements, the A836 (NC500 tourist route) and largely visually shielded from Strath Halladale and Strathnaver, provided a unique opportunity in the local area, to accommodate large turbines. The evolution of the design is described Chapter 1: Introduction (EIAR Volume 2).
- 4.8.3 Mitigation of the potential effects of aviation lighting is the subject of ongoing discussions with statutory consultees. Discussions include consideration of the following:
- Potential reduction of aviation lighting intensity during good meteorological visibility;
 - Radar activated aviation lighting (should this be approved for use); and
 - Potential for cardinal or strategic aviation lighting of selected turbines.
- 4.8.4 However, as discussions are ongoing, these mitigation options are not considered in the Lighting Assessment (see Technical Appendix 4.10 (EIAR Volume 4)), which has been carried out on a worst case scenario basis.

Mitigation during Decommissioning

- 4.8.5 Landscape and visual mitigation measures associated with decommissioning of the Proposed Varied Development would be agreed with statutory consultees as part of the decommissioning plan. Where the detailed assessment refers to the predicted significance of residual construction effects these are also considered to be representative of potential decommissioning effects.

4.9 Assessment of Residual Effects

Residual Effects on Landscape Receptors

- 4.9.1 The extent to which the Proposed Varied Development would affect the existing landscape varies depending on the individual components of the project and the ability of the existing landscape to accommodate these various components.
- 4.9.2 This Section provides an assessment of the effects that the Proposed Varied Development would have on designated and protected landscapes and LCTs during the construction and operational phases in accordance with the methodology outlined above.

- 4.9.3 The character of the landscape relates to the natural processes and human activities that have been at work for a long time to shape the land to its present form. Factors contributing to landscape character include topography, vegetation cover, sense of space or enclosure and past and present land use. Landscape character and resources are considered to have an importance in their own right and are valued for their intrinsic qualities. The aim of the assessment is to determine the likely significant residual effects of the Proposed Varied Development on the landscape character of the area and the elements which contribute to its values and sensitivity.

Effects Likely to be Significant

- 4.9.4 The detailed assessment of landscape receptors considered 16 separate receptors. Of these almost all were identified as likely to have effects which would be not significant. Predicted significant effects were identified for the Bens Griam and Loch nan Clar SLA, , Sweeping Moorland and Flows LCT, as well as for relatively localised parts of the East Halladale Flows Wild Land Area and localised parts of the Lone Mountains LCT. These effects are identified in the detailed landscape assessment tables (Technical Appendix 4.3 (EIAR Volume 4)) and the Wild Land Assessment for East Halladale Flows Wild Land Area (see Technical Appendix 4.9 (EIAR Volume 4)) and are summarised in the following sub-sections.

BENS GRIAM AND LOCH NAN CLAR SLA

- 4.9.5 The focus of this sweeping moorland landscape is the trio of distinctive hills, Ben Griam Mòr, Ben Griam Beg and Meall a' Bhuirich. The moorland is broken up by montane grassland covered hills with rocky outcrops, areas of scree and watercourses cutting into the slopes and includes a collection of large lochs. The overall sense of this landscape is one of remoteness, wildness, and open space. The presence of coniferous plantations juxtaposes the surrounding area and appears alien in this landscape. The atmosphere of isolation and remoteness is intensified by the fact that the area is almost completely uninhabited. However, recent upgrades to the road network to facilitate timber transportation suggest that the area may not be as disconnected as it first appears. Sensitivity is considered to be **High** due to the relationship between the open moorland and the isolated mountains and the sense of scale this creates.
- 4.9.6 There would be no direct change to this landscape. The ZTV indicates that intervisibility of the Proposed Varied Development would be limited to northward views from higher elevations and hill tops. Many of these views are already affected by the operational Bettyhill and / or Strathly North wind farm turbines. However, the increased number of turbines within the landscape and relatively close proximity would likely result in notable change to the landscape context outwith the SLA from localised areas (see Figure 4.3a (EIAR Volume 4a)). The detailed assessment concluded the potential magnitude of change to the Special Qualities of this SLA would range from Negligible to Medium. Taking this and the limited intervisibility into consideration, the overall magnitude of change for the SLA would be considered to be **Medium** during construction and operation.
- 4.9.7 Effects on this SLA would therefore be localised and indirect, resulting from the appearance of turbines to the north in the surrounding landscape. These would virtually always be seen in the context of existing turbines and therefore not introduce new features into the landscape. They would, however, likely extend the horizontal spread of turbines and would appear at a closer distance and of a larger scale. While the Proposed Varied Development would not affect the majority of the SLA and would have a negligible effect on the majority of the Special Qualities of the SLA, it may distract from the appreciation of those qualities focused on its relationship to the wider landscape context. It is therefore considered that the effects on this SLA would be **Moderate** (significant) during construction and operation.

WLA39: EAST HALLADALE FLOWS WILD LAND AREA

- 4.9.8 The Proposed Varied Development would be present within the western context of the WLA. It would appear larger and closer than Strathly North wind farm and would affect a new part of the context where little perceived contemporary land use or development is present. In some areas towards the centre of the WLA and towards the east of the north western section, there is a perceived continuation of the WLA across these landscapes and the Proposed Varied Development would therefore interrupt this. This has the potential to lead to a reduction in perceived scale and to distract focus from far mountains to the west, diverting this to the man-made structures of the Proposed Varied Development.
- 4.9.9 In areas towards the western and northern boundaries, and further to the east within the south eastern section, the effects are considered to be less. These areas, particularly the western and northern boundary areas, have a lower sensitivity due to increased influence of existing features and contemporary land use. The western landscape is also less influential on these areas: in the west and north it is seen as more a part of the surrounding context and less associated with the WLA and therefore the effect would be seen as more indirect; to the east, intervening landform starts to interrupt the view towards this area and therefore it does not appear to increase the extent of the WLA in the same way. However, in these areas the Proposed Varied Development would introduce a new man-made focus and could still lead to a distraction within some views.
- 4.9.10 The above effects would occur only within parts of the WLA where intervisibility would be obtained. For all Key Qualities, there would be large parts of the WLA where the Key Qualities would be unaffected. In areas where theoretical visibility would occur, it is considered that, though there may be some effects, all Key Qualities would remain present in areas where they are already experienced.
- 4.9.11 Predicted localised significant effects to the Key Qualities within central parts of the WLA and areas towards the east of the north western section (where the strength of wildness is generally High), along with other changes to Key Qualities which are not anticipated to be significant on their own are predicted to lead to a locally Moderate and significant effect during construction and operation due to the strength of wildness in these areas. Beyond this area towards the northern and western boundary areas, within around 3 km of the boundary where strength of wildness is considered to be Low or Medium, the effect would be **Minor** and not significant. Within the south eastern section, whilst the Proposed Varied Development would form some new focus within the western context, the effect is anticipated to be **Minor** or **Minor - Moderate** due to the generally reduced strength of wildness in this area, and the greater distance from the Proposed Varied Development. The transition would be gradual. The significant effects would be relatively localised with over half of the WLA completely unaffected by the Proposed Varied Development. It is considered that, whilst limited significant effects would be likely to the strength of wildness and the strength of some of the Key Qualities within the WLA, the integrity of the WLA would not be affected.

LCT 134 – SWEEPING MOORLAND AND FLOWS (OWESG LCA CT4)

- 4.9.12 This LCT covers the Proposed Varied Development site and occurs extensively across Caithness and eastern Sutherland, forming a flat, gently undulating and generally smooth landscape. It forms the setting to the Lone Mountains, the distinctive form and prominence of these mountains being accentuated by the simple, open and expansive nature of the low-lying moorland which surrounds them. Although the area is sparsely settled, it covers a large area and dispersed crofts, farms and estate buildings are present along the edges of the LCT or near straths. These closely relate to the numerous transportation and infrastructure corridors running through this LCT including the Inverness / Thurso Railway, A9, A836, A897 and various transmission lines and associated substations. Wind farms are also a relatively common feature within the wider LCT.
- 4.9.13 The presence of existing wind farms particularly within the immediate area reduces the susceptibility to further wind development. Other areas where scenic qualities and wild

characteristics are more prominent would be more susceptible to development. Landscape sensitivity is consequently varied throughout the LCT. It is considered to be **Low** where the landscape is characterised by other wind turbines and **Medium** where scenic and wild land characteristics are stronger.

- 4.9.14 The Proposed Varied Development would be located entirely within this LCT including turbines, new access tracks, hardstandings, substation, LiDAR and temporary infrastructure and borrow pits during construction. The ZTV indicates that indirect change would be widespread within around 5 km of the turbines of the Proposed Varied Development. Beyond this, higher ground and facing slopes are more likely to be affected than hollows and glen floors. Much of this area, particularly within 5 km is already affected by the existing turbines of Strathly North wind farm and Bettyhill wind farm. However, beyond this, particularly to the south and east, the Proposed Varied Development would appear closer, and in some cases would result in new indirect effects on the LCT within the Detailed Study Area. The magnitude of change would therefore be **Medium-High** during construction and operation.
- 4.9.15 The Proposed Varied Development would directly affect a part of the LCT that is currently used for commercial forest, the turbines would be located in an area already indirectly affected by the Strathly North wind farm turbines and in some cases the Bettyhill wind farm turbines as well. While the Proposed Varied Development would usually be seen in association with existing wind turbines, it will likely increase the visual presence of turbines by occupying a greater part of the horizon, or by the larger scale of turbines in relation to operational turbines in the area. This may increase perception of the development within the surrounding landscape with some potential to diminish the perceived sense of isolation and remoteness. Where not seen in the context of existing turbines, the theoretical visibility would be largely limited to tips and blades seen over intervening landform.
- 4.9.16 While the presence of commercial forest and existing wind development may combine to reduce the sensitivity of the area to further development, new turbines and tracks would increase the developed footprint of the immediate area and result in it becoming more strongly characterised by wind turbines. During construction, the increased activity and noise would potentially reduce some of the sense of isolation and remoteness within the immediate area due to increased activity levels in the area. During operation, the Proposed Varied Development's turbines would form a close new feature which would distract from the key characteristics of the LCT within the immediate area. The predicted likely significant landscape effect across the wider LCT would therefore be **Moderate** (significant) effects during construction and operation.

LCT 138 – LONE MOUNTAINS LCT

- 4.9.17 The mountains which make up the Lone Mountains LCT lie isolated within expanses of lower-lying open moorland. Their distinctive profiles are visible on the horizon throughout the wider landscape. The mountains are typically located within areas of Sweeping Moorland and Flows and Rocky Hills and Moorland and feature steep and sweeping concave slopes. Some also have complex and narrow radiating ridges and multiple peaks. Their profiles can vary vastly from very steep on one side to gently rising on the other, as exhibited by Ben Hope. Within the wider landscape, Ben Griam Mòr and Ben Griam Beg are relatively small, and isolated, standing out amongst the surrounding Sweeping Moorland and Flow in the interior core of Caithness and Sutherland. The isolation of these largely uninhabited mountains and sparse dwarf vegetation allows their full form to be appreciated and makes them prominent landmark features. Their solitary position also offers extensive panoramic views across the surrounding landscape.
- 4.9.18 The distinct forms of these Lone Mountains are susceptible to change of the type proposed, therefore landscape sensitivity is considered to be **High**. The ZTV suggests that intervisibility would be limited to upper slopes facing the Proposed Varied Development. At their nearest this would comprise all thirty-nine turbines seen to the north of Ben Griam Beg in the context of the

operational Strathy North turbines. While there would be no direct change to this LCT, construction works would likely be evident as small movements in the wider landscape. Within the wider Detailed Study Area, the turbines would form part of the northern or eastern horizon. They would be seen in addition to the operational Bettyhill turbines and / or Strathy North turbines, extending the horizontal spread of turbines.

- 4.9.19 Potential effects on the LCT within the Detailed Study Area would be limited to north and east facing slopes and summits. For most of these areas, turbines are already a feature of the surrounding landscape. Taking into account that the majority of the LCT would be unaffected, it is considered that the overall magnitude of change for the LCT would be **Low-Medium** during construction and operation.
- 4.9.20 While the turbines would not represent a new addition to the landscape, they would increase the number of turbines present within the neighbouring landscape, and would bring turbines closer to the LCT. This effect would be emphasised by the larger scale of the turbines and may distract from the appreciation of wider views, particularly to the north coast. Given the limited intervisibility across the wider LCT, landscape effects would generally be considered to be **Minor** (not significant), with localised **Moderate** (significant) effects during both construction and operation.

Effects Likely to be Not Significant

MINOR - MODERATE LANDSCAPE EFFECTS

- 4.9.21 A **Minor - Moderate** (not significant) predicted landscape effect was identified for the Rocky Hills and Moorland LCT (136) and the Rounded Hills – Caithness and Sutherland LCT (135). **Minor** (not significant) effects overall with localised **Minor - Moderate** (not significant effects) were identified for WLA 38: Ben Hope – Ben Loyal.
- 4.9.22 Within the Rocky Hills and Moorland LCT (136) predicted effects would be indirect, relating to an increased presence of wind turbines within the surrounding landscape context. The effect would vary between smaller numbers of turbines, appearing above the horizon and larger numbers of turbines seen as part of a wider expansive vista from elevated areas in combination with operational turbines. Although there are areas with intervisibility of all 39 turbines, their presence would vary considerably due to the screening provided by the irregular landscape and rocky outcrops. The Proposed Varied Development may draw focus within some views however, it would be clearly set within a differing landscape area and in the context of existing turbines. It is generally considered that this would not alter the key characteristics of LCT 136 as a whole, as large parts of the LCT would remain unaffected and it reflects a situation which already exists within the LCT and neighbouring landscapes.
- 4.9.23 Predicted indirect effects on the Rounded Hills – Caithness and Sutherland LCT (135) would result from the appearance of the Proposed Varied Development within the wider landscape context to the north. In most cases these areas are already affected by operational turbines and this would not represent a new addition to the landscape. It would, however, increase the number of turbines present within this neighbouring landscape, and would bring turbines closer to the LCT, an effect that would be emphasised by the larger scale of the turbines and may distract from the appreciation of wider views. While it may result in a small reduction in scenic quality, it is unlikely to result in changes to the intrinsic landscape character. It is therefore considered that the effect on these LCTs would not be significant.
- 4.9.24 The Proposed Varied Development would lead to indirect changes to localised parts of WLA 38: Ben Hope – Ben Loyal, where it would form a new feature within the extended eastern context. From high slopes and summits it would be seen within a wide and expansive context which already features existing turbines of Strathy North wind farm and Bettyhill wind farm and other more distant wind farms. Whilst the Proposed Varied Development may appear somewhat larger and closer than these existing Wind Farms, forest, settlement and other contemporary land uses are

seen in this context and the Proposed Varied Development would be seen as a part of this managed landscape. From some lower areas on the northern plateau and lower eastern facing slopes the Proposed Varied Development may be seen within a less developed or managed context, although from northern areas, development and contemporary land use around Tongue is evident. The drama and awe-inspiring qualities of the mountains within the WLA 38 also draw a greater degree of focus within these areas with distant, external elements less influential. In general from these areas, the Proposed Varied Development would likely appear distant from this WLA with a degree of separation provided by the intervening landform. The most remote parts of WLA 38, within the isolated corries between the 2 mountains, would not be affected by the Proposed Varied Development. As no significant effects would be anticipated and all the Key Qualities would continue to be present within all the areas at which they are currently experienced, the integrity of WLA would not be affected and the anticipated overall effect would be not significant.

MINOR LANDSCAPE EFFECTS

- 4.9.25 **Minor** (not significant) effects are anticipated for Farr Bay, Strathly and Portskerra SLA, Ben Klibreck and Loch Choire SLA, Flow Country and Berriedale Coast SLA, Coastal Crofts and Farms LCT, the majority of the Lone Mountains LCT, and the Strath – Caithness and Sutherland LCT. **Negligible** (not significant) effects overall with localised **Minor** (not significant effects) were identified for WLA 35: Ben Klibreck – Armine Forest. With the exception of the Lone Mountains LCT (138), these areas are generally located further from the site and with relatively small areas of shared intervisibility. Within these areas, the Proposed Varied Development could increase the prominence of wind turbines in the surrounding context. However, given the small areas affected and influence of existing turbines on the landscape, this would not lead to any noticeable reduction to the scenic quality or change to the intrinsic landscape characteristics or special qualities.

NEGLECTIBLE LANDSCAPE EFFECTS

- 4.9.26 A **Negligible** (not significant) effect was identified for the Kyle of Tongue NSA, Dunnet Head SLA, and WLA 36: Causeymire – Knockfin Flows due to the minimal, distant and localised nature of effects. The Proposed Varied Development would be unlikely to lead to any discernible change in scenic quality of values.

Summary of Landscape Effects

- 4.9.27 Predicted residual effects on designated and protected landscapes and LCTs are summarised in Table 4.5 below. For the purposes of this assessment, effects with a **Moderate** rating or greater would be considered significant.

Table 4.5: Summary of Effects on Designated and Protected Landscapes and LCTs

Designated and Protected Landscapes and LCTs	Effect During Construction						Effect During Operation					
	Not Significant			Significant			Not Significant			Significant		
	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Kyle of Tongue NSA	x						x					
Farr Bay, Strathly and Portskerra SLA		x						x				
Ben Klibreck and Loch Choire SLA		x						x				
Bens Griam and Loch nan Clar SLA				x						x		
Flow Country and Berriedale Coast SLA		x						x				
Dunnet Head SLA	x						x					
WLA 35: Ben Klibreck – Armine Forest	x	(L)					x	(L)				
WLA 36: Causeymire – Knockfin Flows	x						x					
WLA 38: Ben Hope – Ben Loyal		x	(L)					x	(L)			
WLA 39: East Halladale Flows Wild Land Area		x		(L)				x		(L)		
Coastal Crofts and Small Farms LCT (144)		x						x				
Lone Mountains LCT (138)		x		(L)				x		(L)		
Rocky Hills and Moorland LCT (136)			x						x			
Rounded Hills – Caithness and Sutherland LCT (135)			x						x			
Strath – Caithness and		x						x				

Table 4.5: Summary of Effects on Designated and Protected Landscapes and LCTs

Sutherland LCT (142)												
Sweeping Moorland and Flows LCT (134)				x						x		
(L) – Denotes that the effect would be localised to only part of the landscape receptor within the Detailed Study Area.												

Residual Effects on Visual Amenity

- 4.9.28 This Section discusses the findings of the detailed visual assessment undertaken for the Proposed Varied Development as set out in Technical Appendix 4.4. It describes and evaluates the likely changes to views that would be obtained from residential properties, places of work, routes, popular destinations and strategic vantage points during the construction and operational phases of the Proposed Varied Development, and the extent to which these would affect residents, visitors and users of the landscape.
- 4.9.29 Visual amenity relates to the way in which people visually experience their surroundings. Adverse visual effects might occur through the intrusion into established views of new features, out of keeping with the existing structure, scale and composition of the view obtained. However, visual effects might also be beneficial where an attractive focus is created in a previously unremarkable view or the influence of previously detracting features is reduced. The significance of effects will vary, depending on the nature and degree of change experienced and the perceived value and composition of the existing view obtained by the viewer.
- 4.9.30 For the purposes of this assessment significant effects are those considered to be **Moderate** or greater. Individual receptor references relate to those indicated on Figures 4.5a and 4.5c (EIAR Volume 3a) and/or described in Technical Appendix 4.4 (EIAR Volume 4). Technical Appendix 4.4 (EIAR Volume 4) provides further detailed information on each receptor and the nature of the predicted effects.

Effects Likely to be Significant

- 4.9.31 Of the 14 representative VPs, 11 settlements and residential groupings, and 14 routes that were selected for inclusion within the visual assessment, the majority were identified as likely to have no significant effect to the view obtained. Residual significant effects were identified to five visual receptors. These receptors were:
- VP1: Ben Griam Beg;
 - VP3: Loch nan Clach Geala;
 - VP6: Bettyhill Viewpoint;
 - VP7: A836 west of the B871; and
 - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy.
- 4.9.32 Localised predicted residual significant effects were identified from two further routes. These were:
- A836 - Between Tongue and the eastern edge of the Detailed Study Area (NC500/ Cycle Route 1); and
 - A836 – From Tongue south to the edge of the Detailed Study Area.

VP1: BEN GRIAM BEG

- 4.9.33 VP1 is located on the summit of Ben Griam Beg to 8.6 km the south of the site. It is representative of elevated nearby and middle-distance views that can be obtained from this direction. It has 360°

panoramic views across the landscape. Ben Griam Mòr and Meall a' Bhuirich are prominent in views to the south while views to the north extend to the North Sea with the operational Strathly North wind farm turbines appearing in the midground. To the south and west the skyline is defined by distinctive mountain ranges. The surrounding lower lying moorland is broken up by lochs and lochans, and large patches of commercial forest. Small tracks and roads are also visible at lower elevations. Sensitivity is considered to be **High** due to the relationship between the isolated mountains and the surrounding open moorland and the sense of scale this creates in the panoramic views.

- 4.9.34 The turbines would be prominently seen by viewers to the north. Although they would increase the horizontal spread of turbines, this view is already affected by unobstructed views of the operational Bettyhill wind farm and / or Strathly North wind farm turbines and as such, the Proposed Varied Development would not introduce new features in the view. However, the increased number of turbines within the view and proximity would likely result in noticeable change to the existing view obtained by viewers. A **High** magnitude of change would lead to a **Major** (significant) visual effect during construction and operation.

VP3: LOCH NAN CLACH GEALA

- 4.9.35 VP3 is representative of views obtained from the interior part of the East Halladale Flows WLA. Views outward are largely restricted by the surrounding rolling moorland. Somewhat more open views are available towards the west where the Ben Hope / Ben Loyal range can be seen in the distance. The operational Strathly North wind farm can be seen in the midground in this direction as well. The top of Ben Griam Beg can also be seen over the intervening ridgeline to the southwest. To the east, post and wire fencing runs along the ridge against the skyline. Sensitivity of this viewpoint is considered to be **Medium**, because the proposed area of change is a slightly less important part of the wider view obtained.
- 4.9.36 The Proposed Varied Development would be visible to the west and would be seen in the context of the operational Strathly North wind farm turbines. Most of the turbine blades would be seen against the skyline when at their highest rotation, while some would be backclothed by the distant mountains. The magnitude of change to the view obtained would be **Medium** leading to a **Moderate** (significant) visual effect during operation and construction.

VP6: BETTYHILL VIEWPOINT

- 4.9.37 VP6 is located at the marked Bettyhill viewpoint and car park on the A836 (NC500) to the south of Kirtomy. It is representative of sections of this road where the proposal would be visible to the northwest of the site and is a popular stopping point. The main view obtained from here is directed towards the southeast and Loch Meadie. Ben Hope and Ben Loyal are visible in distant views to the west beyond the operational Bettyhill wind farm. Rocky moorland and rolling hills restrict more distant views in other directions. Sensitivity of this viewpoint is considered to be slightly reduced to **Medium** because of the influence of existing turbines in close proximity, and the relatively busy road.
- 4.9.38 Blades and hubs of the Proposed Varied Development would be visible and noticeable to the southeast over the ridge and against the skyline which would result in a **Medium** magnitude of change. As these would be seen in the context of the existing operational Bettyhill turbines to the west this would lead to a **Moderate** (significant) visual effect during construction and operation.

VP7: A836 WEST OF THE B871

- 4.9.39 VP7 is found on the A836 to the northwest of the Proposed Varied Development. It is representative of middle-distance worst-case scenario views obtained from this stretch of the A-road and NC500, particularly as travellers descend into Strathnaver from the west. The main views obtained from this viewpoint are along the A836 towards the east and west. Views to the north and south are restricted by rolling moorland covered in low level vegetation. While longer distance

views are largely restricted by the intervening topography, some rolling hills can be seen in the distance, particularly to the south and east. Sensitivity of the viewpoint is considered to be **Medium**.

- 4.9.40 The Proposed Varied Development would be visible and noticeable in the distance to the southeast over the ridge and against the skyline which would result in a **Medium** magnitude of change. As these would be seen from a relatively busy and fast moving route, in only one direction of travel, this would lead to a **Moderate** (significant) visual effect during construction and operation.

SCOTTISH HILL TRACK 344: STRATH HALLADALE (TRANTLEBEG) TO STRATHY

- 4.9.41 This route passes through a very changeable landscape. Large parts of the surrounding coniferous forest have been felled, opening up views to the surrounding 'Flow Country' moorland and bog as part of nature conservation efforts. The Bens Grianm dominates views obtained from the southern portion of the route. Strathy North wind farm is prominent in views obtained along much of the route, particularly the northern section that passes very close to it. Visual sensitivity of the route is therefore considered to be **Medium**.
- 4.9.42 While operational turbines are already a feature along this route, the Proposed Varied Development turbines would be very prominent along the middle part of this route as it passes directly through the site. This would be even more so during construction when parts of the route would be used to provide access to the site. Construction works and working areas would be adjacent to and distracting for walkers or cyclists. It is anticipated that this would lead to a **High** magnitude of change during construction and a **Major** (significant) visual effect largely due to construction associated activities and traffic.
- 4.9.43 During operation, whilst the Proposed Varied Development turbines would appear prominent, they would affect areas where the Strathy North wind farm turbines are already prominent. Given the viewing expectation of those using this route adjacent to an existing operational wind farm, it is anticipated that this would lead to a **Medium – High** magnitude of change leading to a **Moderate** (significant) visual effect during operation.

A836 - BETWEEN TONGUE AND THE EASTERN EDGE OF DETAILED STUDY AREA (NC500/ CYCLE ROUTE 1)

- 4.9.44 The eastern part of the route crosses gently undulating moorland, before descending towards Strath Halladale. Views obtained along the central portion are over simple landscapes with dramatic hills in the distance, particularly toward the west. The western portion overlooks the Kyle of Tongue and the NSA, focusing viewers' attention westward. Visual sensitivity along this route is considered to be **Low - Medium**.
- 4.9.45 Predicted effects would be limited to intermittent distant views obtained from elevated portions of the route when traveling eastward. A large portion of the route would be unaffected by the Proposed Varied Development. Overall magnitude of change for the route is therefore considered to be **Low-Medium** during construction and operation. Given the limited visibility of the Proposed Varied Development, visual effects would be considered **Negligible** (not-significant) with localised areas experiencing **Minor - Moderate** (not significant) to **Moderate** (significant) effects during both construction and operation.

A836 – FROM TONGUE SOUTH TO THE EDGE OF THE DETAILED STUDY AREA

- 4.9.46 This is a single-track road travelling generally north south across open and remote moorland. Loch Loyal is a prominent feature particularly in views obtained along the middle portion of the route when it runs alongside the loch. Rounded hills form a barrier to views to the west and mark the transition to the Ben Hope / Ben Loyal wild land area beyond. Sensitivity is considered to be **Medium**, as this is a potentially important part of the view obtained from a transportation route with few detracting features.

- 4.9.47 Visibility of the Proposed Varied Development along this route is limited and focused in two areas, to the north and south of Loch Loyal. The turbine blades would be seen in the distance against the skyline to the east from the northern part of the route. The operational Bettyhill and Strathly North turbines would often also be visible in this area. From the southern part of the route, views obtained of the Proposed Varied Development would be across the loch with few other manmade features in the view. This would result in a localised noticeable change and therefore **Negligible (Localised Medium)** magnitude of change. Given the limited visibility, visual effects would be considered **Negligible** (not significant) for the overall route with some localised areas experiencing **Moderate** (significant) effects due to the introduction of some detracting features into small parts a valued view obtained from the route during construction and operation.

Effects Likely to be Not Significant

MINOR - MODERATE

- 4.9.48 A **Minor - Moderate** (not significant) effect during construction and operation was identified for four of the VPs, four of the settlements and residential groupings, two of the routes, and localised parts of one other route included in the assessment (see Table 4.6 below for details).
- 4.9.49 For the majority of these receptors it is recognised that the Proposed Varied Development would make a noticeable or fairly noticeable, sometimes intermittent, addition to the view obtained, but when considered in relation to the existing turbines and other infrastructure in the area which already form distracting features within the view, this would not lead to a noticeable deterioration to the quality of the view or the visual amenity. For other receptors the Proposed Varied Development would be a noticeable new addition to the view obtained, but it would be distant and / or not be very prominent and would not appear out of place within the existing context. These effects would therefore be considered not significant.

MINOR

- 4.9.50 A **Minor** (not significant) effect during construction and operation was identified for four of the VPs, four of the settlements and residential groupings, four of the routes, and localised parts of one other route included in the assessment (see Table 4.6 below for details). From these receptors, visibility would often be intermittent and / or distant and turbines would often be seen as blades and tips over intervening landform. The Proposed Varied Development would comprise either a new and perceptible feature within a small part of the wider context or a small additional feature where existing turbines or other infrastructure are more prominent. This would lead to a minimal reduction in the quality of the view experienced from the receptors and therefore the effect would be not significant.

NEGLECTIBLE – MINOR EFFECTS

- 4.9.51 Effects on one residential grouping would be considered **Negligible – Minor** (not significant) largely due to the screening provided by the mature woodlands that surround it. It was considered that while the addition of the Proposed Varied Development could be perceptible from the approach to the settlement it would not lead to any discernible increase in the dominance of wind turbines from the settlement.

NEGLECTIBLE

- 4.9.52 The effects on the visual amenity of all other receptors not discussed would be **Negligible** (not significant). From these receptors the Proposed Varied Development would:
- not lead to any perceptible reduction in the quality of the views obtained;
 - be likely to be barely perceptible from a settlement or residential grouping; and
 - be barely perceptible or perceptible only from a short section of a route that is unlikely to lead to any reduction in the visual amenity value of the route.

Summary of Effects on Visual Amenity

- 4.9.53 Predicted effects to visual receptors are summarised in Table 4.6. For the purposes of this assessment, effects with a **Moderate** rating or greater would be considered significant. This includes four of the 14 VPs, one route which passes through the site, and localised parts of two other routes as indicated below.

Table 4.6: Summary of Effects on Visual Amenity														
Receptor	Effect During Construction								Effect During Operation					
	Not Significant				Significant				Not Significant			Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Viewpoint														
VP1: Ben Griam Beg							x							x
VP2: Cnoc Riabhach				x							x			
VP3: Loch nan Clach Geala					x							x		
VP4: East of Melvich			x							x				
VP5: Strathy			x							x				
VP6: Bettyhill Viewpoint					x							x		
VP7: A836 west of the B871					x							x		
VP8: Sgor Chaonasaid				x							x			
VP9: Creag na h-Iolaire			x							x				
VP10: Beinn Ratha				x							x			
VP11: Forsinard			x							x				
VP12: Moine House	x							x						
VP13: A836 near Middleton	x							x						
VP14: Dunnet Head	x							x						
Routes														
A836 (Tongue – eastern edge of Detailed Study)	x		(L)		(L)			x		(L)		(L)		

Table 4.6: Summary of Effects on Visual Amenity

Receptor	Effect During Construction								Effect During Operation					
	Not Significant				Significant				Not Significant			Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Area) (NC500/ Cycle Route 1)														
A836 Tongue to Detailed Study Area	x				(L)			x				(L)		
A897	x			(L)				x			(L)			
B871 (North)			x							x				
B871 (South)	x							x						
B873	x							x						
Far North Railway	x							x						
Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy							x						x	
Scottish Hill Track 342 – Crask Inn to Badanloch Lodge	x							x						
Scottish Hill Track 343 Halkirk to Forsinain or Braemore			x							x				
Core Path SU04.02 – Torrisdale – Invernaver, Coast Route			x							x				
Core Path SU04.04 – Clachan Burn (Bettyhill to Bettyhill Community Turbines Loop)				x							x			

Table 4.6: Summary of Effects on Visual Amenity

Receptor	Effect During Construction								Effect During Operation					
	Not Significant				Significant				Not Significant			Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Core Path SU04.05 – Kirtomy – Cnoc Mor circuit				x							x			
Core Path SU24.05 – Ben Tongue Circuit			x							x				
Settlement														
Strathy (North of the A836 and east of the River Strathy)				x							x			
Strathy (South of the A836 and East of the River Strathy)				x							x			
Strathy (West of the River Strathy)	x							x						
Strathy Point			x							x				
Baligill			x							x				
Brawl	x							x						
Lednagullin			x							x				
Crask / Farr				x							x			
Modsary / Skerry			x							x				
Skelpick				x							x			
Forsinard		x							x					
(L) – Denotes that the effect would be localised to only part of the visual receptor within the Detailed Study Area.														

Residual Aviation Lighting Effects on Landscape Receptors

- 4.9.54 This Section presents the findings of the assessment of the effects that aviation lighting on the Proposed Varied Development would have on designated and protected landscapes and LCTs in accordance with the methodology outlined in Technical Appendix 4.10 (EIAR Volume 4).
- 4.9.55 The landscape receptors most likely to experience significant effects as a result of the introduction of aviation lighting are those directly affected by the Proposed Varied Development's location

within them and those in close proximity within the Detailed Study Area where the lighting would represent a notable change to the surrounding landscape. Areas with theoretical visibility of the aviation lighting are illustrated through the use of a hub height ZTV as shown on TA Figure 4.10.2 and TA Figure 4.10.3 (EIAR Volume 4, Technical Appendix 4.10, Annex 1). Visibility from other landscape receptors is either very limited and / or located at a distance at which significant effects on landscape character would be unlikely.

- 4.9.56 The following receptors within the Detailed Study Area were predicted to experience effects as a result of aviation lighting as described in Technical Appendix 4.10 (EIAR Volume 4).

Effects Likely to be Significant

SWEEPING MOORLAND AND FLOWS LCT (134)

- 4.9.57 The character of this LCT during hours of darkness is not specifically discussed within the SNH landscape character assessment, however the LCT is generally a dark landscape with little artificial light beyond scattered crofts and farmsteads and passing vehicles. This lack of light contributes to the perception of the landscape as having a “strong sense of naturalness and remoteness, particularly at its core away from the more settled and modified outer fringes.”²⁹ However, it should be noted that as this LCT covers extensive parts of Caithness and Sutherland, sources of artificial light in neighbouring LCTs are visible from some parts of the landscape. As a result, this LCT is considered to have a **Medium** sensitivity to the proposed turbine lights.
- 4.9.58 The introduction of 39 lit turbines into this LCT would result in a **Medium** magnitude of change within a localised part of the wider LCT. It was assessed that this would result in a localised **Moderate** and therefore significant effect to the LCT. This would largely be due to the potential for the proposed aviation lighting to influence the perception of remoteness locally within the LCT at night.

LONE MOUNTAINS LCT (138)

- 4.9.59 The Lone Mountains LCT is characterised by isolated mountains that are the dominant focus within open lower-lying moorland surroundings. Their distinctive profiles are visible from many parts of Caithness and Sutherland. The Bens Griam unit is located closest to the Proposed Varied Development turbines, at just over 7 km to the south. While the proposed aviation lights would not have a direct effect on the LCT they could indirectly affect the perception of the profiles / ridges in some views by appearing in the foreground. This would be most prominent in views towards the western units of the LCT where the ridgelines would be lit up as the sun sets. However, once it is completely dark the profiles of the Lone Mountains and their relationship to the aviation lights would be much less apparent.
- 4.9.60 As a result, this LCT is considered to have a **Medium** sensitivity to the proposed turbine lights. The introduction of 39 lit turbines in the adjacent LCT to the north would result in a notable change within a localised part of the LCT and therefore a **Medium** magnitude of change. At times of reduced visibility when the aviation lights could be on during the day, the profiles of these mountains would be less prominent. It was therefore assessed that the proposed aviation lighting could result in a localised alteration to the sense of isolation of the Lone Mountains at dusk and dawn. There would therefore be a **Moderate** and thus significant effect to the LCT.

ROUNDED - HILLS - CAITHNESS AND SUTHERLAND LCT (135)

- 4.9.61 This LCT occurs extensively across Caithness and Sutherland. The rolling hills form broad rounded summits that often form the site slopes containing straths. Closer to the coast, the slopes are often steeper than in the more inland areas. These hills are incised by narrow burns and small lochans

²⁹ Scottish Natural Heritage (2019) *Scottish Landscape Character Types Map and Descriptions – Sweeping Moorland and Flows Landscape Character Type 134 Description*. Available at: <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions> [accessed March 2020]

on the plateau summits. Wind farms are present within the LCT and therefore the turbines of the Proposed Varied Development, whilst not within this LCT, would not represent a new feature within the daytime context of the LCT. The key characteristics of the LCT as described in the character assessment do not describe the landscape during hours of darkness. However, where it occurs within the Detailed Study Area, this LCT can be characterised as a dark landscape with little influence of artificial light. This landscape was considered to have a **Low-Medium** sensitivity to the type of development proposed.

- 4.9.62 Within the Detailed Study Area aviation lighting would result in a noticeable change within a localised part of the landscape character and therefore a **Medium** magnitude of change. However, it is unlikely that the proposed aviation lights would affect the intrinsic landscape character of the area. They would be locally influential due to their close proximity and as a result it was assessed that the aviation lighting would have a **Moderate** and therefore significant effect on the units of this LCT that occur within the Detailed Study Area.

WLA 39: EAST HALLADALE FLOWS

- 4.9.63 This WLA is located to the east of the site. The Proposed Varied Development would appear larger and closer than Strathy North wind farm during the hours of daylight and would affect a new part of the context where little perceived contemporary land use or development is present. In areas towards the western and northern boundaries, and further to the east within the south-eastern section, the daytime effects would be less. These areas, particularly the western and northern boundary areas, have a lower sensitivity due to increased influence of existing features and contemporary land use. The western landscape is also less influential on these areas: in the west and north the Proposed Varied Development would be seen as more a part of the surrounding context and less associated with the WLA and therefore the effect would be seen as more indirect; to the east, intervening landform starts to interrupt the view towards this area and therefore it does not appear to increase the extent of the WLA in the same way. However, in these areas the Proposed Varied Development would introduce a new man-made focus and could still lead to a distraction within some views.
- 4.9.64 The Key Qualities of the WLA do not specifically describe the landscape during hours of darkness. However, due to its remote nature, particularly within the central parts, the WLA can be characterised as a dark landscape with little influence of artificial light. The WLA is therefore considered to have a **Low-Medium** sensitivity to the type of development proposed.
- 4.9.65 The introduction of aviation lights on 39 turbines into the adjacent landscape would result in localised areas experiencing a **Medium** magnitude of change. As visibility of the aviation lighting across the majority of the WLA would be limited to the western edge it was assessed that this would result in a **Minor** (not significant) overall effect with localised **Moderate** (significant) effect to the LCT. This would largely be due to the potential for the proposed aviation lighting to influence the *Wide Skies* and *Open and Extensive Visibility* Key Qualities at dusk and in low light in views westward towards Ben Hope and Ben Loyal.

Effects Likely to be Not Significant

MINOR TO MODERATE LANDSCAPE EFFECTS

- 4.9.66 A **Minor - Moderate** (not significant) landscape effect was identified for Bens Griam and Loch nan Clàr SLA and Strath – Caithness and Sutherland LCT (142) and localise parts of the Kyle of Tongue NSA, Farr Bay, Strathy and Portskerra SLA, WLA 36: Causeymire – Knockfin Flows. Aviation lighting on the Proposed Varied Development, would affect the wider landscape context outwith these landscape receptors.
- 4.9.67 The Bens Griam and Loch Clàr SLA has a strong sense of remoteness, wildness and space particularly in its interior. Although the characteristics of the SLA during the hours of darkness are not specifically discussed in the citation, the areas sense of isolation and remoteness are

undoubtedly enhanced by the dark nature of the surrounding landscape at night. While the SLA itself would be highly sensitive to the introduction of artificial lighting within its boundaries, aviation lighting on the Proposed Varied Development would be located approximately 7 km to the north at their closest visible point. Additionally, as shown on TA Figure 4.10.3 visibility of the aviation lights would be limited to the north facing slopes of Ben Griam Beg, Ben Griam Mòr and Beinn a' Mhadaidh. More distant sources of artificial lighting can already be seen from within the SLA and as such while located in closer proximity, the proposed aviation lighting would not introduce a wholly new feature into the surrounding landscape context of the SLA. As a result, the SLA has been assessed as having a **Medium** level of sensitivity to the proposed aviation lighting. Due to the predicted notable changes in very localised parts of the SLA a **Low-Medium** magnitude of change was identified.

- 4.9.68 Given the above it was assessed that aviation lighting on the Proposed Varied Development would result in an inappreciable alteration to the intrinsic special qualities of the SLA. As shown by the ZTV on TA Figure 4.10.3 extensive areas of the SLA would remain unaffected by aviation lighting on the Proposed Varied Development, allowing individuals seeking Accessible Solitude (particularly in the interior of the SLA) to find it. Likewise, the Flow Country Views would only be affected within a small part of the SLA. A **Minor – Moderate** (not significant) effect was therefore identified for the SLA.
- 4.9.69 The Strath – Caithness and Sutherland LCT includes all of the major straths in Caithness and Sutherland. Within the Detailed Study Area this includes Strathly Halladale and Strathnaver. These straths create linear spaces, with open floors containing rivers. Water is a key characteristic across all of the straths with a central river meandering across the floodplain, often traced by clumps of birch and alder. The side slopes channel views obtained from the narrow roads running along the edge of the floodplain. While the straths are relatively well-settled, they remain dark landscapes at night with a distinctly rural sense of place emphasised by the pastures and fields located within the floodplain. The main sources of artificial light come from the scattered dwellings and passing vehicles.
- 4.9.70 The ZTV indicates that the visibility of aviation lighting on the Proposed Varied Development within this LCT would largely be limited to the upper slope, however, aviation lights on all 39 turbines could be visible from some very localised areas. Given the presence of existing artificial lights within the LCT the sensitivity to the proposals was assessed to be **Medium**. The introduction of aviation lighting approximately 5 km to the east at the closest visible point and its limited potential visibility across the two units of the LCT within the Detailed Study Area was judged to represent a **Low-Medium** magnitude of change. It was therefore judged that aviation lighting on the Proposed Varied Development would result in a **Minor-Moderate** and therefore not significant effect to the LCT.
- 4.9.71 **Negligible** overall effects with areas of Localised **Minor – Moderate** and therefore not significant effects were identified for the Kyle of Tongue NSA, Farr Bay, Strathly and Portskerra SLA and WLA 36: Causeymire – Knockfin Flows. As with most of the Detailed Study Area these landscapes are generally considered to be characterised by darkness outside of the settlements that dot the coastline at night. While the Proposed Varied Development could increase the prominence of wind turbines in the surrounding context during the hours of daylight, given the scattered settlements and associated artificial lighting along the coast it would not introduce a new feature within surrounding context of the NSA or the SLA. While the parts of the WLA that fall within the Detailed Study Area are less influenced by artificial lights associated with the coastal settlement, they are located over 15 km southeast from the Proposed Varied Development turbines. Given the small areas affected within these receptors and distance to the Proposed Varied Development, the introduction of aviation lighting on the Proposed Varied Development would be very unlikely to lead to any noticeable reduction to the scenic quality or change to the intrinsic landscape characteristics or special qualities of these landscapes.

MINOR LANDSCAPE EFFECTS

- 4.9.72 **Minor** (not significant) effects would be anticipated for the Rocky Hills and Moorland LCT (136). Located approximately 4 km northwest of the Proposed Varied Development turbines at its closest point, the LCT is considered to have a **Low-Medium** sensitivity to aviation lighting on the Proposed Varied Development, largely due to its proximity to other sources of artificial light (i.e. passing vehicles and dwellings) and the scattered pattern of theoretical visibility. While aviation lighting on the Proposed Varied Development would not directly affect the distinctive dips, straths and glens and knolls of the LCT, it could result in perceptible changes to the sense of seclusion within localised areas and therefore a **Low-Medium** magnitude of change. It was considered that while the aviation lighting may be locally influential, it would not result in an appreciable alteration to the intrinsic landscape character of the area. There would therefore be a **Minor** and thus not significant effect to the LCT.

Residual Aviation Lighting Effects on Landscape Receptors Summary

- 4.9.73 Predicted effects on designated and protected landscapes and LCTs are summarised in Table 4.7 below. For the purposes of this assessment, effects with a **Moderate** rating or greater are considered to be significant.

Table 4.7: Residual Aviation Lighting Effects on Landscape Receptors Summary							
	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Lone Mountains LCT (138)					x		
Rocky Hills and Moorland LCT (136)			x				
Rounded Hills – Caithness and Sutherland LCT (135)					x		
Strath – Caithness and Sutherland LCT (142)				x			
Sweeping Moorland and Flows LCT (134)					x		
Kyle of Tongue NSA	x			(L)			
Farr Bay, Strathy and Portskerra SLA	x			(L)			
Bens Griam and Loch nan Clar SLA				x			
WLA 36: Causeymire – Knockfin Flows	x			(L)			
WLA 39: East Halladale Flows WLA			x		(L)		
(L) – Denotes that the effect would be localised to only part of the landscape receptor within the Detailed Study Area.							

Residual Aviation Lighting Effects on Visual Amenity

- 4.9.74 This Section presents the assessment of the effects that aviation lighting on the Proposed Varied Development would have on visual amenity. The visual receptors most likely to experience significant effects as a result of the introduction of aviation lighting are those in close proximity

where the lighting would represent a notable change to the view obtained. Areas with theoretical visibility of the aviation lighting are illustrated through the use of a hub height ZTV as shown on TA Figure 4.10.4 (EIAR Volume 4, Technical Appendix 4.10, Annex 1).

- 4.9.75 Ten of the viewpoints included in the LVIA fell within the study area for the aviation lighting assessment. These were considered to be representative of the range of views likely to be obtained during low light or dark conditions. In consultation with SNH and THC, four of these viewpoints were selected as the locations for visualisations of the aviation lighting see TA Figures 4.10.5a-c through 4.10.8a-c (EIAR Volume 4, Technical Appendix 4.10, Annex 1).
- 4.9.76 Of the 11 settlement receptors identified for inclusion in the LVIA, eight were identified as having the potential to experience effects as a result of the aviation lighting, based on the ZTV diagram (see TA Figure 4.10.4). The ZTV shows that there is very limited or no potential visibility of the proposed aviation lighting from Bettyhill, Melvich or Tongue. Artificial lighting is already present in each of these communities in the form of streetlights, domestic lights and other lights such as at the local hotels. While these are not overly bright landscapes it is unlikely that the introduction of the proposed aviation lighting would be noticeable even on the outskirts. As such, these communities are scoped out of further assessment.
- 4.9.77 The following receptors within the Detailed Study Area were identified as having the potential to experience effects as a result of aviation lighting on the Proposed Varied Development.

Effects Likely to Be Significant

SCOTTISH HILL TRACK 344: STRATH HALLADALE (TRANTLEBEG) TO STRATHY

- 4.9.78 This recreational route passes through a changeable landscape. Large parts of the surrounding coniferous planting have been felled, opening up views during the day to the surrounding 'Flow Country' moorland and bog as part of nature conservation efforts. The Bens Griam dominate views from the southern portion of the route. Strathy North wind farm is prominent in views obtained along much of the route, particularly the northern section that passes very close to it. Beside Strathy North wind farm there are very few potential sources of artificial light along this route, until it begins to approach Strathy. Visual sensitivity of the route is therefore considered to be **Medium-High**. The introduction of lit turbines would represent a noticeable change to views obtained from this route, particularly along the middle stretch where it passes through the site. This would lead to a **Medium-High** magnitude of change leading to a **Moderate-Major** (significant) visual effect. This is largely due to the potential for the aviation lighting to influence the perception of remoteness along this otherwise dark route at night.

VIEWPOINT 4 – VIEW FROM EAST OF MELVICH

- 4.9.79 This viewpoint is located on the A836 to the northeast of the site. It is representative of middle to longer distance views that users including commuters travelling westward along this road could experience as they pass from Caithness into Sutherland. During daylight hours, this viewpoint offers views from A-road over the surrounding area with a number of power lines crossing the views with Strathy North wind farm visible over the horizon line. The baseline dusk view is one with limited artificial light. The lights at Dounreay Power station can be made out in the distance to the east as a regularly spaced grouping.
- 4.9.80 Similar to the daytime baseline, views obtained during the hours of darkness are channelled along the road eastward and westward, with the ridgeline of the distant rolling hills prominent against the dusk sky. Views to the north and south of the road are somewhat restricted due to the road's position within the rolling moorland landscape.
- 4.9.81 The photomontage for this viewpoint (TA Figure 4.10.6c (EIAR Volume 4, Technical Appendix 4.10, Annex 1)) indicates that aviation lighting would be seen against the sky over the ridge to the southwest in the middle distance. It also shows that the turbine tower lights would be hidden behind the ridgeline and not visible from this viewpoint.

- 4.9.82 The introduction of aviation lighting on the Proposed Varied Development into the baseline view, would result in a **Medium** magnitude of change to a viewpoint with **Medium** visual sensitivity. It was assessed that the introduction of the aviation lighting would result in a **Moderate** and therefore significant effect to the viewpoint largely due to the absence of other artificial lighting in the view obtained from the viewpoint.

VIEWPOINT 5 – VIEW FROM STRATHY

- 4.9.83 This viewpoint is located on the A836 within Strathy near Cnoc Tuthcaid and is representative of worst-case scenario views obtained from the settlement and nearby areas. It is also representative of the views drivers could get as they pass through the settlement. Daytime views are focused along the A836 towards the east and west with distant views restricted by the rolling hills. There are open views to the south over low lying grassland before the ground slopes up towards the hills. Strathy North wind farm is visible over the ridgeline. Residential properties form a linear feature along the single track road to the south defining the edge of the foreground field system.
- 4.9.84 Dusk views obtained from the viewpoint would be similar to their daytime counterparts however, as the light faded, they would become more focused on the road and ridgelines against the sky. The scattered farmsteads and dwellings provide some baseline artificial light in addition to the cars passing through. TA Figure 4.10.7c (EIAR Volume 4, Technical Appendix 4.10, Annex 1) illustrates that aviation lighting would be seen to the south over the ridgeline against the sky in a relatively dark part of the surrounding landscape. In dusk light the Strathy North wind farm would be visible in the foreground, but it would fade from view as the sky grew darker.
- 4.9.85 The introduction of aviation lighting on the Proposed Varied Development would result in a **Medium** magnitude of change to a viewpoint with **Medium** visual sensitivity. It was assessed that this introduction would result in a **Moderate** and therefore significant effect to the viewpoint, largely due to the sensitivity of the settlement set within an otherwise largely dark landscape.

VIEWPOINT 7 – VIEW FROM A936 WEST OF THE B871 (NR BORGIE)

- 4.9.86 This viewpoint is found on the A836 to the northwest of the proposal. It is representative of middle distance views drivers would get from this stretch of the A-road and potential worst case scenario views on the descent into Strathnaver from the west.
- 4.9.87 The main views obtained from this viewpoint regardless of the time of day are along the A836 towards the east and west. Views to the north and south are restricted by the simple rolling moorland covered in low level vegetation. Longer distance views are largely restricted by the intervening topography with some rolling hills seen in the distance to the south and east.
- 4.9.88 The aviation lighting on the Proposed Varied Development would be visible in the distance to the southeast over the ridgeline against the sky (see TA Figure 4.10.8c (EIAR Volume 4, Technical Appendix 4.10, Annex 1)). As the only other baseline artificial lighting at this viewpoint is from passing cars, this would represent a new feature within the otherwise dark landscape.
- 4.9.89 The introduction of aviation lighting on the Proposed Varied Development to this **Medium** sensitivity viewpoint would result in a **High** magnitude of change. It was assessed that the resulting effect would be **Moderate** and therefore significant. While the change would be very noticeable as it would be within the main view of those travelling eastward, it would represent a distant change to only one part of the much larger dark surroundings.

VIEWPOINT 11 - FORSINARD

- 4.9.90 This viewpoint is located near Forsinard Flows NNR at the junction of the A897 and Far North Line on the edge of the Bens Griam and Loch nan Clar SLA. It is representative of the views which could be obtained by road/rail users and visitors to the RSPB Forsinard Flows Visitor Centre to the southeast of the site.

- 4.9.91 The main view is to the south along the A897 across a low lying landscape to the hills in the distance. Ben Grian Beg, Ben Grian Mòr and Meall a' Bhùirich are prominent against the skyline to the southwest. Towards the west the RSPB Flows Lookout is visible standing within the peatland pools of the blanket bog landscape. Views to the north are restricted by the trees that make up the shelterbelt around the Forsinard Railway Station and surrounding buildings, while commercial forest restricts views to the southeast. This results in a dark landscape when the sun sets, with the only artificial lights coming from the small collection of buildings surrounding the station and from passing vehicles.
- 4.9.92 The LVIA wirelines (see Figure 4.18b (EIAR Volume 3b)) indicate that four turbine hubs and therefore aviation lights would be visible from this viewpoint to the northwest over the ridge against the skyline. As this viewpoint is likely to be visited by birdwatchers at dusk and dawn with the expectation that it will be a dark landscape, it is identified as being **Highly** sensitivity to the introduction of artificial light. The introduction of four aviation lights against the skyline would be noticeable and would represent a **Medium** magnitude of change. The proposals would introduce some detracting features to an existing highly valued view and would have a **Moderate** (significant) effect largely focused around the predicted effects at dusk.

STRATHY – ALL PARTS (NORTH OF THE A836 AND EAST OF THE RIVER STRATHY, SOUTH OF THE A836 AND EAST OF THE RIVER STRATHY AND WEST OF THE RIVER STRATHY)

- 4.9.93 Strathy is a dispersed settlement. Existing artificial lights are largely limited to domestic lights and community amenities, such as the hall. The ZTV shows that due to variations in topography visibility of aviation lighting on the Proposed Varied Development would be scattered and intermittent. As a result, Strathy is considered to have localised **Medium** sensitivity to the aviation lighting on the Proposed Varied Development, while the wider settlement is considered to have a **Low** sensitivity. The introduction of aviation lighting on the Proposed Varied Development into the skies to the south would be a notable change seen at a distance of approximately 12-14 km. This would result in a localised **Medium** magnitude of change and localised **Moderate** and therefore locally significant effect where aviation lighting was visible. There would be a **Negligible** (not significant) and therefore not significant effect in the wider parts of the community where aviation lighting was not visible.

A836 (TONGUE – EASTERN EDGE OF DETAILED STUDY AREA) (NC500/ CYCLE ROUTE 1), A897 AND B871 (NORTH)

- 4.9.94 The three main roads within the Detailed Study Area that fall within the ZTV are the A836, the A897 and the B871. With the exception of the A836 when it passes through the settlements discussed above, these three roads are generally dark with no street lighting and limited artificial light from other sources. The roads are narrow and winding and in the case of the A897 and B871 single-track. Driving these roads during hours of darkness or even low light, requires the full attention of the driver on the road ahead. These routes are therefore considered to be of **Medium** sensitivity. Whilst aviation lighting on the Proposed Varied Development would be theoretically visible from some sections of these roads, users' attention would generally be focused on the immediate area in front of the car illuminated by the headlights. As a result, the lighting would be perceived as part of the wider background. Aviation lights could be more prominent in sections where they appeared in the direction of travel, however, the undulating nature of the surrounding landscape would mean that they were only visible for short stretches at a time as drivers travelled through the area. As a result, it was considered that they would result in localised **Medium** magnitude of change for each of the three routes. Due to the intermittent and limited nature of visibility along the three routes, predicted effects were assessed to be **Minor** (not significant) overall with some localised areas of **Moderate** (significant) effect.

Effects Likely to be Not Significant

MINOR – MODERATE EFFECTS

- 4.9.95 From the summit of Ben Griam Beg, to the south of the site, 360° panoramic views can be obtained across the landscape during the daytime. Much of the detail of this surrounding landscape would become lost during the hours of full darkness. However, during dusk and other low light conditions, Ben Graim Mòr and Meall a' Bhuirich to the south and the distinctive western mountain ranges would likely still be influential on perceptions of the surrounding landscape. Existing artificial light is limited to the settlement clusters along the coast, small scattered farmsteads along the straths and the lights of the odd passing car. Sensitivity is considered to be **Medium** as aviation lighting on the Proposed Varied Development would not introduce a wholly new feature into the surrounding landscape. The changes to views northward would represent a notable change to one part of the wider view and therefore a **Low-Medium** magnitude of change was identified. Given that the wider surrounding landscape would remain largely dark and that artificial lighting is already present, a **Minor-Moderate** (not-significant) predicted effect was identified.

MINOR EFFECTS

- 4.9.96 A **Minor** (not significant) effect was identified for one of the VPs, four of the routes, four of the settlements and residential groupings, and localised parts of one other route included in the assessment (see Table 4.8 below for details). From these receptors, visibility would often be intermittent and / or distant. Aviation lighting on the Proposed Varied Development would comprise either a new and perceptible feature within a small part of the wider context or a small additional feature where existing artificial lighting is more prominent. This would lead to a minimal reduction in the quality of the view experienced from the receptors and therefore the effect would be not significant.
- 4.9.97 Daytime views obtained from VP2: Cnoc Riabhach are extensive towards the west and south-west, if somewhat more constrained by undulating moorland in other directions. The simple landscape has few existing sources of artificial light to interrupt the otherwise dark expanse at night. As such, it was identified to have a **Medium** sensitivity to the introduction of turbine lighting in the distance. Given the distance and direction of the proposed aviation lighting, it was considered that this would result in a **Low-Medium** magnitude of change. This would represent a small deterioration to a part the wider existing view and therefore a **Minor** (not significant) effect.
- 4.9.98 Lednagullin is located to the west of Strathy off the A836 overlooking Armadale Bay. The ZTV indicates that there would be theoretical visibility of aviation lighting from the dwellings closest to the A836. The surrounding landform slopes towards Armadale Bay provides viewers with wide open views to the northwest and restricted views to the south. Where visible, the aviation lighting would appear in the sky over the horizon to the south. As this a less important part of the overall view, but one that would still be experienced on a regular basis by residents as they made their way towards the A836, Lednagullin was identified to have a **Low-Medium** sensitivity to the introduction of aviation lighting. Given the distance and direction of the proposed aviation lighting, it was considered that they would result in a **Low-Medium** magnitude of change. This would represent a small deterioration to a part the wider existing view and therefore a **Minor** (not significant) effect.
- 4.9.99 Crask is located to the east of Bettyhill, off the A836 to the northwest of the site. It is made up of a number of scattered properties, the majority of which are off a single track road travelling east-west. Farr Bay draws viewers' attention towards the water and Ben Hope and Ben Loyal are visible in the distance to the west. As the sun sets, these views draw the eye to the northwest. The settlement was considered to have a **Medium** sensitivity to the Proposed Varied Development as it would not alter the main view. The ZTV indicates that aviation lighting would be theoretically visible from parts of the settlement. This would likely result in a perceptible-noticeable and therefore **Low-Medium** change to the existing views to the southeast. Given the distance to

proposal, the introduction of the aviation lighting would likely result in a small deterioration to a small part of the much wider landscape and therefore a **Minor** (not significant) effect.

- 4.9.100 Skelpick is located to the northwest of the site within Strathnaver. The properties along the single track road are generally well spaced with views over and along the Strath. The surrounding landform focuses views to the north and south. The ZTV indicates that aviation lighting would be theoretically visible from parts of the community. Given the dark nature of this rural landscape it is likely that most activities undertaken by residents after sunset will take place indoors or with the aid of artificial outdoor lighting. As a result, Skelpick is identified as having a **Low-Medium** level of sensitivity to the proposed aviation lighting. As shown by the ZTV the topography of the surrounding area will limit the extent to which the aviation lighting would be theoretically visible. Local obstructions including trees and outbuildings would further limit these views. It was therefore judged that the proposals would result in a perceptible change and therefore **Low** magnitude of change and a **Minor** (not significant) effect.
- 4.9.101 Strathly Point is a linear settlement overlooking Strathly Bay. Existing artificial lights are largely limited to domestic lights within the community. The ZTV shows that due to variations in topography, visibility of the proposed lighting would be scattered and intermittent. As a result, this receptor is considered to have a **Low** sensitivity to the proposed aviation lighting, with localised areas of **Medium** sensitivity. The introduction of aviation lighting into the skies to the south could result in a perceptible change, however given the distance and intermittent visibility, this would be a localised **Low-Medium** magnitude of change. This would represent a small deterioration to a part the wider existing view and therefore a **Minor** (not significant) effect.
- 4.9.102 The three core paths leading off of the A836 to the northwest of the site (Core Path SU04.04 – Clachan Burn (Bettyhill to Bettyhill Community Turbines Loop), Core Path SU04.05 – Kirtomy – Cnoc Mor circuit and Core Path SU24.05 – Ben Tongue Circuit) all experience similar existing levels of artificial lighting. These include lighting from the nearby settlements, scattered farmsteads and passing vehicles on the A836. As such, they are considered to have a **Low-Medium** sensitivity to the introduction of turbine lighting. The addition of aviation lighting on the Proposed Varied Development to the south-east would represent a perceptible **Low-Medium** change in views obtained from the routes which are otherwise largely dark. This addition would represent a small deterioration to a part the wider existing view and therefore a **Minor** (not significant) effect.
- 4.9.103 Scottish Hill Track 343 Halkirk to Forsinain or Braemore is a remote recreational route through a largely dark landscape. It is likely that mature forest would screen much of the theoretical visibility of the aviation lighting, however where visible it would represent a perceptible change within the surrounding landscape. The route is considered to a **Low-Medium** sensitivity to the introduction of turbine lighting. Where visible, the addition of aviation lighting would represent a **Low-Medium** change and a small deterioration to a part of the view obtained and therefore a **Minor** (not significant) effect.
- 4.9.104 The A836 from Tongue to the edge of the Detailed Study Area travel generally north / south across open, dark and remote moorland. Artificial lighting is largely limited to passing vehicles using the route. As such the sensitivity of this transportation route to the introduction of artificial light is considered to be **Medium**. Visibility of the aviation lighting on the Proposed Varied Development would be limited to distant views against the skyline to the east obtained from a small part of the northern section of the route. From the southern part of the route, a very small number of aviation lights would be visible across Loch Loyal. This would result in a localised perceptible change and therefore **Negligible** (Localised **Low**) magnitude of change. Given the limited visibility, visual effects would be considered to be **Negligible** (not significant) for the overall route with some localised areas experiencing **Minor** (not significant) effects.

NEGLECTIBLE – MINOR EFFECTS

- 4.9.105 Effects on the Forsinard residential grouping would be considered to be **Negligible – Minor** (not significant) largely due to the screening provided by the mature woodlands that surround it. It was considered that while a small number of the aviation lights could be perceptible from the approach to the settlement from the south they would not lead to any discernible change within the settlement.
- 4.9.106 Effects on Core Path SU04.02 – Torrisdale – Invernaver, Coast Route, would be considered to be **Negligible – Minor** (not significant) largely due to the distance, limited visibility and influence of artificial lighting at Bettyhill.
- 4.9.107 Given the constrained views and influence of internal train lighting limiting travellers' views outward onto the dark landscape obtained from the Far North Railway, effects on this route would be considered to be **Negligible – Minor** (not significant).

Residual Aviation Lighting Effects on Visual Amenity Summary

- 4.9.108 Predicted effects on visual receptors are summarised in Table 4.8 below. For the purposes of this assessment, effects with a **Moderate** rating or greater are considered to be significant.

Table 4.8: Residual Aviation Lighting Effects on Visual Amenity Summary							
Receptor	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Viewpoints							
VP1: Ben Griam Beg				x			
VP2: Cnoc Riabhach			x				
VP3: Loch nan Clach Geala					x		
VP4: East of Melvich					x		
VP5: Strathy					x		
VP6: Bettyhill Viewpoint							
VP7: A836 west of the B871					x		
VP8: Sgor Chaonasaid				x			
VP10: Beinn Ratha					x		
VP11: Forsinard					x		
Routes							
A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1)			x		(L)		
A836 Tongue to Detailed Study Area	x		(L)				
A897			x		(L)		
B871 (North)			x		(L)		
Far North Railway		x					

Table 4.8: Residual Aviation Lighting Effects on Visual Amenity Summary

Receptor	Not Significant				Significant		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathly						x	
Scottish Hill Track 343 Halkirk to Forsinain or Braemore			x				
Core Path SU04.02 – Torrisdale – Invernaver, Coast Route		x					
Core Path SU04.04 – Clachan Burn (Bettyhill to Bettyhill Community Turbines Loop)			x				
Core Path SU04.05 – Kirtomy – Cnoc Mor circuit			x				
Core Path SU24.05 – Ben Tongue Circuit			x				
Settlements							
Strathly (North of the A836 and east of the River Strathly)			x		(L)		
Strathly (South of the A836 and East of the River Strathly)			x		(L)		
Strathly (West of the River Strathly)	x						
Strathly Point			x				
Lednagullin			x				
Crask / Farr			x				
Skelpick			x				
Forsinard		x					
(L) – Denotes that the effect would be localised to only part of the visual receptor within the Detailed Study Area.							

Residual Decommissioning Effects

4.9.109 As noted above in paragraph 4.8.5, any decommissioning proposals would be developed in consultation with statutory consultees at the time. It is assumed that the focus of these would be to reduce likely significant effects. As previously noted above, the assessment of residual effects arising from the process of decommissioning the Proposed Varied Development have been scoped out since the nature of the mitigation is not currently known and it is assumed that they are of a similar nature to residual construction effects, but of a smaller scale and shorter duration. Where the assessment refers to predicted residual construction effects these are also considered representative of potential residual decommissioning effects.

Residual Cumulative Effects

- 4.9.110 The cumulative landscape and visual assessment considers the predicted cumulative effects resulting from the addition of the Proposed Varied Development to the cumulative development baseline. Refer to EIAR Volume 3a: Figure 4.6.b: Cumulative Sites Included Within the Assessment, EIAR Volume 4: Technical Appendix 4.5 Cumulative Sites, EIAR Volume 4: Technical Appendix 4.6: Cumulative Landscape Assessment Tables and EIAR Volume 4: Technical Appendix 4.7: Cumulative Visual Assessment Tables. For the purposes of the assessment, it is assumed that all cumulative developments included within the assessment would be constructed and operational.

Analysis of the Cumulative ZTV

- 4.9.111 Cumulative ZTVs showing the theoretical visibility of the Proposed Varied Development and those of the cumulative developments included within the assessment have been produced to identify areas of combined and sequential visibility (see EIAR Volume 3a: Figures 4.7a – 4.7h). These demonstrate that the cumulative development baseline would be one of relatively widespread visibility of wind turbines, a number of which are also large-scale turbines. Visibility of these is largely focused towards the north and northeast of the Wider Study Area. All the cumulative developments included within the assessment show some level of theoretical visibility from most of the prominent hilltops within the Wider Study Area. The cumulative developments form several distinct clusters within the Wider Study Area with similar extents of theoretical visibility:
- The ZTVs for Limekiln wind farm (see Figure 4.7e, EIAR Volume 3a) and Baillie wind farm (see Figure 4.7c, EIAR Volume 3a), show theoretical coverage focussed on the coast around Reay and eastward to Thurso. The ZTVs show this theoretical visibility extending to Dunnet Head and to the southeast through central Caithness.
 - Armadale wind farm (see Figure 4.7b, EIAR Volume 3a) and Bettyhill wind farm (see Figure 4.7d, EIAR Volume 3a), show theoretical visibility focussed along the coast and around the site of the Proposed Varied Development. They also show theoretical visibility from the upper slopes of both Strath Halladale and Strathnaver.
 - The ZTV for Ackron wind farm (see Figure 4.7a, EIAR Volume 3a), shows extensive theoretical visibility along the coast near Melvich and through Strath Halladale.
 - Theoretical visibility of Strathy North wind farm (see Figure 4.7f, EIAR Volume 3a) and Strathy Wood wind farm (see Figure 4.7g, EIAR Volume 3a), would be focussed on the site of the Proposed Varied Development and the upper slopes of Strath Halladale and Strathnaver. The ZTVs also show some theoretical visibility from the area around Strathy but this is largely limited across the wider coast.
- 4.9.112 When considering the combined theoretical visibility of operational cumulative developments only, the Proposed Varied Development would exhibit theoretical visibility in areas not affected by operational cumulative developments. This is focussed in the south of the detailed and Wider Study Area around upper Strath Halladale, parts of Scottish Hill Track 342 track leading to Loch Choire, the southern part Loch Naver and the A836 along the southern part of Loch Loyal. The addition of consented cumulative developments to the cumulative development baseline would not noticeably alter the extent of these additional areas. However, when application and scoping cumulative developments are added to the cumulative development baseline these areas would be reduced particularly through Strath Halladale. This would be due to the influence of Strathy Wood wind farm and Ackron wind farm on the strath. The combined cumulative ZTV for all cumulative developments (see Figure 4.7h, EIAR Volume 3a), shows very few small areas of additional theoretical intervisibility mainly limited to a few glens to the southwest of the Proposed Varied Development site and small areas of elevated slopes within the hills to the southwest and southeast.
- 4.9.113 The Proposed Varied Development would share a similar degree of intervisibility to Strathy North wind farm and Strathy Wood wind farm, the sites in closest proximity to its proposed location.

There are very few areas where the Proposed Varied Development would be theoretically visible which would not be affected by one of these sites.

Cumulative Landscape Effects

- 4.9.114 The detailed cumulative assessment of LCTs and designated and protected landscapes is presented in Technical Appendix 4.6: Cumulative Landscape Assessment Tables (EIAR Volume 4). Only those designated or protected landscapes or LCTs that have been identified as likely to experience a Minor landscape effect or greater as a result of the Proposed Varied Development alone (see EIAR Volume 4: Technical Appendices 4.3) have been included in the cumulative assessment, as it is considered that an effect below Minor could not contribute to a significant cumulative effect. The following section provides a summary of the results and key issues highlighted by the assessment.
- 4.9.115 No significant cumulative effects to LCTs or designated and protected landscapes have been identified when considering the potential addition of the Proposed Varied Development to the cumulative development baseline. This is largely due to the position of the Proposed Varied Development adjacent to the operational Strathy North wind farm site and Strathy Wood wind farm application site, which would lead to the appearance of a cohesive cluster of development and the prominence of the Armadale and Ackron wind farm scoping sites. The effect of the cumulative development baseline would be such that the addition of the Proposed Varied Development to the Strathy North / Strathy Wood cluster, would often lead to only a perceptible or barely perceptible increased influence of wind turbine development leading to a **Negligible - Low to Low – Medium** magnitude of change to landscape receptors.
- 4.9.116 **Minor** (not significant) effects would be received by most the LCTs and designated and protected landscapes assessed as part of the CLIVA, apart from one which would receive **Negligible – Minor** (not significant) effects and two which would receive **Negligible** (not significant) effects (refer to Table 4.9). One protected landscape would receive localised **Minor – Moderate** (not significant) effects. Within these areas the Proposed Varied Development would increase the visibility of wind turbines in the surrounding context, however it would be seen as part of the cluster of Strathy North and Strathy Wood turbines. Generally, it would appear as a cohesive part of this cluster within the landscape, particularly as it would be at a similar scale to the Strathy Wood turbines. From the small areas where these developments are not intervisible, other cumulative developments would usually already be influential, particularly to the north of the site where Bettyhill, Armadale and Ackron wind farm would be prominent and considered likely to minimise any noticeable increased effect resulting from the addition of the Proposed Varied Development. Although cumulative developments would usually be present within the wider landscape there are small areas, mainly limited to a few glens to the southwest and small areas of elevated slopes to the southwest and southeast where the Proposed Varied Development would not share intervisibility with other cumulative developments. However, visibility of the Proposed Varied Development from these areas would be limited and would be unlikely to lead to any discernible increase in the dominance of wind turbines.

SUMMARY OF CUMULATIVE LANDSCAPE EFFECTS

- 4.9.117 Table 4.9 provides a summary of predicted cumulative landscape effects on those LCTs and designated and protected landscapes included in the CLIVA.

Table 4.9: Summary of Cumulative Landscape Effects

LCT, Designated or Protected Landscape	Predicted Effect (Not Significant)				Predicted Effect (Significant)		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Landscape Character Type							
Coastal Crofts and Small Farms LCT			x				
Lone Mountains LCT			x				
Rocky Hills and Moorland LCT		x					
Rounded Hills – Caithness and Sutherland LCT			x				
Strath – Caithness and Sutherland LCT			x				
Sweeping Moorland and Flows LCT			x				
Designated or Protected Landscape							
Kyle of Tongue NSA			x				
Farr Bay, Strathy and Portskerra SLA			x				
Ben Klibreck and Loch Choire SLA			x				
Bens Griam and Loch nan Clar SLA			x				
Flow Country and Berriedale Coast SLA			x				
WLA 35: Ben Klibreck – Armine Forest	x						
WLA 38: Ben Hope – Ben Loyal	x		(L)				
WLA 39: East Halladale Flows Wild Land Area			x	(L)			
(L) – Denotes that the effect would be localised to only part of the landscape receptor within the Detailed Study Area.							

Cumulative Visual Effects

4.9.118 Visual receptors located at viewpoints, settlements and using routes (see EIAR Volume 3a Figures 4.5a and 4.5c), are considered in the cumulative visual assessment, as described in Technical Appendix 4.4: Visual Assessment Tables (EIAR Volume 4). Only those locations which have been identified as likely to experience a Minor visual effect or greater as a result of the Proposed Varied Development alone have been included, as it is considered that an effect below Minor could not contribute to a significant cumulative effect. The following section provides a summary of the results and key issues highlighted by the assessment, focussing on predicted significant effects.

4.9.119 When considered in relation to the cumulative development baseline, the addition of the Proposed Varied Development would result in a significant cumulative visual effect from one viewpoint, VP1: Ben Griam Beg. The cumulative effect would be not significant for all other VPs, settlements and routes.

VP1: BEN GRIAM BEG

4.9.120 From VP1 under the cumulative development baseline wind farm turbines, including Strathy Wood, Strathy North and Armadale, would be fairly prominent features in the mid-ground whilst Bettyhill

and Ackron wind farm turbines would be seen as separate clusters in the farther mid-ground to the northeast and northwest respectively. Limekiln and Baillie wind farm turbines would be perceptible, but distant, cluster to the northeast. Although the Proposed Varied Development would increase the horizontal spread within this panoramic view, this is an area that would already be partially occupied by turbines. The Proposed Varied Development would be seen in the nearer mid-ground in combination with the cluster of Strathy North and Strathy Wood wind farm turbines and would increase the prominence of wind turbines in the area largely due to its proximity. While the overall prominence of turbines in the view would be increased, this is unlikely to dominate or obstruct the view when considered in the context the wider panoramic view which includes a number of large scale turbines. This would lead to a **Medium** magnitude of change and a **Moderate** (significant) cumulative effect.

MINOR – MODERATE EFFECTS

- 4.9.121 A **Minor – Moderate** (not significant) cumulative visual effects have been identified for four visual receptors (Table 4.10). The addition of the Proposed Varied Development to the cumulative development baseline would lead to a perceptible increase in wind turbines within views from three viewpoints (VP6, VP7 and VP11) and one route (Scottish Hill Track 344) (Table 4.10), which would slightly increase the prominence of wind turbines as a feature in the view, but not to an extent that is considered significant.

MINOR EFFECTS

- 4.9.122 The majority of visual receptors considered in the CLVIA would experience a **Minor** (not significant) cumulative visual effect (Table 4.10). This comprises five VPs, three settlements and four routes, and localised parts of three routes included in the CLVIA (Table 4.10). It is considered that the increased numbers of wind turbines visible from these receptors would be largely imperceptible or that they would be seen as part of the Strathy North / Strathy Wood wind farm cluster and / or in the context of the much more prominent Ackron and Armadale wind farms. They would therefore be unlikely to increase the prominence of wind turbines in the view.

NEGLECTIBLE – MINOR EFFECTS

- 4.9.123 A **Negligible – Minor** (not significant) cumulative visual effect has been identified for eight visual receptors (Table 4.10). This would largely be due to the prominence of the cumulative development baseline in the foreground or distance of receptors from the Proposed Varied Development and its position within the wider cumulative development baseline. It is considered that while the addition of the Proposed Varied Development could be perceptible it would not lead to any discernible increase in the appearance of wind turbines as a feature in the view.

SUMMARY OF CUMULATIVE VISUAL EFFECTS

- 4.9.124 Table 4.10 provides a summary of predicted cumulative visual effects on those VPs, Settlements and Routes included in the CLVIA.

Table 4.10: Summary of Cumulative Visual Effects							
Visual Receptor	Predicted Effect (Not Significant)				Predicted Effect (Significant)		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Viewpoints							
VP1: Ben Griam Beg					x		
VP2: Cnoc Riabhach			x				

Table 4.10: Summary of Cumulative Visual Effects

Visual Receptor	Predicted Effect (Not Significant)				Predicted Effect (Significant)		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
VP3: Loch nan Clach Geala			x				
VP4: East of Melvich			x				
VP5: Strathy		x					
VP6: Bettyhill Viewpoint				x			
VP7: A836 west of the B871				x			
VP8: Sgor Chaonasaoid			x				
VP9: Creag na h-Iolaire		x					
VP10: Beinn Ratha			x				
VP11: Forsinard				x			
Routes							
A836 (Between Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1)	x		(L)				
A836 from Tongue south to edge of Detailed Study Area	x		(L)				
A897	x		(L)				
B871 (North)		x					
Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy				x			
Scottish Hill Track 343 Halkirk to Forsinain or Braemore			x				
Core Path SU04.02 – Torrisdale – Invernaver, Coast Route		x					
Core Path SU04.04 – Clachan Burn (Bettyhill to Bettyhill Community Turbines Loop)			x				
Core Path SU04.05 – Kirtomy – Cnoc Mor circuit			x				
Core Path SU24.05 – Ben Tongue Circuit			x				
Settlements							
Strathy (North of the A836 and east of the River Strathy)			x				
Strathy (South of the A836 and East of the River Strathy)			x				
Strathy Point			x				
Baligill		x					
Lednagullin		x					

Table 4.10: Summary of Cumulative Visual Effects

Visual Receptor	Predicted Effect (Not Significant)				Predicted Effect (Significant)		
	Negligible	Negligible - Minor	Minor	Minor - Moderate	Moderate	Moderate - Major	Major
Crask / Farr		x					
Modsary / Skerray		x					
(L) – Denotes that the effect would be localised to only part of the visual receptor within the Detailed Study Area.							

4.10 Monitoring

4.10.1 In line with best practice no LVIA monitoring is required.

4.11 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

4.11.1 Section 4.3 provides a summary of effects of the Consented Scheme and concludes that while the Consented Scheme would result in some significant effects, these would be largely confined to a few areas. The Consented Scheme would not result in significant effects on any nationally designated landscape or settlement. The limited overall effects of the Consented Scheme demonstrate that the site is uniquely positioned to accommodate wind development. The following section and Table 4.11 summarise a comparison of the predicted significant effects identified for the Consented Scheme and the Proposed Varied Development. It is important to note that the effects related to the inclusion of aviation lighting on each of the 39 turbines, represents a worst case scenario and that the Applicant is engaging with aviation stakeholders and the CAA to agree a lighting solution which could result in reduced landscape and visual effects. A summary of the findings of the 2013 ES Addendum and 2014 FIR are not presented in the table below (see Column A of Table 4.11). Given the changes to identified receptors, baseline and assessment methodology guidance, the findings are not directly comparable with the assessment of Proposed Varied Development. The Consented Scheme has therefore been assessed against the 2019 baseline (see Column B of Table 4.11). Detailed assessments of the predicted residual effects on receptors that would result from each can be found in Technical Appendices 4.3, 4.4 and 4.10 in relation to the Proposed Varied Development, and, Technical Appendix 4.8, in relation to the Consented Scheme; (EIAR Volume 4). A comparative ZTV of the Proposed Varied Development and the Consented Scheme is provided in Figure 4.2a (EIAR Volume 3a).

4.11.2 The assessment of the Consented Scheme identified predicted residual significant effects for the following receptors:

- Bens Griam and Loch nan Clar SLA (**Moderate**);
- Localised parts of the Lone Mountains LCT (138) (**Minor (localised Moderate)**);
- Sweeping Moorland and Flows LCT (134) (**Moderate**);
- VP1: Ben Griam Beg (**Major**);
- VP6: Bettyhill Viewpoint (**Moderate**);
- VP7: A836 west of B871 (**Moderate**); and
- Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (**Major**).

4.11.3 Although the Proposed Varied Development turbines would be 65 m taller than those of the Consented Scheme, the identified receptors in the Wider Study Area would experience very similar

effects from the two schemes. This is largely due to the unique position of the site within the wider large scale landscape, set back from the majority of key receptors and often partially screened by topography and this means that the increased height of the turbines, while perceptible, would be unlikely to be fully recognised. The following additional significant effects resulting from the Proposed Varied Development would be experienced:

- Localised parts of WLA 39: East Halladale Flows Wild Land Area would experience **Moderate** (significant) effects. Effects across the wider WLA would be **Minor** (not significant).
- VP3: Loch nan Clach Geala would experience **Moderate** (significant) effects. The assessment of the Consented Scheme identified predicted **Minor - Moderate** (not significant) effects from this viewpoint.
- Although localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1) would experience **Moderate** (significant) effects, the overall route would experience **Negligible** effects. The assessment of the Consented Scheme identified an overall predicted **Negligible** effect with localised areas of predicted **Minor** (not significant) effect for this route.
- Although localised parts of the A836 Tongue to Detailed Study Area would experience **Moderate** (significant) effects, the overall route would experience **Negligible** (not significant) effects. The assessment of the Consented Scheme identified an overall predicted **Negligible** (not significant) effect with localised areas of predicted **Minor** (not significant) effect for this route.

4.11.4 Individually these are considered to represent material changes to the predicted residual effects that would be experienced by these receptors given the change from not significant to significant. As the turbines of the Consented Scheme would be below the threshold requiring aviation lighting any significant effects experienced as a result of aviation lighting on the Proposed Varied Development would be an increase. The assessment of aviation lighting concluded that it would result in significant effects during low light conditions and the hours of darkness above those identified for the Consented Scheme at 10 landscape and visual receptors and localised parts of six landscape and visual receptors as outline in paragraph 4.2.17. It should be noted that the Applicant is engaging with aviation stakeholders to agree a lighting solution which could result in a reduced effect.

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Construction				
Predicted significant residual construction effects on landscape receptors	N/A	Predicted significant residual construction effects were identified for the following landscape receptors: - Bens Griam and Loch nan Clar SLA (Moderate); - Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate); and - Sweeping Moorland and Flows LCT (134) (Moderate).	Predicted significant residual construction effects were identified for the following landscape receptors: - Bens Griam and Loch nan Clar SLA (Moderate); - Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate)); - Sweeping Moorland and Flows LCT (134) (Moderate); and - Localised parts of the WLA 39: East Halladale Flows Wild Land Area (Minor (localised Moderate)).	Additional significant effects were identified for very localised parts of WLA 39: East Halladale Flows Wild Land Area. Effects across the wider WLA are considered to be Minor. This would represent a material change. However, it is considered that, whilst limited significant effects would be likely to the strength of wildness and the strength of some of the Key Qualities within WLA 39, the integrity of the WLA would not be affected. Other areas which were identified as experiencing significant effects due to the Consented Scheme would continue to experience these at a similar level as a result of the Proposed Varied Development. This would not represent a material change.
Predicted significant residual construction effects on visual receptors	N/A	Predicted significant residual construction effects were identified for the following visual receptors:	Predicted significant residual construction effects were identified for the following visual receptors: - VP1: Ben Griam Beg (Major); - VP3: Loch nan Clach Geala (Moderate);	Significant effects were identified for four receptors as a result of the Consented Scheme. Additional significant effects resulting from the Proposed Varied Development were identified for one VP and localised parts of two routes. Given the change from not significant to significant for these receptors this would be considered a material change. However, when

³⁰ A summary of the findings of the 2013 Addendum and 2014 FIR are not presented in Table 4.11 (Column A). Given the changes to identified receptors, baseline and assessment methodology guidance, the findings are not directly comparable with the assessment of Proposed Varied Development. The Consented Scheme has therefore been assessed against the 2019 baseline (Column B).

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
		- VP1: Ben Griam Beg (Major); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Major).	- VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1) (Negligible (localised Minor-Moderate or localised Moderate)); - Localised parts of the A836 Tongue to Detailed Study Area (Negligible (localised Moderate)); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Major).	viewed in the context of the overall scheme they would represent a small change to the overall effects.
Operation				
Predicted significant residual operational effects on landscape receptors	N/A	Predicted significant residual operational effects were identified for the following landscape receptors: Bens Griam and Loch nan Clar SLA (Moderate);	Predicted significant residual operational effects were identified for the following landscape receptors: Bens Griam and Loch nan Clar SLA (Moderate);	Additional significant effects were identified for localised parts of WLA 39: East Halladale Flows Wild Land Area. Effects across the wider WLA would be considered to be Minor. This would represent a material change. However, it is considered that, whilst limited significant effects would be likely due to the strength of wildness and the strength of some of the

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
		- Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate)); and - Sweeping Moorland and Flows LCT (134) (Moderate).	- Localised parts of the Lone Mountains LCT (138) (Minor (localised Moderate)); - Sweeping Moorland and Flows LCT (134) (Moderate); and - Localised parts of the WLA 39: East Halladale Flows Wild Land Area (Minor (localised Moderate)). Predicted significant residual operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development. - The Lone Mountains Landscape Character Type LCT (138) (Moderate); - The Rounded Hills – Caithness and Sutherland LCT (135) (Moderate); - The Sweeping Moorlands and Flows LCT (134) (Moderate); and - Localised parts of the WLA39: East Halladale Flows Wild Land	Key Qualities within WLA 39, the integrity of the WLA would not be affected. In addition to the Moderate effects identified for the Sweeping Moorland and Flows LCT (134) as a result of the Consented Scheme, it is expected that localised areas of the receptor would experience Major effects as a result of the Proposed Varied Development. This would not represent a material change. Other areas which were identified as experiencing significant effects due to the Consented Scheme would continue to experience these at a similar level as a result of the Proposed Varied Development. This would not represent a material change. Although aviation lighting effects would result in significant effects. The Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in a reduced visual effect.

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
			Area (WLA) (Minor (localised Moderate)).	
Predicted significant residual operational effects on visual receptors	N/A	Predicted significant residual operational effects were identified for the following visual receptors: - VP1: Ben Griam Beg (Major); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Moderate).	Predicted significant residual operational effects were identified for the following visual receptors: - VP1: Ben Griam Beg (Major); - VP3: Loch nan Clach Geala (Moderate); - VP6: Bettyhill Viewpoint (Moderate); - VP7: A836 west of B871 (Moderate); - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1) (Negligible (localised Minor-Moderate or localised Moderate)); - Localised parts of the A836 Tongue to Detailed Study Area (Negligible (localised Moderate)); and - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Moderate).	Significant effects were identified for four receptors as a result of the Consented Scheme. Additional significant effects resulting from the Proposed Varied Development were identified for one VP and localised parts of two routes. Given the change from not significant to significant for these receptors this would be considered a material change. However, when viewed in the context of the overall scheme they would represent a small change to the overall effects. Although aviation lighting effects would result in significant effects. The Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in a reduced visual effect.

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
			Predicted significant residual operational effects were identified for the following visual receptors as a result of aviation lighting on the Proposed Varied Development. - VP3: Loch nan Clach Geala (Moderate); - VP4: East of Melvich (Moderate); - VP5: Strathy (Moderate); - VP7: A836 west of B871 (Moderate); - VP10: Beinn Ratha (Moderate); - VP11: Forsinard (Moderate); - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy (Moderate – Major); - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1) (Minor (localised Moderate)); - Localised parts of the A897 (Minor (localised Moderate));	

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
			- Localised parts of the B871 (North) (Minor (localised Moderate)); - Localised parts of Strathy (North of the A836 and east of the River Strathy) (Minor (localised Moderate)); and - Localised parts of Strathy (South of the A836 and east of the River Strathy) (Minor (localised Moderate)).	
Decommissioning				
	N/A	N/A	N/A	Decommissioning effects were scoped out of the assessment of the Proposed Varied Development and the Consented Scheme for the reasons discussed in paragraphs 4.7.5, 4.8.5 and 4.9.109 above.
Cumulative Construction				
	N/A	Scoped out, given the improbability that any additional significant effects would be experienced as a result of the smaller sized turbines for the Consented Scheme.	The CLVIA of the Proposed Varied Development found that potential significant construction effects would be limited to VP1: Ben Griam Beg (Moderate).	Significant construction effects resulting from the Proposed Varied Development were identified for one VP and this would be considered a material change. However, when viewed in the context of the overall scheme this represents a small change to the overall effects.

Table 4.11: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
LVIA Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required) ³⁰	Predicted Significant Residual Effects of the Proposed Varied Development ³⁰	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Cumulative Operation				
	N/A	Scoped out, given the improbability that any additional significant effects would be experienced as a result of the smaller sized turbines for the Consented Scheme.	The CLVIA of the Proposed Varied Development found that potential significant operational effects would be limited to VP1: Ben Grian Beg (Moderate).	Significant operational effects resulting from the Proposed Varied Development were identified for one VP and this would be considered a material change. However, when viewed in the context of the overall scheme this represents a small change to the overall effects.

4.12 Summary and Conclusions

Key Steps

- 4.12.1 This assessment has been undertaken in line with GLVIA3. The GLVIA3 methodology for landscape and visual assessment involves an appreciation of the existing receptors, their sensitivity to the change proposed, and an understanding of the potential effects which could occur and how these could affect receptors. The assessment has been undertaken and verified by two Chartered Landscape Professionals to provide a robust and consistent approach.
- 4.12.2 There are five key stages to the assessment:
- establishment of the baseline;
 - appreciation of the Proposed Varied Development;
 - identification of key landscape and visual receptors;
 - identification of potential landscape and visual effects; and
 - assessment of the significance of the landscape and visual residual effects.
- 4.12.3 Detailed methods and criteria for the above key stages are included under the relevant methodology sections for landscape and visual amenity above.

Key Baseline Conditions

- 4.12.4 The site is located in an area of sweeping moorland to the south of the A836 and Scotland's northern coastline. The area is characterised by a flat, gently undulating and generally smooth landscape. It forms part of the setting to the surrounding summits, particularly the nearby Bens Grian, the distinctive form and prominence of which is accentuated by the simple, open and expansive nature of the low-lying moorland. Although the immediate area is sparsely settled, it is strongly influenced by the turbines and access tracks of the operational Strathy North wind farm. Dispersed crofts, farms and small settlements are present along the coast and in the nearby straths closely related to the transportation and infrastructure corridors running through wider area.
- 4.12.5 The Wider Study Area is characterised by the peatlands and bogs that make up the Flow Country that stretches across Caithness and Sutherland. These areas are largely uninhabited adding to the sense of remoteness and isolation experienced across much of the area. The flows are interrupted by iconic hills that can be seen from much of the area. To the west the distinctive summits of Ben Hope and Ben Loyal act as landmarks for much of the Wider Study Area. To the south Ben Klibreck, Ben Armine, Morven and Scaraben define the skyline. To the north, the dramatic coastline and views out to sea, including to distant Orkney, characterise the area.
- 4.12.6 Major infrastructure is frequently present within this wider landscape including the 275 kV overhead line through Strath Halladale, past Connagill substation, and connecting into Dounreay Nuclear Power Station. Existing wind farms are also characteristic of the Wider Study Area particularly through the farmed lowlands of Caithness where they are a relatively regular feature. Nevertheless, the Wider Study Area also features areas where there are few contemporary features, and impressions of wildness and remoteness are therefore stronger.

Summary of Landscape Effects

- 4.12.7 The vast majority of effects to landscape character, landscape designations and other protected landscapes resulting from the Proposed Varied Development would not be significant. This is largely due to the proximity of the Proposed Varied Development to Strathy North wind farm which provides a precedent in most areas for the types of effects which would be experienced, and the natural screening provided by the surrounding rolling landform. Significant landscape effects (excluding the effects of turbine lighting) would be limited to:

- Ben Graim and Loch nan Clar Special Landscape Area (SLA);
- Localised parts of the Lone Mountains Landscape Character Type LCT (138);
- Localised Parts of the Sweeping Moorlands and Flows LCT (134); and
- Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA).

- 4.12.8 These effects would occur within the Detailed Study Area, largely within 5 km of the Proposed Varied Development turbines and not more than 15 km away, generally affecting discrete parts of the landscape.
- 4.12.9 Significant effects during construction would relate to temporary disturbance and activity within a localised area from construction activities. During operation, significant effects would occur in the form of direct effects from the presence of turbines, associated tracks and other infrastructure. Indirect effects would occur within a small number of localised areas due to the appearance of turbines within close proximity, where other similar development is not already influential, thereby locally affecting qualities of remoteness and wildness.

Summary of Visual Effects

- 4.12.10 The majority of visual effects anticipated to result from the Proposed Varied Development would not be significant, including viewpoints, routes, settlements and residential groupings. This is generally due to the natural screening provided by the surrounding landform and the proximity of the Proposed Varied Development to Strathy North wind farm which leads to an existing similar appearance of wind turbines in most views. The presence of Strathy North wind farm often reduces the sensitivity of the part of the view affected, and also reduces the perceptibility of changes that would result from the Proposed Varied Development.
- 4.12.11 Significant effects (excluding the effects of turbine lighting) would be limited to changes in the views from:
- VP 1: Ben Griam Beg;
 - VP3: Loch nan Clach Geala;
 - VP6: Bettyhill Viewpoint;
 - VP7: A836 west of B871;
 - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1);
 - Localised parts of the A836 Tongue to Detailed Study Area; and
 - Scottish Hill Track 344: Strath Halladdale (Trantlebeg) to Strathy.
- 4.12.12 With the exception of Scottish Hill Track 344, the effects experienced by these receptors would be the same during construction and operation. The effects on Scottish Hill Track 344 would reduce from **Major** (significant) during construction to **Moderate-Major** (significant) during operation. This is due to the proximity of the route to the site and the potential close experience of construction activity.
- 4.12.13 The visual assessment has demonstrated that of the few residential areas where views would be theoretically obtained, no significant visual effects would occur.
- 4.12.14 Long term predicted significant visual effects are therefore anticipated to be limited to those experienced by recreational users in the hills and moorland around the Proposed Varied Development of which VP1: Ben Griam Beg and VP3: Loch nan Clach Geala, are representative, and to a lesser extent travellers along small localised parts of the A836, of which VP6: Bettyhill viewpoint and VP7: A836 west of the B871, are representative.

Summary of Cumulative Effects

- 4.12.15 No significant cumulative landscape effects have been identified when considering the addition of the Proposed Varied Development to the cumulative development baseline (existing and proposed wind farm sites). This would mainly be related to the position of the Proposed Varied Development adjacent to the operational site of Strathy North wind farm and the proposed Strathy Wood wind farm, leading to the appearance of a largely cohesive cluster of baseline development which would strongly define the character of the landscape in which it would be located. In adjacent areas, where the more notable landscape effects of the Proposed Varied Development alone would be experienced, the effect of the cumulative development baseline would be such that the addition of the Proposed Varied Development would be unlikely to increase the prominence of wind turbines as a feature of the landscape.
- 4.12.16 The CLVIA has identified that the addition of the Proposed Varied Development to the cumulative development baseline would result in a significant cumulative effect to one viewpoint, VP1: Ben Griam Beg, located approximately 8.6 km to the south of the turbines of the Proposed Varied Development, where they would appear closer, larger and more prominent than the cumulative developments leading to an increased prominence of wind turbines within northward views. All other cumulative effects to viewpoints, routes and residential receptors would be not significant.

Summary Effects of Aviation Lighting

- 4.12.17 Due to the height of Proposed Varied Development (turbines being above 150 m to tip), aviation lighting would be required in line with the CAA Policy Statement². Discussions between the Applicant and the CAA on a reduced aviation lighting scheme are currently taking place, however, as an aviation lighting design had not been agreed at the time of finalising the aviation lighting assessment, assumptions have been made with regard to the worst-case scenario on the extent and type of aviation lighting, as noted above. As noted in paragraphs 4.9.54 through 4.9.107, the assessment of the predicted effects of aviation lighting on each of the 39 turbines, (as required by CAA guidelines³¹), found that effects would be significant from:
- The Lone Mountains Landscape Character Type LCT (138);
 - The Rounded Hills – Caithness and Sutherland LCT (135);
 - The Sweeping Moorlands and Flows LCT (134);
 - Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA);
 - VP3: Loch nan Clach Geala;
 - VP4: East of Melvich;
 - VP5: Strathy;
 - VP7: A836 west of B871;
 - VP10: Beinn Ratha;
 - VP11: Forsinard;
 - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy;
 - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1);
 - Localised parts of the A897;
 - Localised parts of the B871 (North);
 - Localised parts of Strathy (North of the A836 and east of the River Strathy); and
 - Localised parts of Strathy (South of the A836 and east of the River Strathy).

³¹ Safety and Airspace Regulation Group, 2017. *Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m Above Ground Level*. Civil Aviation Authority

4.12.18 This is largely due to the absence of existing artificial light within the Detailed Study Area. Receptors would therefore generally be more sensitive to this type of change. It was concluded that when taking aviation lighting on the Proposed Varied Development into consideration, significant effects would result during low light conditions and the hours of darkness. However, the Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in a reduced visual effect. Discussions would include consideration of the following:

- Potential reduction of aviation lighting intensity during good meteorological visibility;
- Radar activated aviation lighting (should this be approved for use); and
- Potential for cardinal or strategic aviation lighting on selected turbines.

Table 4.12: Summary of Predicted Significant Effects of the Proposed Varied Development

Predicted Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Construction				
Predicted significant construction effects were identified for the following landscape receptors:				
• Bens Grian and Loch nan Clar SLA	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
• Localised parts of the Lone Mountains LCT (138)	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Minor (localised Moderate (significant))
• Localised parts of the Sweeping Moorland and Flows LCT (134)	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Minor (localised Moderate (significant))
• Localised parts of the WLA 39: East Halladale Flows Wild Land Area	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (localised Major (significant))
Predicted significant construction effects were identified for the following visual receptors:				
• VP1: Ben Grian Beg	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Major (significant)
• VP3: Loch nan Clach Geala	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
• VP6: Bettyhill Viewpoint	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
• VP7: A836 west of B871	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)

³² Landscape and visual mitigation relates to the design evolution and iterations, encompassing identification of a site, turbine location, turbine selection and design. As such an assessment of the significance of effects without mitigation is not applicable.

Table 4.12: Summary of Predicted Significant Effects of the Proposed Varied Development

Predicted Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1)	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Negligible (localised Moderate (significant))
Localised parts of the A836 Tongue to Detailed Study Area	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Negligible (localised Moderate (significant))
Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Major (significant)
Operation				
Predicted significant operational effects were identified for the following landscape receptors: Bens Griam and Loch nan Clar SLA	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
Localised parts of the Lone Mountains LCT (138)	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Minor (localised Moderate (significant))
Sweeping Moorland and Flows LCT (134)	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Minor (localised Moderate (significant))
Localised parts of the WLA 39: East Halladale Flows Wild Land Area	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant) (localised Major (significant))
Predicted significant operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development. - The Lone Mountains Landscape Character Type LCT (138) - The Rounded Hills – Caithness and Sutherland LCT (135) - The Sweeping Moorlands and Flows LCT (134)	Moderate Moderate Moderate	- Potential reduction of aviation lighting intensity during good meteorological visibility; - Radar activated aviation lighting (should this be	Upon agreement with aviation stakeholders prior construction and / or during operation.	The Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in a

Table 4.12: Summary of Predicted Significant Effects of the Proposed Varied Development

Predicted Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA)	Minor (localised Moderate)	approved for use); and Potential for cardinal or strategic aviation lighting on selected turbines.		reduced visual effect.
Predicted significant operational effects were identified for the following visual receptors: - VP1: Ben Giam Beg - VP3: Loch nan Clach Geala - VP6: Bettyhill Viewpoint - VP7: A836 west of B871 - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1) - Localised parts of the A836 Tongue to Detailed Study Area - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Major (significant)
	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Negligible (localised Moderate (significant))
	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Negligible (localised Moderate (significant))
	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate - Major (significant)
Predicted significant operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development. - VP3: Loch nan Clach Geala - VP4: East of Melvich - VP5: Strathy	Moderate	Potential reduction of aviation lighting intensity during good	Upon agreement with aviation stakeholders prior construction and	The Applicant is engaging with aviation stakeholders and the CAA to agree an aviation

Table 4.12: Summary of Predicted Significant Effects of the Proposed Varied Development

Predicted Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
- VP7: A836 west of B871 - VP10: Beinn Ratha - VP11: Forsinard - Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy - Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1) - Localised parts of the A897 - Localised parts of the B871 (North) - Localised parts of Strathy (North of the A836 and east of the River Strathy) - Localised parts of Strathy (South of the A836 and east of the River Strathy)	Moderate Moderate Moderate Moderate – Major Minor (localised Moderate) Minor (localised Moderate) Minor (localised Moderate) Minor (localised Moderate) Minor (localised Moderate)	meteorological visibility; - Radar activated aviation lighting (should this be approved for use); and - Potential for cardinal or strategic aviation lighting on selected turbines.	/ or during operation.	lighting solution which could result in a reduced visual effect
Decommissioning				
Decommissioning effects were scoped out of the LVIA.				
Cumulative Construction				
Significant cumulative construction effects were identified for the following receptor: VP1: Ben Griam Beg	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)
Cumulative Operation				
Significant cumulative operational effects were identified for the following receptor:				

Table 4.12: Summary of Predicted Significant Effects of the Proposed Varied Development

Predicted Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
VP1: Ben Griam Beg	N/A ³²	Site location, turbine location and turbine selection	Design evolution and iteration	Moderate (significant)

Conclusions

- 4.12.19 The vast majority of landscape, visual and cumulative effects of the Proposed Varied Development (excluding the effects of turbine lighting) would be not significant. Significant landscape and visual effects would be limited to an area within close proximity of the site, affecting relatively discrete parts of the landscape within 15 km of the turbines of the Proposed Varied Development and occasional views obtained by recreational users of the landscape, and travellers along small parts of the A836.
- 4.12.20 There could be very localised significant effects to wild land characteristics within WLA39: East Halladale Flows, however, there would be no significant effects to any nationally designated landscapes and the integrity of these areas would not be affected.
- 4.12.21 Significant cumulative effects of the Proposed Varied Development would be limited to one viewpoint. There would be no significant cumulative visual effects to other visual receptors and no significant cumulative effects to designated landscape receptors.
- 4.12.22 Although the Proposed Varied Development turbines would be 65 m taller than those of the Consented Scheme, with the exception of one landscape receptor, one viewpoint and localised parts of two routes, the identified receptors in the Wider Study Area would experience very similar effects from the two schemes (excluding aviation lighting). This is largely due to the unique position of the site within the wider large scale landscape, set back from the majority of key receptors and often partially screened by topography and this means that the increased height of the turbines, while perceptible, would be unlikely to be fully recognised.
- 4.12.23 When taking turbine lighting into consideration, it was concluded that aviation lighting every turbine of the Proposed Varied Development would result in significant effects during low light conditions and the hours of darkness above those experienced as a result of the Consented Scheme. However, the Applicant is engaging with aviation stakeholders to agree a lighting solution which could result in a reduced effect.

4.13 Glossary and Abbreviations

Term (in alphabetical order)	Definition
Cumulative development baseline	A hypothetical baseline in which all cumulative developments are constructed and operational.
Detailed Study Area	Set as a 20 km radius from the outermost turbines of the Proposed Varied Development
North Coast 500 (NC500)	The NC500 is a 516 mile tourist route that starts in Inverness and weaves around the north coast of Scotland.
Wider Study Area	Set as a 45 km radius from the outermost turbines of the Proposed Varied Development

Abbreviation (in alphabetical order)	Expanded Term
CAA	Civil Aviation Authority
CaSPlan	Caithness and Sutherland Local Development Plan
CLVIA	Cumulative Landscape and Visual Impact Assessment
GLVIA2	The second edition of Guidelines for Landscape and Visual Impact Assessment
GLVIA3	The third edition of Guidelines for Landscape and Visual Impact Assessment
LCT	Landscape Character Type
LVIA	Landscape and Visual Impact Assessment
HwLDP	Highland-wide Local Development Plan
NC500	North Coast 500
NSA	National Scenic Area
OWESG	The Highland Council Onshore Wind Energy Supplementary Guidance
RSPB	Royal Society for the Protection of Birds
SEPA	Scottish Environment Protection Agency
SLA	Special Landscape Area
SNH	Scottish Natural Heritage
THC	The Highland Council
VP	Viewpoint
WLA	Wild Land Area
ZTV	Zone of Theoretical Visibility

5. ORNITHOLOGY

5.1 Executive Summary

- 5.1.1 An assessment of the predicted effects of the Proposed Varied Development has been made on valued ornithological receptors (VORs) at the Strathly South main site (the 'main site') and its surroundings, drawing on standard industry guidance (CIEEM 2018¹).
- 5.1.2 The assessment is based on a comprehensive up-to-date ornithological baseline produced for the Proposed Varied Development, compiled from a combination of desk study and new surveys.
- 5.1.3 The desk study brought together published scientific literature, grey literature, data from Royal Society for the Protection Birds (RSPB), Scottish Natural Heritage (SNH), the Highland Raptor Study Group (HRSBG), data from local wind farms (including Strathly Wood wind farm which is at the application stage and the Applicant's Strathly North wind farm). Relevant earlier data from the Consented Scheme was also included where this provided informative context for the April 2018 to 2019 survey results, particularly on species distribution and trends.
- 5.1.4 The surveys were to determine the bird species, their abundance and distribution. They consisted of:
- Vantage point (VP) surveys to map and quantify flight activity over the main site, during both the breeding and non-breeding seasons;
 - Moorland breeding bird surveys to identify territory distribution of moorland species (in particular the qualifying breeding waders of the Caithness and Sutherland Peatlands SPA/Ramsar site). This covered the main site and out to 1 km;
 - Breeding raptor surveys out to 2 km from the main site boundary, to characterise the number and distribution of breeding raptors, with particular emphasis on the qualifying breeding raptors of the Caithness and Sutherland Peatlands SPA/Ramsar site); and
 - Breeding red-throated diver and black-throated diver surveys at all water bodies within 2 km of the main Strathly South site.
- 5.1.5 The combined 2018 and 2019 desk study and survey data confirm that the Strathly South site remains:
- relatively poorly used by qualifying species of the Caithness and Sutherland Special Protection Area (SPA), with the exception of small numbers of greenshank, which annually use interior forest lochans and boggy clearings for nesting, feeding, and/or chick-rearing;
 - the great majority of red-throated breeding and flight activity remains to the west and northwest of the site and to the northeast, where Loch ID 44 and Loch ID 35 are the most consistently used breeding red-throated diver lochans anywhere within 2 km of the site, Strathly Wood wind farm and Strathly North wind farm;
 - the evidence that the 2012 occurrence of breeding red-throated diver at Loch ID 64 (in the northwest of the Strathly South main site) was atypical has been further confirmed, as apart from 2012, no other evidence of breeding has been recorded at this location in 2003, 2004, 2007, 2010, 2014, 2018 or 2019;
 - black-throated diver occasionally uses Loch nan Clach (Loch ID 54) for foraging but breeding and flight activity remain distributed to the west and south of Strathly South;
 - in the surrounding moorland (within 1 km of the main site), evidence of breeding has been regularly recorded for greenshank, golden plover and dunlin;

¹ CIEEM. (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

- golden eagle has regularly bred in the wider area, but the topography in and around the site lacks favourable topographic features for golden eagle so activity is limited to occasional flights in the locality;
- there has been occasional evidence of possible merlin breeding on the Strathly South conifer plantation edge, as well as in the wider surrounding moorland;
- there have been no breeding records for short-eared owl, common scoter, wood sandpiper, peregrine, white-tailed eagle or osprey, and site usage is rare;
- the site is traversed by migratory whooper swan, greylag and pink-footed geese during winter and on migration.

- 5.1.6 In all these respects, the results of the 2018 and 2019 baseline surveys for the Proposed Varied Development have been mainly comparable with the Consented Scheme's baseline. Presented in the 2013 ES Addendum and the 2014 Further Information Report (FIR), combined desk study and survey results demonstrated that based on 2003 to 2014 data, the main site was relatively poorly used by SPA-qualifying species with the exception of small numbers of greenshank, relatively regular breeding hen harrier and, in 2012, the atypical breeding red-throated diver on Loch ID 64 (in the northwest of the site). Black-throated diver and osprey on occasion also used Loch nan Clach (Loch ID 54) for foraging. In the surrounding moorland (within 2 km), evidence of breeding had been regularly recorded for red-throated diver and black-throated diver, and within 1 km, greenshank, golden plover and dunlin. Within 2 km hen harriers bred in Strathly Wood wind farm to the north (peaking with three nests in 2011). Golden eagle regularly bred in the wider area, and occasionally foraged in the vicinity of the main site. Evidence of merlin breeding was occasionally recorded in the vicinity of the Strathly South main site. There were no breeding records for short-eared owl, common scoter, peregrine, white-tailed eagle or osprey, and use by these species was rare. Wood sandpiper were present very rarely, but not breeding. The main site was traversed by migratory whooper swan and greylag goose during winter with additional greylag flights likely to come from the indigenous breeding population throughout the year.
- 5.1.7 By comparing the baseline for the Proposed Varied Development with that from the Consented Scheme, the VORs remain relatively consistent in terms of distribution and abundance. There are however, three notable changes since the Consented Scheme's ornithological baseline. Specifically, the 2018 and 2019 surveys show that:
- hen harrier flight activity, and therefore collision risk, is lower for the Proposed Varied Development;
 - white-tailed eagle flight activity is more common at Strathly South main site (and Strathly North wind farm and Strathly Wood wind farm) than it was back in 2003 to 2012, reflecting the range and population expansion of this species. No nesting or roosting were recorded on, or within at least 6 km of Strathly South main site, Strathly North wind farm or Strathly Wood wind farm sites in 2018 and 2019;
 - barn owl was reported for the first time over 2018 and 2019, with signs indicative of nesting at Strathly South main site (in the Strathly South Bothy) and nesting at Strathly Wood wind farm (at Braerathly Lodge).
- 5.1.8 The baseline dataset comprising the desk study and 2018 and 2019 survey results is comprehensive in itself. In combination with the integrated insights generated by the long-running surveys at Strathly North wind farm and Strathly Wood wind farm, there is a uniquely comprehensive and insightful baseline of bird breeding and flight activity across the Strathly South main site and its surrounding peatland habitat. There is consequently adequate data from which to assess the potential significant effects on birds from the construction, operation and decommissioning of the Proposed Varied Development.
- 5.1.9 As part of the assessment process, the species recorded during the 2018-2019 surveys were categorised according to conservation value, their use of the site, and feedback from consultees.

5.1.10 The species categorised as VORs for inclusion in the baseline assessment are shown in Table 5.1.

Table 5.1: Valued Ornithological Receptors Identified During Baseline Assessment 2018-19		
Species of International importance (with site sensitivity)	Species of National importance (with site sensitivity)	Species of Regional importance (with site sensitivity)
Greylag goose (breeding) (high) Greylag goose (non-breeding) (medium) Wigeon (high) Teal (medium) Common scoter (high) Red-throated diver (high) Black-throated diver (high) Golden eagle (high) Hen harrier (high) Merlin (high) Golden plover (high) Dunlin (high) Wood sandpiper (high) Greenshank (high) Curlew (high) Arctic skua (low) Short-eared owl (high)	Osprey (medium) White-tailed eagle (medium) Peregrine (medium) Barn owl (medium) Red kite (negligible) Whimbrel (negligible)	Whooper swan (medium) Pink-footed goose (medium)

- 5.1.11 All the listed VORs were assessed for potential effects during construction, operation and decommissioning (except wigeon, teal, whimbrel and red-kite, which were screened-out).
- 5.1.12 The assessment of effects of the Proposed Varied Development has taken into account the modification to a 50 year proposed operational lifetime. The cumulative effects from other developments have also been taken into account for the whole Caithness and Sutherland Peatlands SPA/Ramsar site. Within the local context of the Proposed Varied Development, the cumulative effects of Strathy North wind farm and Strathy Wood wind farm have also been considered, drawing on current flight and breeding distribution data collected for those projects.
- 5.1.13 The mitigation and environmental enhancement agreed for the Consented Scheme is being fully adopted for the Proposed Varied Development. Integral to the mitigation is the implementation of the proposed Bird Protection and Mitigation Plan (which is referred to in the Technical Appendix 2.1: Outline Construction Environmental Management Plan (CEMP) EIAR Volume 4). The CEMP is designed to prevent disturbance to breeding birds and damage to nests, and therefore ensure compliance with wildlife legislation.
- 5.1.14 The assessment carried out to identify likely significant effects concluded that, provided best practice is followed to avoid disturbance to breeding birds during construction, there would be no significant predicted residual effects on key bird interests. The assessment considered the effects from the operation of the Proposed Varied Development to important bird communities in terms of displacement from habitat, disturbance and collision risk. It has concluded that none of these effects would be significant.
- 5.1.15 The assessment considered predicted effects on the SPA qualifying species against the conservation objectives of the Caithness and Sutherland Peatlands Special Protection Area (SPA) (as reported in the Confidential Technical Appendix 5.1). The assessment also identified the likely significance of effect on the VOR's of the Caithness and Sutherland Peatlands Ramsar site and its underlying Sites of Special Scientific Interest (SSSIs) (the Lochan Buidhe Mires, Skelpick Peatlands,

Strathy Bogs and West Halladale SSSIs). The assessment work on these designated sites addressed the likely significance of effects predicted to result from the Proposed Varied Development both alone, and in combination with other plans and projects. The assessment concluded that, beyond reasonable scientific doubt, there would be no likely significant effects that would adversely affect the integrity of these sites. This is the same conclusion reached for the Consented Scheme.

5.2 Introduction

- 5.2.1 The application site for the Proposed Varied Development is located in north Sutherland (Figure 5.1 (Environmental Impact Assessment Report (EIAR) Volume 3a: Figures) and primarily comprises of a large U-shaped conifer plantation. This is referred to as “the main site” in this Chapter, in accordance with the definition in the Glossary. Local land uses adjoining or in proximity, include other commercial forestry plantations managed for timber, or undergoing clearance for restoration to peatland habitat. Restoration work to peatland habitat on adjoining land is being carried out by RSPB Scotland. There are other wind farms proposed or operational in the Strathy glen area (see Glossary at end of this Chapter), amidst large tracts designated for their bird or habitat interest (Figure 5.2 (EIAR Volume 3a: Figures).
- 5.2.2 The Proposed Varied Development is bounded by the Caithness and Sutherland Peatlands SPA and Ramsar site, and the Caithness and Sutherland Peatlands Special Area of Conservation (SAC). These designations are underlain by several SSSIs, shown in Figure 5.3 (EIAR Volume 3a: Figures).
- 5.2.3 The infrastructure for the Proposed Varied Development is shown in Figures 5.4 and 5.5 (EIAR Volume 3a: Figures). The aerial photos show the extent of forest felling at Strathy North wind farm and at the proposed Strathy Wood, which is useful as they present a more realistic picture of contemporary land cover as OS maps show both as near-continuous conifer plantation.
- 5.2.4 EIAR Volume 2: Chapter 9: Ecology (non-avian) provides useful contextual baseline information on habitat on-site, as this heavily influences the bird species present, their distribution and abundance. EIAR Volume 4: Technical Appendix 9.5 details the outline Habitat Management Plan (HMP), which has been updated since the Public Local Inquiry for the Consented Scheme. The HMP would mitigate ecological effects resulting from the Proposed Varied Development and would contribute to the protection and enhancement of key bird communities over the 50-year operational lifespan of the Proposed Varied Development.
- 5.2.5 This Chapter reports on the likely significant effects on key bird species from the construction, operation and decommissioning of the Proposed Varied Development. The specific objectives of this Chapter are to:
- describe the ornithological baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including direct, indirect and cumulative effects of the Proposed Varied Development;
 - describe the mitigation measures proposed to address likely significant effects;
 - assess the residual effects remaining following the implementation of mitigation; and
 - provide a comparison of effects between the Consented Scheme and the Proposed Varied Development.
- 5.2.6 It is worth noting at the outset that whilst the full range of potential effects have been considered for birds, the key issue between the Proposed Varied Development and the Consented Scheme is whether collision risk changes significantly due to the proposed larger turbines. The assessment therefore focuses in particular on potential differences in collision risk to key bird species between the Proposed Varied Development and the Consented Scheme.

- 5.2.7 As well as this Chapter, the ornithology assessment is supported by figures and technical appendices presented in Table 5.2.

Table 5.2: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source	Reason for use/reuse
EIAR Volume 3a: Figures - Figure 5.1 – Site Context in Relation to NHFZs, SPAs and RSPB Reserves	Site context is provided in relation to Natural Heritage Future Zones (NHFZs) (which for some species provide population contexts for considering significance). The context in relation to SPAs is key to the Habitats Regulations Assessment. The RSPB's Forsinard Reserve is included as conservation context.	The information is used to inform the impact assessment for the Proposed Varied Development and allow a comparison of the potential effects of the Consented Scheme and the Proposed Varied Development on protected bird species.
EIAR Volume 3a: Figures - Figure 5.2 – Local Site Context in Relation to SPAs, RSPB Reserves and Wind Farms	Updated information generated for the purpose of this assessment. The Figure presents the site's regional context in relations to other cumulative developments referred to, including those considered for the cumulative impact assessment (specifically Strathy North, Strathy Wood and Armadale wind farms), and to designated sites.	As above.
EIAR Volume 3a: Figures – Figure 5.3 – Local Site Context in Relation to SPA/Ramsar Site, SSSIs, RSPB Reserve and Local Wind Farm Developments	Updated information generated for the purpose of this assessment. The Figure presents the site's local context in relation to other wind farm developments considered in the cumulative impact assessment (specifically Strathy North, Strathy Wood and Armadale wind farms), and to designated sites.	The information gives the updated local context of the site within Strathy Glen, including the current information on turbine layouts of the other wind farms considered relevant for the cumulative impact assessment for key species.
EIAR Volume 3a: Figures - Figure 5.4 – Site Boundary, Proposed Turbine Layout and Landownership Boundaries	Updated information generated for the purpose of this assessment. The Figure presents the site's local context and relationship to Strathy North wind farm, and the proposed Strathy Wood wind farm, with the aerial photo also showing broad habitat characteristics.	Unlike many of the OS base maps which still show Strathy North and Strathy Wood plantations intact, the aerial photo shows the extent of forest removal at the operational Strathy North wind farm and forest felling and regeneration at Strathy Wood. The local context of these developments is shown within Strathy Glen because they are particularly relevant to the baseline data collated for the assessment and the cumulative impact assessment for the Proposed Varied Development. The aerial photo is also indicative of the land cover that would result from felling and removal of Strathy South plantation.

Table 5.2: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source	Reason for use/reuse
EIAR Volume 3a: Figures - Figure 5.5 – Site Boundary and Proposed Wind Farm Infrastructure	Updated information generated for the purpose of this assessment. The Figure presents the Proposed Varied Development wind farm infrastructure with the aerial photo also showing current habitat characteristics.	Unlike many of the OS base maps which still show Strathy North and Strathy Wood plantations to be intact, the aerial photo shows the extent of forest felling and regeneration at Strathy Wood. This Figure also shows the site's local context in relation to the 2019 Strathy Wood proposed turbine layout.
EIAR Volume 3a: Figures - Figure 5.6 – Site Topography and Vantage Point Locations	Updated information generated for the purpose of this assessment. The Figure presents the locations of vantage points used over 2018 and 2019.	To show the 2018 and 2019 vantage point locations from which flight activity monitoring was carried out.
EIAR Volume 3a: Figures - Figure 5.7 – RPS VP Locations 2018 and 2019 with 2 km Viewshed to 20 m	Updated information generated for the purpose of this assessment. The Figure presents the viewshed from VPs used over 2018 and 2019, generated using a Geographical Information System (GIS), (specifically Arc GIS).	To show the 2018 and 2019 vantage point viewsheds from which flight activity monitoring was carried out.
EIAR Volume 3a: Figures - Figure 5.8 – RPS Diver VP Locations 2018 with 2 km Viewshed to 20 m	Updated information generated for the purpose of this assessment. The Figure presents the viewshed from vantage points generated using a GIS as above. The unique identified numbers for lochs, lochans and pool systems are also shown for reference.	To show the 2018 vantage point locations and viewsheds from which flight activity monitoring was carried out in 2018 for the Proposed Varied Development and for the proposed Strathy Wood wind farm to monitor red-throated and black-throated divers.
EIAR Volume 3a: Figures - Figure 5.9 – RPS Diver VP Locations 2019 with 2 km Viewshed to 20 m	As above but for 2019.	As above but for 2019.
EIAR Volume 3a: Figures - Figure 5.10 – RPS Diver Loch Survey ID System	The unique identified numbers for lochs, lochans and pool systems are shown for reference.	To reference bird observations to particular lochs, lochans and pool systems (the numbering system is necessary as many of these water features do not have place names). The numbering system developed by RPS extends on a consistent basis from the site, through Strathy Wood and covers Strathy North (and its survey buffers) and Armadale.
EIAR Volume 5 Confidential Documents: Confidential Technical Appendix 5.1: 2018 and 2019 Up-dated Ornithology Compilation of Relevant Data, Survey Details and Collision Risk Modelling	Details of the updated desk study and 2018 and 2019 bird surveys and results collated for the Proposed Varied Development.	The document presents the bird data collected on-site and in the surrounding area over 2018 and 2019. It also summarises relevant data from the ES Addendum ² where this provides useful additional historical context for certain species. Relevant bird data are also collated for neighbouring wind farm sites (including Armadale, Strathy North

Table 5.2: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source	Reason for use/reuse
		and Strathy Wood), notably for wider ranging species. Results are described, tabulated and mapped through Technical Appendix Figures 5.1.1 to 5.1.29). The Technical Appendix also presents the results of collision risk modelling (CRM) for the Consented Scheme and the Proposed Varied Development using the baseline bird data from 2018-2019 and assuming an operational life of 50 years for both the Consented Scheme and the Proposed Varied Development. This is to enable a comparative assessment of collision risk to be undertaken whereby the only difference between the Schemes are the turbine parameters.
EIAR Volume 5: Confidential Documents: Technical Appendix 5.2: Information to Inform an Appropriate Assessment	Updated information generated for the purpose of this assessment, based on the 2018 and 2019 bird surveys results and collated desk study information.	To inform the Appropriate Assessment by providing up-dated survey and desk results for determining whether the Proposed Varied Development would have an adverse effect, either alone or in combination with other plans and projects, on the qualifying interests and integrity of the Caithness and Sutherland Peatlands SPA.

Competent Expert Summary

- 5.2.8 The assessment has been carried out by ornithology specialists, led by Dr. Simon Zisman of RPS. He has over 20 years' experience working on numerous onshore wind farm Environmental Impact Assessments, Habitat Regulations Appraisals and Habitat Management Plans. He has also overseen Ecological Clerk of Works (ECOW) inputs for onshore wind farms and associated grid connections (including Strathy North). He has provided expert witness evidence on wind farm developments in Scotland and has worked on Strathy South wind farm (and Strathy North wind farm) since 2007. A table presenting Dr. Zisman's qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).
- 5.2.9 The surveys completed for the Proposed Varied Development were carried out by highly experienced field ornithologists, most with several years bird monitoring expertise in Scottish peatland environments in general, and at the site and at Strathy North wind farm specifically. The surveyors therefore bring the benefit of detailed site knowledge and a long history of bird recording in this particular part of Scotland.

5.3 Summary of Effects of Consented Scheme

- 5.3.1 The 2007 Environmental Statement (ES) assessed the effects of the construction and operation of the Original 2007 Scheme on birds, and on habitats. The adverse impact pathways identified for birds were displacement from habitat, disturbance, and collision risk; while positive impact pathways were peatland habitat restoration following removal of the conifer plantation and additional habitat creation. The assessment concluded that there would be no significant adverse residual effects caused by the Original 2007 Scheme to birds either within or outwith the Caithness

and Sutherland Peatlands SPA/Ramsar site, and that there would be significant beneficial effects for birds through habitat restoration.

- 5.3.2 The subsequent 2013 ES Addendum assessed the effects of changes to the design with the removal of 30 turbines. The assessment was made against an updated baseline dataset, created by comprehensive additional bird surveys in 2007, 2010 and 2012. The construction effects remained unchanged from those outlined in the 2007 ES, but the predicted collision mortality increased for certain key species due to higher levels of flight activity recorded over this survey period, even though the number of turbines was reduced from 77 to 47.
- 5.3.3 The assessment concluded that the residual effects of the Modified 2013 Scheme from construction would be negligible and that collision risk to key species would be negligible (not significant) except for red-throated diver. A minor adverse residual effect (not significant) was predicted for this species although this was based on collision risk modelling that assumed an avoidance rate of 98%. As discussed in Table 5.3 below, SNH has since revised that avoidance rate and increased it to 99.5%. The effect from displacement of breeding birds was considered to have a minor adverse residual effect (not significant). Removal of the conifer plantation was considered to provide moderate beneficial effects (significant).
- 5.3.4 The effects of the Consented Scheme were assessed again in the 2014 Further Information Report (FIR) following further turbine reductions (from 47 to 39) and with updated baseline data for red-throated diver and greenshank. With a commitment by the Applicant to implement a comprehensive Bird Protection and Mitigation Plan as part of the Construction Environmental Management Plan (CEMP), there were no significant residual adverse effects predicted as a result of the Consented Scheme. In response to further SNH requests, additional analysis was completed to generate a distance detection correction for greenshank (14.2), which resulted in a revised predicted collision rate of 0.142 birds a year for greenshank. Taking this into account for greenshank and re-calculating the predicted collision rate for red-throated diver following SNH's acceptance of the 99.5% avoidance rate for this species, resulted in a negligible residual effect (not significant) on all key species, and no adverse impact on the integrity of the Caithness and Sutherland Peatlands SPA/Ramsar site.
- 5.3.5 Table 5.3 provides a summary of the predicted effects from construction, operation and decommissioning of the Consented Scheme.

Table 5.3: Summary of the Consented Scheme's Residual Effects		
Potential Significant Effect	Details	Mitigation and Residual Effect Significance
Construction		
Temporary disturbance to SPA-qualifying species and other breeding birds on site, and potentially on the adjacent SPA.	Visual or noise disturbance from construction traffic and other construction activity, including upgrading/widening and laying grid cables adjacent to the access track.	With the application of mitigation measures (pre-commencement breeding bird checks, deployment of an ECoW, implementation of Bird Protection and Mitigation Plan as part of the CEMP and specialist ornithology support), the residual effect would be Negligible (Not Significant).
Operation/Ongoing		
Collision risk to red-throated divers	Predicted collision rates were sufficiently low (even at 98% avoidance rate) to enable the 2013	The 2013 ES Addendum (SSE 2013) ² concluded a residual effect of Minor Adverse from the Consented Scheme. It was judged however, that the proposed mitigation (in the form of diver raft provision) was likely to off-set any increased mortality by improving red-throated diver productivity. Whilst this

Table 5.3: Summary of the Consented Scheme's Residual Effects

Potential Significant Effect	Details	Mitigation and Residual Effect Significance
	ES Addendum² to conclude that with mitigation (diverting any breeding attempts at Loch ID 64 and provision of diver rafts off-site for the duration of the Consented Scheme's operational life), there would be no population-level effects on this species. SNH ultimately accepted the 98% avoidance rate was over-precautionary (SNH 2015)³ and were able to advise there would be no adverse effect on the integrity of the Caithness and Sutherland Peatlands SPA, in relation to this species as a result of the Consented Scheme.	proposed mitigation had a clear logic, and benefitted from expert opinion (Dave Butterfield, RPS Field Ornithologist <i>personal comm.</i> 2015) and insights gained from red-throated diver mitigation research on Shetland for the Viking wind farm that SSE has been involved in developing, it was acknowledged by the Applicant and RPS that there was no published evidence to this effect, and the published evidence on the productivity benefits of rafts were for black-throated diver and not for red-throated diver. In keeping with reasoning and evidence that was provided by RPS in the 2013 ES Addendum (SSE 2013)², the 2014 FIR (SSE 2014)⁴, and in RPS (2015f)⁵, SNH commissioned a review and on the basis of these findings advised 99.5% henceforth be used as the avoidance rate for this species (SNH 2015)³. In light of the very low predicted effect on red-throated divers, the Outline HMP (version 1) (RPS 2015h)⁶ replaced the original Draft HMP excluded provision of diver rafts as an explicit objective, although retained the measure as an option if SNH subsequently considered it beneficial. The residual effect on SPA qualifying interests, alone and in combination with other plans and projects, was therefore modified to be Negligible (Not Significant).
Collision risk to black-throated divers	Provision of diver rafts for the duration of the Consented Scheme's operational life. This was included in the 2013 ES Addendum's Outline HMP, which would be finalised into a Detailed HMP as a condition of consent.	In light of the very low predicted effect on red-throated divers, and SNH considering there to be no published evidence of the benefit, the Outline HMP (version 1) (RPS 2015)⁷ excluded provision of diver rafts as an explicit objective. It was however, retained as an option if SNH subsequently considered it beneficial. The residual effect of the Consented Scheme was concluded to be Negligible (Not Significant) on this species.
Collision risk to greenshank	Predicted collision rates were sufficiently low (even at 98% avoidance rate) to enable the 2013 ES Addendum (SSE 2013)² to conclude that with mitigation (peatland restoration on and off-site, through the Outline HMP, to be implemented as a condition of consent)	The 2013 ES Addendum (SSE 2013)² concluded the residual effect on this species from the Consented Scheme would be Negligible (Not Significant). SNH requested supplemental analysis to the 2013 ES Addendum (SSE 2013)² to demonstrate beyond reasonable scientific doubt that collision risk would be negligible. Further evidence was provided in the 2014 FIR (SSE 2014)⁴, providing a distance detection multiplier. A final iteration of this was presented as evidence to the 2015 Public Local Inquiry (PLI), in

² SSE (2013) ES Addendum: Volume A2 Main Report: Chapter A11: Birds:

³ SNH. (2015) A Review of Red-throated Diver and Great Skua Avoidance Rates at Onshore Windfarms in Scotland. Commissioned Report No. 885 Battleby.

⁴ SSE (2014) Further Information Report. Strathy South Wind Farm. November 2014.

⁵ RPS (2015f) Red-throated Diver Interactions with Operational Wind Farms. Unpublished Report.

⁶ RPS (2015h) Outline Habitat Management Plan for Strathy South – Version 1. Unpublished Report.

⁷ The original Draft Outline Habitat Management Plan for Strathy South Wind Farm was included as part of the ES 2013 Addendum.

Table 5.3: Summary of the Consented Scheme's Residual Effects

Potential Significant Effect	Details	Mitigation and Residual Effect Significance
	there would be no population-level effects on this species.	RPS (2015b) ⁸ , and derived a conversion factor of 14.2 for applying to collision risk predictions for this species. When applied to the 2013 ES Addendum (SSE 2013) ² collision risk, the adjusted predicted mortality was still found to be Negligible (Not Significant) from the Consented Scheme.
Collision risk to hen harrier merlin and short-eared owl	Peatland restoration and vegetation management, notably control of conifer regeneration, treatment of brash and any vegetation (such as rushes) would reduce the risk of these species being attracted into the main site's turbine array post-felling, in proximity to turbines that SNH would consider posing an unacceptable risk of increasing collision.	Through implementation of the Outline HMP, the 2013 ES Addendum (SSE 2013) ² concluded the residual effect of the Consented Scheme was Negligible (Not Significant). Following further liaison with SNH during the 2015 public inquiry, and in response to the updated Outline HMP (Version 1) submitted to the PLI (RPS 2015h) ⁶ , SNH advised that, providing satisfactory implementation of this HMP was secured through condition, it agreed the effect of the Consented Scheme on these species was Negligible (Not Significant).
Collision risk to all other SPA qualifying species	Predicted collision rates were sufficiently low to enable SNH to conclude and advise there would be no population-level effects on non-breeding season or breeding season interests.	Demonstrated beyond reasonable scientific doubt, without recourse to further fieldwork or analysis, that predicted rates of collision, using baseline flight activity and published SNH avoidance rates current at the time (2014), would avoid adverse impacts on the site integrity of the Caithness and Sutherland Peatlands SPA/Ramsar site, for its qualifying interests (breeding birds). No likely significant effect/adverse impact was concluded previously for the Caithness Lochs SPA/Ramsar site non-breeding season interests, on the basis of the 2007 ES and subsequent stakeholder responses. The residual effect on SPA/Ramsar site qualifying interests, alone and in combination with other plans and projects, was concluded to be Negligible (Not Significant).
Displacement of breeding birds, including qualifying species of the SPA	There is evidence that the presence of conifer plantations reduce territory occupation in proximity to forest edges for some breeding waders. There is also some evidence that for some species, displacement occurs during wind farm construction or operation, i.e. causing a displacement effect.	To reduce this displacement effect, the Consented Scheme, through the implementation of its HMP, would remove the conifer plantation and restore and enhance peatland habitats on and off-site. With the delivery of these mitigation measures over the operational lifetime of the wind farm, the Consented Scheme's residual effect was Minor Adverse (Not Significant).

⁸ RPS (2015b) An Assessment of Flight Activity of Greenshank in Relation to Collision Risk Modelling at Strathy South Wind Farm. Unpublished Report.

5.4 Summary of Mitigation for the Consented Scheme

5.4.1 To mitigate the predicted adverse effects of the Consented Scheme to the valued ornithological receptors (VORs) identified in both the 2013 ES Addendum² and the 2014 FIR⁴ the following measures were proposed:

- Implementation of a CEMP which would include details of:
 - The production of a Bird Protection and Mitigation Plan, as part of the CEMP, setting out the survey methods, coverage and reporting schedule for all bird monitoring during construction, the protocols and buffer distances to be put in place for all breeding birds, and, materials for tool box talks for all site staff on the legal obligations and best practice. record of bird surveys completed and their results to inform ongoing construction works;
 - As part of the Bird Protection and Mitigation Plan, a complete pre-construction survey for birds (specifically moorland breeding birds, breeding divers and breeding raptors);
 - The follow-on mitigation measures during the construction phase would consist of two inputs. Firstly the implementation of the Bird Protection and Mitigation Plan by a suitably experienced ornithological specialist and, secondly, the separate employment of one or more full-time ECoWs. The appointed individuals would work closely together and ensure full implementation of the Bird Protection and Mitigation Plan. Notably, during the forest removal phase, this would focus on ensuring breeding birds were protected from disturbance, in accordance with wildlife legislation, using pre-clearance checks before any forest removal and monitoring of breeding bird activity on open ground and water bodies within and adjacent to the site. The results of this work would be reported on a monthly basis to SNH, THC and RSPB Scotland throughout the construction period, through ECoW Reports; and
 - Techniques for habitat reinstatement, taking account of approaches designed to benefit key breeding species and drawing on the experience of RSPB Scotland's staff at its Forsinard Nature Reserve.
- Implementation of a Forest Management Plan (FMP) to detail the phased felling of the conifer plantation and mitigation implemented during these works to protected environmental receptors.
- Implementation of an HMP to offset direct and indirect effects to habitats both within the Caithness and Sutherland Peatlands SAC and the main site, and to include monitoring and management of sward height to avoid attracting nesting hen harriers, short-eared owl or merlin to where they may be at excessive risk of collision.
- Implementation of a Deer Management Plan (DMP) to ensure deer dispersal during the phased removal of the conifer plantation would be controlled to minimise effects to the surrounding Caithness and Sutherlands Peatland SAC's qualifying habitats and the SPA's qualifying species (the majority of which are ground nesting species).
- Implementation of the bird monitoring set out in the 2013 ES Addendum² (Ornithology Chapter Table A11.4 p. 18) and as a condition of consent for the Consented Scheme.

The Applicant is committed to continuing to provide the mitigation as detailed for the Consented Scheme, and where appropriate updates have been made to these commitments to ensure they remain relevant for the Proposed Varied Development

5.5 Methodology

Scope of the Assessment

5.5.1 This Chapter identifies and assesses the potential for significant effects on bird populations from the Proposed Varied Development and assesses the likely significance of predicted residual effects.

- 5.5.2 Full details of the changes from the Consented Scheme can be found in Table 2. 2 of Chapter 2: Description of Development (EIAR Volume 2). Variations between the Consented Scheme and Proposed Varied Development relevant to ornithological receptors are:
- Maximum tip height up to 200 m;
 - Maximum rotor diameter up to 162 m;
 - Hub height of 119 m;
 - Inclusion of the Yellow Bog Track for use by construction traffic and its associated up-grade to facilitate its use for this purpose;
 - Alterations to the construction method of the access track, in particular in relation to the installation of the grid connection cables; and
 - Increased operational life of 50 years.
- 5.5.3 Although turbine dimensions have changed, in its Scoping response in May 2019, SNH stated they would accept revised collision modelling that made use of data collected from Vantage Point surveys carried out during the 2012 and 2014 breeding season (see Table 5.4).
- 5.5.4 This reflects the fact that there is considerable baseline ornithological information from previous EIA submissions from which to assess the effects of the Proposed Varied Development on collision risk. Baseline surveys have been conducted at the main site since 2003 and it gives a robust baseline for all key species for the site. This is discussed in greater detail in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
- 5.5.5 The proximity of the proposed Strathly Wood wind farm and Strathly North wind farm does mean however, that recent changes to land cover at these two sites could possibly influence bird activity at, and adjacent to, the Proposed Varied Development. In particular, at Strathly Wood there has been a gradual reduction in forest brash as it continues to rot down, and natural regeneration has allowed thicket to spread across substantial areas of previously open felled conifer plantation. At Strathly North wind farm, the conifer plantation has been removed and is now under active habitat management in line with its HMP.
- 5.5.6 Due to these changes to the environmental baseline rather than rely solely on the 2012 and 2014 data, a further two-years of bird surveys were undertaken, from April 2018 to September 2019 (encompassing two breeding seasons and one non-breeding season). This also allows for the comparative assessment of the Proposed Varied Development with the Consented Scheme to be based on a contemporary representative environmental baseline.
- 5.5.7 The surveys, taking account of contemporary SNH guidance⁹, comprised:
- i. Moorland breeding birds (waders): the site plus 1 km buffer;
 - ii. Breeding divers: the site plus 2 km buffer;
 - iii. Breeding raptors: the site plus 2 km buffer (from which larger species were visible over a wider area); and
 - iv. Flight activity surveys, both standard Vantage Point (VP) surveys (fixed locations for all target species, and diver focal VPs sighted each breeding season to overlook breeding diver lochans).
- 5.5.8 The main site was covered in its entirety by a total of 10 Vantage Point (VP) locations (Figures 5.6 and 5.7 (EIAR Volume 3a: Figures)). These VPs were all located off-site with the exception of VP19 which was on the Yellow Bog track, and collectively ensured that the area within the main site was visible within at least a 2 km range during VP surveys. Extra VPs were used for targeted monitoring of diver lochans in 2018 and 2019 (Figures 5.8 and 5.9 (EIAR Volume 3a: Figures) respectively). As there has been a data sharing agreement between the Applicant and RWE/E.ON (the applicant for

⁹ SNH (2017a) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms.

Strathy Wood wind farm), the VPs at Strathy Wood wind farm are also shown, as for certain survey types and years, the 2018 and 2019 survey results from both are represented on the baseline figures presented in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

- 5.5.9 The results of the baseline surveys have been assessed to identify the bird species using the site that could be particularly sensitive to any potential effects (i.e. the VOR's). The importance of a VOR is classed as International, National, Regional, District, or Local, in accordance with the conservation value of the populations involved.
- 5.5.10 The significance of predicted effects has been assessed by a combination of the conservation value of receptor population (sensitivity) and magnitude of change.
- 5.5.11 Baseline data collected for the Consented Scheme, where relevant, are referred to when this helps improve understanding of the importance of the site for key bird species. In particular, this longer-term perspective is considered where differences occur between the predicted effects on VORs of the Consented Scheme and the Proposed Varied Development.
- 5.5.12 The predicted effects of the Proposed Varied Development are compared directly against the predicted effects of the Consented Scheme. This is intended to help consultees and decision-makers to consider any material differences in significant effects arising from the Proposed Varied Development.
- 5.5.13 As one of the principal objectives of this Chapter is to provide direct comparison of the predicted effects for the Consented Scheme and Proposed Varied Development, the relevant information from the ornithological assessment of the Consented Scheme is summarised in this Chapter and contained within Technical Appendix 5.1 and its Appendices (EIAR Volume 5: Confidential Documents).

Relevant Guidance for Ornithological Baseline and Impact Assessment

- 5.5.14 The list below indicates the key documents used to guide the ornithological assessment for the Proposed Varied Development. In addition, key references used to inform the interpretation of baseline data are also listed. These and additional references can be found in footnotes in the relevant sections of this Chapter:
- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM 2018¹);
 - Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms (SNH 2014¹⁰, SNH 2017a⁹);
 - Monitoring the Impacts of Onshore Wind Farms on Birds (SNH 2009a¹¹);
 - Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms (SNH 2009b¹²);
 - Assessing Significance of Impacts from Onshore Wind Farms on Birds Outwith Designated Areas. Version 2 (SNH 2018¹³);
 - Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms (Band *et al.* 2007¹⁴);

¹⁰ SNH. (2014) Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. Scottish Natural Heritage, Battleby.

¹¹ SNH. (2009a) Monitoring the Impacts of Onshore Wind Farms on Birds. Guidance Note, Scottish Natural Heritage, Battleby.

¹² SNH. (2009b) Guidance on Methods for Monitoring Bird Populations at Onshore Wind Farms. Guidance Note, Scottish Natural Heritage, Battleby.

¹³ SNH. (2018) Assessing Significance of Impacts from Onshore Wind Farms on Birds Outwith Designated Areas. Version 2. Scottish Natural Heritage, Battleby.

¹⁴ Band, W., Madders, M. and Whitfield, D.P. (2007) Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms. pp 259-275 In: Birds and Wind Farms: Risk Assessment and Mitigation. de Lucas, M., Guyonne, F.E., Ferrer, J and M. (Eds) Quercus, Madrid.

- Calculating a Theoretical Collision Risk Assuming No Avoidance Action (SNH 2000¹⁵); and
- Flight Speeds and Biometrics for Collision Risk Modelling (SNH 2014¹⁶)
- Avoidance Rates for the Onshore SNH Collision Risk Model (SNH 2018a¹⁷);
- Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model (SNH 2010¹⁸);
- Avoidance Rates Wintering Species of Geese in Scotland at Onshore Wind Farms (SNH 2013¹⁹);
- Wind Farm Proposals on Afforested Sites – Advice on Reducing Suitability for Hen Harrier, Merlin and Short-eared Owl (SNH 2016²⁰);
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH 2012²¹);
- Assessing Connectivity with Special Protection Areas (SPAs) (SNH 2016²²);
- A review of Disturbance Distances in Selected Bird Species (Ruddock and Whitfield 2007²³);
- Natural Heritage Zone (NHZ) Bird Population Estimates, Scottish Wind Farms Bird Steering Group (SWBSG) Commissioned Report no. 1504 (Wilson *et al.* 2015²⁴);
- Bird Sensitivity Map to Provide Locational Guidance for Onshore Wind Farms in Scotland (Bright *et al.* 2016²⁵);
- The Impact of Renewable Energy Generation on Biodiversity with Reference to Birds and Bats – Facts, Gaps in our Knowledge, Areas for Further Research and Ornithological Criteria for the Expansion of Renewables. NABU Report, Germany (Hötter *et al.* 2006²⁶);
- Bird Fatalities at Wind Turbines in Europe (Dürr 2019²⁷);
- Bird Monitoring Methods (Gilbert *et al.* 1998²⁸); and
- Raptors: A Field Guide to Survey and Monitoring (3rd edition. Hardey *et al.* 2013²⁹).

Consultation

- 5.5.15 To inform the scope of the assessment for the Proposed Varied Development consultation was undertaken with statutory and non-statutory agencies to determine and agree upon the approach. Consultees of particular relevance to this Chapter are SNH and the RSPB Scotland. A summary of the consultation outcome from each is presented in Table 5.4 below.

¹⁵ SNH. (2000) Calculating a Theoretical Collision Risk Assuming no Avoiding Action. Guidance Note, Scottish Natural Heritage, Battleby.

¹⁶ SNH. (2014) Flight Speeds and Biometrics for Collision Risk Modelling. Guidance Note, Scottish Natural Heritage, Battleby.

¹⁷ SNH. (2018a) Avoidance Rates for the Onshore SNH Wind Farm Collision Risk Model. Guidance Note, Scottish Natural Heritage, Battleby.

¹⁸ SNH. (2010) Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model. Guidance Note. Scottish Natural Heritage, Battleby.

¹⁹ SNH. (2013) Avoidance Rates of Wintering Species of Geese in Scotland at Onshore Wind Farms. Scottish Natural Heritage, Battleby.

²⁰ SNH. (2016) Wind Farm Proposals on Afforested Sites – Advice on Reducing Suitability for Hen Harrier, Merlin and Short-eared Owl. Scottish Natural Heritage, Battleby.

²¹ SNH. (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments. Scottish Natural Heritage, Battleby.

²² SNH. (2016) Assessing Connectivity with Special Protection Areas (SPAs) Guidance V3. Scottish Natural Heritage, Battleby.

²³ Ruddock and Whitfield. (2007) A Review of Disturbance Distances in Selected Bird Species. Natural Research Projects Limited, Banchory, Scotland; Report to Scottish Natural Heritage.

²⁴ Wilson, M.W., Austin, G.E. and Wernham, C.V. (2015) Natural Heritage Zone (NHZ) Bird Population Estimates, Scottish Wind Farms Bird Steering Group (SWBSG) Commissioned Report No. 1504 (pp72).

²⁵ Bright, J., Langston, R., Bullman, R., Evans, R., Gardner, S. and Pearce-Higgins, J. (2008) Map of Bird Sensitivities to Wind Farms in Scotland: A Tool to Aid Planning and Conservation. Biological Conservation 141: 2342-2356.

²⁶ Hötter, H., Thomsen, K.M. and Koster, H. (2006) The Impact of Renewable Energy Generation on Biodiversity with Reference to Birds and Bats – Facts, Gaps in Our Knowledge, Areas for Further Research and Ornithological Criteria for the Expansion of Renewables. NABU Report, Germany.

²⁷ Dürr (2019) Vogelverluste an Windenergieanlagen / Bird Fatalities at Wind Turbines in Europe (updated 02 September 2019). Online at <https://ifu.brandenburg.de/cms/detail.php/bb1.c.312579.de> [accessed 10/11/19].

²⁸ Gilbert, G., Gibbons, D.W. and Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.

²⁹ Hardey, J., Crick, H., Wenham, C., Riley, H., Etheridge, B. and Thomson, D. (2013) Raptors: A Field Guide to Survey and Monitoring (2nd edition). The Stationary Office, Edinburgh.

Table 5.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
ECU 18/0719	Scoping	In order to assess the environmental impacts a baseline needs to be established using up-to-date information and methods. It is a matter for the Applicant to determine whether information presented in the former applications is still up-to-date and suitable for inclusion in the new application, and whether updates or new analysis are appropriate. Should any data be resubmitted, or analysis produced prior to the 2018 Consent it must satisfy Scottish Ministers that the information remains up-to-date and appropriate for the currently environmental baseline and provide an updated analysis or justification why this is not thought necessary. Mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion for each chapter.	Paragraphs 5.5.33 to 5.5.57 of this Chapter detail the surveys completed to update and inform a robust impact assessment of the predicted significant effects of the Proposed Varied Development to VORs.
Scottish Natural Heritage 31/05/19	Scoping	Advised that the proposal is likely to have significant effect on red-throated diver and greenshank interests of the Caithness and Sutherland Peatland SPA. The EIAR should therefore fully address any changes in the collision risk of these two species. SNH considers the height bands used in the most recent survey work undertaken in 2012 and the summer 2014 that used 5 height bands is sufficient to recalculate collision risk but would expect the Applicant to include all flights recorded in the 150 m+ band in any revised collision risk model.	The likely significant effects of the Proposed Varied Development have been assessed in detail in this Chapter and in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents) using updated vantage point flight activity baseline data from 2018 and 2019. Six height bands have been used for flight activity surveys, to allow for the taller turbines. The information to inform the Habitat Regulations Appraisal for the Proposed Varied Development is included with this Chapter in Technical Appendix 5.2 (EIAR Volume 5: Confidential Documents).
SNH consultation meetings 11/09/19 and 27/11/19	Consultation	No issue raised regarding the proposed scope of ornithology surveys and assessment. Advised that SNH were content for the assessment to focus on the 2018 and 2019 survey results, rather than include all previously collected data in the analysis.	Surveys, desk study compilations and assessment completed are summarised in the Baseline Conditions section of this Chapter

Table 5.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
			and supported by the Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
RSPB Scotland 29/05/2019	Scoping	RSPB reiterated their objection to the Strathy South wind farm proposal as they considered it would cause an adverse effect to the Caithness and Sutherland SPA and unacceptable harm to its qualifying species. The change in rotor swept area due to an increase in turbine height will require collision risk to be recalculated. RSPB also recommend that collision risk impact accounts for the Proposed Varied Development individually and the difference between the Proposed Varied Development and the Consented Scheme. The assessment should consider attractiveness of the clear-felled area for hen harrier. An updated collision risk model for black and red-throated diver and an assessment of the effects on their nesting sites within 2 km is required. RSPB would like the EIAR to present detailed proposals for post-construction monitoring, including collision mortality.	Addressed in this Chapter and associated Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
RSPB Scotland 22/04/20 and 14/05/20	Consultation	RSPB repeated issues it raised at or prior to the Strathy South PLI, including survey and analytical methods used including counting singing greenshank in analysis of territories and using the national survey methodology, using standard methodology for VPs for divers, as well as following standard collision risk modelling methods in the analysis.	All RSPB's previous issues were fully taken into account by the Reporter and Scottish Ministers when approving the Consented Scheme, and when concluding that the evidence submitted by RPS demonstrated beyond reasonable scientific doubt that the Consented Scheme would have no likely significant adverse residual effects on the qualifying species of the Caithness and Sutherland Peatlands SPA/Ramsar site. The survey and analytical methods used are consistent with those used for the Consented Scheme, including in

Table 5.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
			relation to greenshank and divers. These points are therefore addressed in this Chapter and associated Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
		Requested clear comparison of predicted effects of the Proposed Varied Development with the Consented Scheme.	The comparative effects are presented in this Chapter and associated Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
		Seek confirmation whether wood sandpiper were recorded and whether a specific survey method was used for this species.	The results of the baseline surveys for wood sandpiper are included in the Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). The methods used for wader surveys are also detailed in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). Wood sandpipers were surveyed through a combination of comprehensive surveys, in line with previous methods used to determine the baseline for the Consented Scheme.
		Requested cumulative assessment of collision risk, disturbance, displacement and barrier effects on the Caithness and Sutherland Peatlands SPA.	The cumulative effects are presented in this Chapter and associated Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). The information to inform the Habitat Regulations Appraisal for the Proposed Varied Development is included with this Chapter in Technical Appendix 5.2 (EIAR Volume 5:

Table 5.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
			Confidential Documents).
		Request that common scoter be included in the assessment.	This species was considered but screened out for the Consented Scheme as only a single bird was recorded over the entire 2003 to 2014 survey period. However, RSPB's request has been met nonetheless and the effects of the Proposed Varied Development have been considered. All common scoter data that RSPB and SNH supplied has been reviewed for this assessment (supplied to Applicant's team on 20/05/20 and 11/08/20).

Baseline Conditions

Desk Study

DESIGNATED SITES

- 5.5.16 A desk study was undertaken to collate relevant information on all sites with designated ornithological features (SPAs/Ramsar sites/SSSIs/SINCs) within a distance of the main site where there may exist ecological connectivity between the site and qualifying bird populations.
- 5.5.17 A search for all designated sites within a 10 km radius of the main site was made utilising online sources. This search was extended to 25 km for SPA and Ramsar sites (the search to 25 km was to identify any SPAs where gulls and/or geese are qualifying species). This includes all SPAs, Ramsar sites, and SSSIs (Figures 5.1 and 5.2 (EIAR Volume 3a: Figures)). The online sources used to obtain this information were:
- SNH Sitelink³⁰
 - JNCC website³¹
 - Scotland's Environment website³²

EXISTING RECORDS

- 5.5.18 A desk study was also undertaken to help anticipate the target species likely to be encountered at the main site and inform the field survey design. The survey design for the 2018-19 updated baseline was guided by the findings of previous assessments and is directly comparable with the baseline surveys undertaken for the Consented Scheme.

³⁰ Available at <http://gateway.snh.gov.uk/sitelink/index.jsp>.

³¹ Available at <https://www.jncc.gov.uk>.

³² Available at <https://map.environment.gov.scot/sewebmap/>.

- 5.5.19 Existing data from previous assessments were used in this assessment to confirm whether baseline interests remain unchanged from the Consented Scheme, or where there is change, to consider the nature of any trends or implications of that change for the assessment of effects for the Proposed Varied Development. Pre-existing information has also been used, where relevant, to inform the cumulative impact/in combination assessment for VORs.
- 5.5.20 In addition, information has been reviewed from confidential and public domain survey data, scientific publications and grey literature.
- 5.5.21 Primary sources of contextual data include the following (additional references are listed in footnotes throughout the chapter):
- The Birds of Scotland. Scottish Ornithologists Club (Forrester *et al.* 2007³³);
 - Population Estimates of Birds in Great Britain and the United Kingdom (Musgrove *et al.* 2013³⁴, Frost *et al.* 2019³⁵);
 - Bird Atlas 2007-11: The Breeding and Wintering Birds of Britain and Ireland (Balmer *et al.* 2013³⁶);
 - Scottish Raptor Monitoring Scheme Report 2018 (Challis *et al.* 2018³⁷);
 - Birds of Conservation Concern (BoCC) 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man (Eaton *et al.* 2015³⁸);
 - The Status of UK SPAs in the 2000s: The Third Network Review. JNCC (Stroud *et al.* 2016³⁹);
 - Natural Heritage Zone (NHZ) bird population estimates, Scottish Wind Farms Bird Steering Group (SWBSG) commissioned report no. 1504 (Wilson *et al.* 2015²⁴);
 - UK Biodiversity Action Plan (UKBAP); and
 - Scottish Biodiversity List.
- 5.5.22 Finally, a number of research and other reports were also produced by RPS for the 2015 PLI for the Consented Scheme (RPS 2015a⁴⁰, b⁸, c⁴¹, d⁴², e⁴³, f⁵, g⁴⁴ h⁶, i⁴⁵). These reports have also been referred to as they provide a range of contextual information, species insights and supportive evidence.

³³ Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. and Grundy, D.S. (eds). (2007) *The Birds of Scotland*. The Scottish Ornithologists' Club, Aberlady.

³⁴ Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risely, K. and Stroud, D. (2013) Population Estimates of Birds in Great Britain and the United Kingdom. *British Birds* 106:64-100.

³⁵ Frost et al. (2019). Frost, T., Austin, G., Hearn, R., McAvoys, S., Robinson, A., Stroud, D., Woodward, I. and Wotton, S. (2019) Population Estimates of Wintering Waterbirds in Great Britain. *British Birds*, 112: 130-145.

³⁶ Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J. (eds). (2013) *Bird Atlas 2007-11: The Breeding and Wintering Birds of Britain and Ireland*. BTO, Thetford.

³⁷ Challis, A., Wilson, M.W., Holling, M., Roos, S., Stevenson, A. and Stirling-Aird, P. (2018) *Scottish Raptor Monitoring Scheme Annual Report 2018*. BTO Scotland, Stirling.

³⁸ Eaton, M.A., Brown, A.F., Noble, D.G., Musgrove, A.J., Hearn, R.D., Aebischer, N.J., Gibbons, D.W., Evans, A. and Gregory, R.D. (2015) *Birds of Conservation Concern (BoCC) 4: The Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man*. *British Birds*, 108: 708-746.

³⁹ Stroud, D.A., Bainbridge, I.P., Maddock, A., Anthony, S., Baker, H., Buxton, N., Chambers, D., Enlander, I., Hearn, R.D., Jennings, K.R., Mavor, R., Whitehead, S. and Wilson, J.D. – on behalf of the UK SPA & Ramsar Scientific Working Group (eds). (2016) *The Status of UK SPAs in the 2000s: The Third Network Review*. JNCC, Peterborough.

⁴⁰ RPS. (2015a) *A Review of the Combined Findings of Achany and Rosehall Wind Farms Bird Monitoring 2003 – 2014*. Unpublished Report.

⁴¹ RPS. (2015c) *Cumulative Impacts of Wind Farms in Relation to Red-throated Diver, Greenshank, Wood Sandpiper and Hen Harrier at Strathy South*. Unpublished Report.

⁴² RPS. (2015d) *Habitat Suitability and Greenshank Distribution Relating to Strathy South Windfarm*. Unpublished Report. D104.

⁴³ RPS. (2015e) *Hen Harrier Interactions with Operational Wind Farms and Response to RSPB Objection*. Unpublished Report.

⁴⁴ RPS. (2015g) *Wood Sandpipers and Strathy South Wind Farm*. Unpublished Report.

⁴⁵ RPS. (2015i) *An Assessment of Survey Effort at Strathy South Wind Farm: Concluding 'Beyond Reasonable Doubt' Compared to Other Developments*. Unpublished Report.

FURTHER INSIGHTS FROM OTHER WIND FARMS

- 5.5.23 The desk study for this Chapter included a review of nearby wind farm developments within Strathy glen to supplement knowledge of the bird communities in proximity to the Proposed Varied Development. This baseline data review has focussed on Strathy Wood wind farm, Strathy North wind farm and Armadale wind farm (Figures 5.3 (EIAR Volume 3a: Figures)).
- 5.5.24 Other wind farms from which application information has been reviewed are listed in Table 5.5.
- 5.5.25 The wind farms where there has been particularly relevant post-construction monitoring are denoted by an asterisk in Table 5.5. Strathy North wind farm post-construction monitoring is relevant to all the species encountered at the main site and surrounding area for the Proposed Varied Development. Achany, Rosehall and Causeymire wind farms are relevant to greenshank, where the bird has been a key focus of post-construction monitoring. RPS (2015a)⁴⁰ reviewed the findings on the first two of these wind farms, using post-construction monitoring reports available up to that point. Evidence from Bugar Hill also contributed to SNH updating its recommended avoidance rate for red-throated diver from 98% to 99.5% in 2015, during the PLI for the Consented Scheme (SNH 2015)³. Gordonbush Extension wind farm is particularly relevant to golden eagle flight behaviour. Baillie wind farm is relevant to non-breeding flight activity for geese and swans, and for which RPS carried out the baseline surveys and provided expert witness at PLI addressing the objection from RSPB Scotland on grounds of collision risk and displacement).

Table 5.5: Wind Farm Developments included within the Desk Study Exercise		
Wind Farm	Planning Status	Distance / Direction from the Main Site
Strathy North wind farm *	Operational	2 km north
Bettyhill wind farm *		6.8 km northwest
Baillie wind farm *		23.8 km northeast
Causeymire wind farm *		34.3 km east
Achany wind farm *		52.4 km southwest
Rosehall wind farm *		53.1 km southwest
Gordonbush Extension wind farm	Under construction	33.5 km south
Limekiln wind farm and Extension	Consented	17.5 km northeast
Strathy Wood wind farm	In Planning	1.8 km north
Armadale wind farm	In Scoping	7.4 km north
Akron wind farm		12.9 km northeast

Target Species Selection

- 5.5.26 Consultation responses from SNH and RSPB highlighted that the key species of residual concern for SNH is greenshank, and for RSPB Scotland concerns include red-throated diver, hen harrier, greenshank, wood sandpiper and latterly common scoter. For the sake of completeness, consideration has been given to all target species recorded on site.
- 5.5.27 SNH Guidance (SNH 2017a⁹) states that assessment of effects of wind farms on birds should be limited to protected species and other species of conservation concern that are particularly subject to adverse effects from wind farms. The Guidance states that there are three principal lists describing protected species and species of conservation concern:
- Species listed on the Birds Directive (Directive 2009/147/EC) on the Conservation of Wild Birds;

- Species protected under Schedule I of the Wildlife and Countryside Act 1981 (as amended); and
 - Red-listed BoCC (Eaton *et al.* 2015³⁸).
- 5.5.28 In addition, special consideration should also be given to species listed on the Scottish Biodiversity list (and UKBAP Priority species), Local Biodiversity Action Plans (LBAP) and any species for which a site holds a particular concentration, such as regionally-important numbers (particularly where species are of moderate conservation concern, Amber-list BoCC).
- 5.5.29 As individual sites can vary in their ornithological sensitivity, SNH (2017a)⁹ recommends that survey programmes and efforts be tailored to the specific requirements of individual sites.
- 5.5.30 Following consultation and desk study, the following species/groups were identified as target species:
- All qualifying birds of the Caithness and Sutherland Peatlands SPA and Ramsar site;
 - All species listed on Annex I of the Birds Directive/Schedule I of Wildlife and Countryside Act (as amended);
 - All wild goose, whooper swan and duck species (with the exception of Canada goose); and
 - All wader species.
- 5.5.31 Other species/groups were identified as secondary species. These are birds which are of conservation value but not identified by SNH Guidance as target species. Whilst fieldwork methods are not specifically targeted to assess these species, they were recorded during fieldwork and assessed for importance. The following species/groups were identified as secondary species:
- All other raptor and owl species;
 - Raven;
 - Species listed under the breeding bird assemblage of the adjacent SSSIs (Lochan Buidhe Mires, Skelpick Peatlands, Strathy Bogs and West Halladale); and
 - Red and Amber-listed BoCC.
- 5.5.32 Note that these lists include some exceptions, whereby common and widespread species of low conservation concern (BoCC Green-listed) qualify as target or secondary species. These are Green-listed species identified as particularly vulnerable to impacts of wind farms (e.g. wildfowl such as mute swan and goosander or raptors/other species such as buzzard, sparrowhawk and raven). There are also Green-listed species to which some other conservation value is attached (e.g. crossbill is Green-list but also Schedule I).

Field Study

- 5.5.33 An updated ornithological baseline was compiled during two seasons of field survey, undertaken between April 2018 and September 2019 (encompassing two breeding seasons and one non-breeding season).
- 5.5.34 The scope of field surveys was devised following Guidance for assessing onshore wind farms (SNH 2017a)⁹ and corresponds with that of the 2013 ES Addendum² and 2014 FIR⁴. All surveys were undertaken by experienced surveyors holding Schedule I licenses.
- 5.5.35 As well as VP surveys of the main site, surveys for breeding birds extended to a 1 km buffer for moorland birds, 2 km buffer for raptors and a 2 km buffer for divers, during which all suitable waterbodies were surveyed (see Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents)).

Vantage Point Surveys

- 5.5.36 VP surveys are a standardised method for assessing flight activity over a site and are a method advocated by SNH for onshore wind developments (SNH 2017a)⁹. A surveyor records flight path

and height of target species from a fixed VP. The resulting data are used to predict a theoretical collision rate by collision risk modelling (CRM). The flight patterns can also shed light on how the birds use the landscape, including foraging and breeding locations.

- 5.5.37 For the Proposed Varied Development, there were 10 VP locations required to ensure that appropriate viewsheds covered the site. These VPs included the same locations as used for the Consented Scheme. At two VP locations (VPs 15 and 17) surveyors used deer high seats to give views over the plantation canopy, given the increased tree height from previous years.
- 5.5.38 The VP locations and areas covered by viewsheds are shown in Figures 5.6 and 5.7 respectively (EIAR Volume 3a: Figures).
- 5.5.39 The height bands used to record flight activity are shown in Table 5.6. Birds recorded as flying within height bands 3, 4 and 5 were considered to be flying at potential collision height (PCH), as this represents the height range at which birds could be interacting with rotating turbine blades.

Table 5.6: Height Bands used to Record Flight Activity during VP Surveys 2018-19		
Flight Band	Height Range	Potential Collision Height (PCH)
Band 1	<20 m	Below PCH
Band 2	20 – 40 m	Below PCH
Band 3	40 – 100 m	At PCH
Band 4	100 – 150 m	At PCH
Band 5	150 – 250 m	At PCH
Band 6	>250 m	Above PCH

- 5.5.40 A total of 1,430 hours of VP watches were undertaken in 2018-19. The number of hours of VP surveys is summarised in Table 5.7. Full details of effort at each VP location are provided in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

Table 5.7: VP Survey Effort during 2018-19 Baseline Surveys			
Season	Period		Total hours
	From	To	
Breeding season 2018	14/03/2018	31/08/2018	516
Non-breeding season 2018-19	01/09/2018	29/02/2019	360
Breeding season 2019	16/03/2019	16/09/2019	554
Note: the breeding/non-breeding season breakdown presented here is illustrative. The species surveyed can vary widely in timing and duration of breeding cycle. For the purposes of CRM, the VP data is categorised as breeding and non-breeding season according to the breeding ecology of the species involved as demonstrated in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).			

Moorland Breeding Bird Surveys

- 5.5.41 The survey area for Moorland Breeding Bird Surveys comprised all open ground within the site and a buffer area of 1 km around the main site. Surveys were undertaken following the methodological guidance described by SNH (2017a)⁹.
- 5.5.42 Breeding bird surveys for proposed onshore wind farm developments on upland sites follow the methodology described by Brown and Shepherd (1993)⁴⁶. This methodology, originally proposed for monitoring upland breeding waders, ensures that surveyors methodically search within 100 m of all points within the survey area. Territories of breeding birds are mapped and the final number

⁴⁶ Brown, A. F. and Shepherd, K. B. (1993) A Method for Censusing Upland Breeding Waders. *Bird Study*. 40. p. 189-195.

of territories determined by reviewing the consistency of distribution and territorial behaviour across all visits. For greenshank, additional standard methods for estimating territory numbers were also used.

- 5.5.43 The total number of hours spent undertaking Moorland Breeding Bird Surveys is shown in Table 5.8. Full details of the number, duration and location of these surveys are provided in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

Table 5.8: Moorland Breeding Bird Survey Effort (hours) during 2018-19 Baseline Surveys					
Breeding Season	April	May	June	July	Total hours
2018	58	61	53	51	223
2019	60	60	16	31	167

Breeding Diver Surveys

- 5.5.44 Breeding diver surveys comprised a walk-over survey to check all suitable water bodies within 2 km of the main site (shown in Figure 5.10 (EIAR Volume 3a: Figures)). A greater survey effort was applied than the two-visit standard methodology described in Gilbert *et al.* (1998)²⁸, although the survey protocol was the same. To ensure that no breeding attempts were missed, a minimum of three visits were made between 1st May and 15th June (black-throated diver) and 1st June and 15th July (red-throated diver) in 2018 and 2019. These early visits were to confirm occupied territories, with information collected on nest location, number of adults present and behaviour (where achievable without causing any additional disturbance). When breeding was proven during the first or second visit, it was not essential to make further visits.
- 5.5.45 For those territories (waterbodies) where breeding was confirmed, at least two further visits were made each year after 15th June (black-throated diver), or 15th July (red-throated diver). This was in order to monitor nest outcomes. Chick(s) were monitored until they were at least two-thirds adult size (about one month old), after which they were assumed to have fledged if not encountered again (possibly requiring further visits). Chick number and size and information on breeding status was recorded during these visits (where achievable without causing any additional disturbance).
- 5.5.46 The total hours spent undertaking Breeding Diver Surveys is shown in Table 5.9. Full details of the number, duration and location of breeding diver surveys are provided in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

Table 5.9: Breeding Diver Survey Effort during 2018-19 Baseline Surveys (hours)					
Breeding Season	May	June	July	August	Total hours
2018	44	51	52	73	220
2019	23	54	29	1	107

Breeding Diver Focal Vantage Point Surveys

- 5.5.47 Focal VP surveys for breeding divers were undertaken to improve understanding of diver flight behaviour in the vicinity of their breeding lochs and commuting routes to foraging locations. Red-throated divers (and less-so, black throated divers) will commute between breeding lochs and feeding lochs or the sea. This activity peaks during chick provisioning. It is therefore important to understand if a proposed development may cause a barrier between nesting and feeding areas.
- 5.5.48 The VP surveys followed SNH Guidance (SNH 2017a)⁹, which specifically outlines a methodology for focal VPs for divers. Watches were undertaken three hours after sunrise and three hours before sunset, in order to coincide with maximum flight activity. Flights were followed and mapped across the entire period birds were in view and height bands recorded (as described for generic VP surveys in paragraph 5.5.39). The Guidance recommends a minimum of 36 hours of focal VPs per breeding season. However, the Guidance also states a desired number of flights (20-30 per season

at each loch). Therefore, effort may increase or decrease, dependent on the rate at which flights are observed.

- 5.5.49 During the focal watches, behaviour of adult birds on the loch was recorded (such as incubation, display and territorial behaviour). Where flights were of a social/territorial nature (as opposed to foraging), the flight was recorded on survey maps with the behavioural observations recorded.
- 5.5.50 The total hours spent undertaking Breeding Diver VP surveys is shown in Table 5.10.

Table 5.10: Breeding Diver Focal VP Survey Effort during 2018-19 Baseline Surveys		
Breeding Season	Number of Surveys	Total Hours
2018	12	46
2019	41	124

Breeding Raptor Surveys

- 5.5.51 The survey area for breeding raptor surveys comprised a buffer area of 2 km around the main site. Surveys were undertaken following the Guidance provided by SNH (2014¹⁰, 2017a⁹).
- 5.5.52 Raptor breeding territories and, if required, nest locations were detected through a combination of walk-over surveys and fixed-point watches. Survey protocol and timing followed the guidance detailed in Hardey *et al.* (2013)²⁹.
- 5.5.53 When potential territories were identified during surveys, fixed point watches at a suitable distance were used to confirm territories or locate nests. These were in effect ad-hoc VP surveys and surveyors recorded flight activity, although these flights are not used in collision risk monitoring. In addition, focal watches at confirmed territories were watched to help gain information on regular flight lines of the breeding birds.
- 5.5.54 The total hours spent undertaking breeding raptor surveys is shown in Table 5.11.

Table 5.11: Breeding Raptor Survey Effort during 2018-19 Baseline Surveys						
Breeding Season	April	May	June	July	August	Total hours
2018	71.8	49.3	51.1	45.1	37.1	254.4
2019	82.3	63.0	42.5	42.0	0.0	229.8

Modelling Methodology

COLLISION RISK MODELLING (CRM)

- 5.5.55 CRM is a tool for predicting the number of individuals of a target species that might collide with wind turbine rotors. Based on the model developed by Band *et al.* (2007¹⁴), it is the modelling approach recommended by SNH (2000¹⁵).
- 5.5.56 The CRM relies on data collected at VP surveys to calculate theoretical collision risk by establishing the amount of time birds are flying through airspace potentially occupied by rotating turbine blades. The critical data is the time birds are observed flying at PCH, close enough to a proposed turbine location where a collision might occur if a turbine was in place, known as the potential collision zone (PCZ). The PCZ incorporated a precautionary 200 m buffer distance from the outer turbines, forming the area referred to as the 'turbine envelope'.
- 5.5.57 The CRM model requires a minimum of at least three flights, or more than 10 individuals of a given species per survey season (i.e. breeding or non-breeding), where the flight is both at PCH and within the PCZ (for a particular turbine location). Using fewer flights, which match these criteria, would fail to give a statistically robust collision risk value when using the CRM model, as the sample of flight activity is so limited. This is the same approach used for the Consented Scheme.

- 5.5.58 Full technical details of the CRM model, including all data input to the CRM process, is provided in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). This approach allows independent calculation of collision rates for the Proposed Varied Development to be carried out and follows SNH Guidance (SNH 2000¹⁵, 2014¹⁶, 2017b¹⁷, 2010¹⁸, 2013¹⁹).

CUMULATIVE BASELINE

- 5.5.59 Consideration has been given to which developments, including those referred to in Table 5.5 have the potential to affect ornithological receptors cumulatively with the Proposed Varied Development.
- 5.5.60 The cumulative effects of the Proposed Varied Development are restricted to developments that have the potential to negatively (or positively) affect the same species within a particular area. The definition of this area determines which developments are included in the cumulative (and in combination) assessment. In accordance with standard practice, guidance and consultee responses (Table 5.3), this Chapter has assessed cumulative effects at a local and SPA scales. This first encompasses the developments in close proximity to the Proposed Varied Development, where the same individual birds or territories could be cumulatively affected.
- 5.5.61 Strathy North wind farm (operational) forms a key part of the cumulative baseline, comprising 32 turbines, sub-station, track infrastructure and an HMP. Cumulative effects have been assessed using data collected during the Strathy North wind farm's baseline surveys (2003-2009), pre- and during construction surveys (2012-2015) and operational and HMP-related surveys undertaken from 2016 to 2019.
- 5.5.62 The proposed Strathy Wood wind farm (in planning) is located between the Proposed Varied Development and Strathy North wind farm (EIAR Volume 3a: Figure 5.3). There is an overlap in survey area buffers and VORs (particularly hen harrier and red-throated diver) between the Proposed Varied Development and Strathy Wood wind farm. Since the submission of the Strathy South 2013 ES Addendum (SSE 2013²) and 2014 FIR (SSE 2014⁴), breeding bird and flight survey information has become available for Strathy Wood wind farm from 2009 to 2013 (E.ON 2013)⁴⁷, 2014 (E.ON 2015)⁴⁸, 2016 to 2018 (E.ON 2019)⁴⁹ and 2019 (E.ON unpublished data). This information has all been reviewed as part of the baseline collation of bird data.
- 5.5.63 Armadale wind farm (Scoping) (Brookfield Renewables 2019)⁵⁰ lies 7.4 km north of the main site. It is at sufficient distance to avoid cumulative effects on the same individuals and territories of most species at the main site, except wider ranging birds. The most notable being red and black-throated divers, golden and white-tailed eagles, migrating geese and whooper swans and, to a lesser extent (given that the majority of flight activity of nesting individuals is of shorter duration), hen harrier. Apart from the summary data in the Armadale wind farm Scoping Report there is no other publicly available data from which to assess cumulative effects in more detail. The potential for cumulative effects from Armadale wind farm are therefore considered in qualitative terms, out of necessity. Given the number of flights reported however, this is not considered to be a significant constraint on the cumulative assessment.
- 5.5.64 The second scale at which cumulative effects have been considered is for the Caithness and Sutherlands Peatlands SPA/Ramsar site scale, to define in-combination effects of relevant plans and projects. SNH maintains an Excel spreadsheet of wind farm developments where there is potential connectivity. This has been supplied (04/06/20) and reviewed for each qualifying species that has been recorded at the main site, and a resulting 'in combination' assessment undertaken.

⁴⁷ E.ON. (2013) Strathy Wood Wind Farm Environmental Statement. November 2013.

⁴⁸ E.ON. (2015) Strathy Wood Wind Farm Further Environmental Information. May 2015.

⁴⁹ E.ON. (2019) Strathy Wood Wind Farm Further Environmental Information. July 2019.

⁵⁰ Brookfield Renewables. (2019) Armadale Wind Farm Scoping Report.

- 5.5.65 The SNH spreadsheet also allows scrutiny of cumulative effects at the NHZ level, supplemented by examination at the NHZ level, using <https://map.environment.gov.scot/sewebmap/> and its onshore wind farm layer.

Identification of Potential Effects

- 5.5.66 The assessment process follows the approach detailed in CIEEM (2018)¹ which now places a greater emphasis on professional judgement of the reporting ornithologist, rather than the table-based assessment used for the Consented Scheme. The term VOR is still used for those species identified to be included in the assessment. For each impact with the potential to affect the relevant VOR, the assessment considers the following parameters:
- Whether the impact is positive or negative in its influence;
 - The extent of the impact;
 - The magnitude, duration and timing of the impact; and,
 - The impact's frequency and ease of reversibility.
- 5.5.67 The assessment identifies any potential cumulative impacts from surrounding cumulative developments prior to determining the significance of any effect, be this negligible, minor, moderate or major. Effects could be either beneficial or adverse.

Potential Construction Effects

- 5.5.68 In general, the potential effects that could arise on birds from construction of the Proposed Varied Development are:
- Direct physical damage to nests or nesting birds;
 - Disturbance and displacement from foraging or nesting areas;
 - Direct temporary or permanent loss of habitat for the construction requirements (such as borrow pits) and permanent wind farm infrastructure; and
 - Indirect effects from pollution (refer to Chapter 10: Soil and Water (EIAR Volume 2) which assesses the potential effects of pollution and the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) which presents the proposed pollution mitigation and management measures.

Potential Operational Effects

- 5.5.69 The potential effects that could arise on birds during operation are:
- Displacement due to the presence of turbines or other wind farm infrastructure;
 - Barrier effects, if the presence of the turbines prevents movement across previously used airspace;
 - Collision with turbines when birds are in flight; and
 - Disturbance from staff, vehicles or other activities during operation (e.g. lighting) or operational maintenance.

Potential Decommissioning Effects

- 5.5.70 The potential effects that could arise on birds from decommissioning of the Proposed Varied Development would be the same as those from construction, other than loss of habitat (on the basis that the decommissioning process would not require more land than previously used).

Potential Cumulative Construction Effects

- 5.5.71 The potential for cumulative effects from wind farm construction arises if construction periods overlap with each other, which means birds could be exposed to construction effects over longer periods than would otherwise be the case. The second form of cumulative effects is if the construction areas are in proximity to each other. In these circumstances, the spatial extent of a

potential effect could overlap, and cumulatively cover a larger area, either effecting a greater proportion of habitat used by a territorial pair of birds, for example, or effecting a greater number of territories (or a combination of both). The potential causes of cumulative construction effects are the same set of influences as for construction effects (physical damage to nests, disturbance and displacement from foraging or nesting areas etc.).

Potential Cumulative Operational Effects

- 5.5.72 The potential for cumulative operational effects from wind farm operation occurs in two sets of circumstances, firstly where wind farms are sufficiently close together that their operational effects impact the same birds (for example where two or more wind farms fall within a golden eagle territory), or where the bird population within a certain area is exposed to potential effects from a number of wind farms (for example the birds of the Caithness and Sutherland Peatlands SPA). The potential causes of cumulative operational effects are the same set of influences as for operational effects (displacement, barrier effects, collision etc.).

Assessment of Residual Effects

- 5.5.73 The assessment of residual effects follows consideration of mitigation measures proposed to avoid or minimise the significance of predicted effect that has been assessed for the relevant VORs. The residual effect will take into account the likely success of the proposed mitigation measures to reduce the extent, magnitude and duration of any impact prior to determining the residual significance of any effect.

Criteria for Assessing Sensitivity of Receptors

- 5.5.74 The identification of VORs and assessing their level of importance ('value') is guided by a range of criteria, as described in Table 5.12. These criteria are a guide and not definitive; ornithologists should apply judgment based on knowledge of the region and bird populations involved.
- 5.5.75 Following identification of VORs, it is important to determine the importance of the site for these birds. Therefore, following assessment, for each VOR there is a value for the importance of the site, from international through to negligible.
- 5.5.76 The site importance is a function of the species value in combination with size and nature of the population reliant upon the site. For example, where an internationally important species has only been recorded over-flying the site as a migrant, making no use of its habitats, then the site level of importance would be considered to be negligible.

Table 5.12: Criteria for Assessing Sensitivity of VORs		
Level of Importance	Sensitivity	Example of VOR
International	High	Species listed as qualifying feature of an internationally designated site (SPA/Ramsar site, including candidate sites). This includes birds outside of protected areas, particularly when there is clear connectivity with internationally designated populations or where the populations are at levels with sufficient conservation importance to meet criteria for SPA selection.
National	High	Birds listed as Annex I/Schedule I (but no connectivity with international site). A species listed as a notified feature of a nationally designated site (e.g. SSSI).
Regional	Medium	A bird species present in regionally-important numbers, e.g. more than 1% of regional or Natural Heritage Zone population. Birds that are subject to conservation action plans e.g. Scottish Biodiversity List/UKBAP/LBAP. Birds that form part of the cited interests of a Local Nature Reserve, or some local-level site designation.

Table 5.12: Criteria for Assessing Sensitivity of VORs

Level of Importance	Sensitivity	Example of VOR
District	Medium	Bird species where a significant proportion (greater than 1%) of the sub-regional/district population breeds within the site.
Local	Low	A bird species that is of nature conservation value in a local context only, with insufficient value to merit a formal designation (e.g. Red and amber-listed BoCC species).
Negligible	Low	Common and widespread species of little or no conservation importance (Green-listed BoCC species).

Criteria for Assessing Magnitude of Change

- 5.5.77 The magnitude, or scale, of the change (effect) is described in this chapter as a quantitative value as far as is practicable. For example, magnitude of change can be quantified as a percentage decline of a population or as area of habitat from which birds will be displaced.
- 5.5.78 In addition, the magnitude of an impact is influenced by its duration, reversibility and cumulative effect with other impacts. With regard to duration of impact, it can be defined as permanent (beyond 25 years duration), long-term (15-25 years), medium-term (5-15 years) and short-term (up to 5 years). Again, knowledge of the ability of the birds to recover from impacts is required to assess the duration of the effect. For example, mortality events for species with small population sizes and low reproductive output (such as raptors) will take considerably longer to recover than abundant and widespread species that have high output so can fill vacant territories and replace numbers rapidly (e.g. small passerines such as skylark and meadow pipit).
- 5.5.79 The magnitude of change from a given development will differ between species and populations and therefore assessing the magnitude requires consideration of the behavioural sensitivity of the birds to the Proposed Varied Development, population size and trends (among other considerations). Examples include the different responses by different species to disturbance, different risk of collision between species, and the greater vulnerability of small, declining and isolated populations to the impacts of additional pressures.
- 5.5.80 Consideration of the above factors allows quantification as to the magnitude of change. Table 5.13 presents magnitude at six levels, from Total/near total to None and this is the scale by which effect or change is quantified in this Chapter. Note that the magnitude of change is sometimes readily quantified, such as a change in population, range etc. However, it is often necessary to give a qualitative scale, such as high to low. Note that some of the lower magnitudes of effect can be applied to beneficial (positive) effects.

Table 5.13: Criteria for Assessing Magnitude of Change

Magnitude	Typical Descriptors of Effect
Total/Near total	Would cause the loss of a major proportion or whole feature/population or cause sufficient damage to a feature so as to immediately compromise viability. Irreversible.
Substantial	Major effects on feature/population, which would have sufficient effect to irreversibly alter the nature of the feature in the short-to-long term and affect long-term viability. For example, more than 20% decline in population an area is able to support.
Moderate	Effects that are detectable in short and longer-term, but which should not alter the long-term viability of the feature/population, for example 10-20% decline in population an area is able to support.

Table 5.13: Criteria for Assessing Magnitude of Change

Magnitude	Typical Descriptors of Effect
Slight	Minor effects, either sufficiently small-scale or of short duration so as not to cause long-term decline in feature/population; for example, less than a 10% decline in population that an area is able to support.
Negligible	A potential impact that is not expected to affect the feature/population in any meaningful way, with no detectable decline in population/distribution.
None	No impacts to feature/population.

Criteria for Assessing Significance

- 5.5.81 CIEEM (2018)¹ guidance requires a determination of whether an effect is significant or not significant. Significance of an effect is determined by a combination of the magnitude of the effect and the sensitivity of a species. Table 5.14 shows the matrix used for this assessment of effect on ornithological features.
- 5.5.82 As set out in CIEEM (2018)¹, a significant effect is one that either supports or undermines biodiversity conservation objectives for an important ornithological feature.
- 5.5.83 The meeting of conservation objectives is a judgement based on the species' extent, abundance and distribution on site and more widely, and its population trends, and the condition of the habitats and ecosystems on which it depends.
- 5.5.84 As shown in Table 5.14, a significant effect is shown by Major and Major/moderate in the matrix (shaded grey). Moderate effects are not considered significant, based on a combination of considerations relating to the conservation objectives of the VOR. The site's value in supporting the VOR population is a key factor in this (for example, whether the site is used infrequently or at all by a species to breed, whether birds only overfly the site, making no use of it as supporting habitat, or whether the species is present in low or high numbers or densities compared to elsewhere in its range). Moderate effects do not prejudice the achievement of the species' conservation objectives at the scale that is ecologically appropriate for that VOR (national populations for wide-ranging species, for example).

Table 5.14: Matrix for Determining Significance of Effects

		Magnitude of Change					
Sensitivity		Total/Near Total	Substantial	Moderate	Slight	Negligible	None
	High	Major	Major	Major/moderate	Moderate	Moderate / minor	None
	Medium	Major	Major/moderate	Moderate	Moderate / minor	Minor	None
	Low	Major	Moderate	Moderate / minor	Minor	Minor/ none	None
		Sensitivity: Conservation importance of bird population High: Site population is of International / National importance Medium: Site population is Regional / District importance Low: Site population is Local / Negligible importance Magnitude of change: Size of effect on population/feature. Assessed with consideration of sensitivity of species/feature to impact, duration of effect and ability of species/feature to recover (among other factors) Significant effects are in dark shading.					

Assumptions and Limitations

- 5.5.85 This assessment draws primarily from the results of 2018 and 2019 baseline surveys undertaken on the main site and surrounding survey buffers, across two breeding seasons and one non-breeding season. Fieldwork included flight activity surveys over the site, using ten VP locations, with surveyors raised on high deer seats at two VPs (VP15 and VP17) to ensure visibility over the conifer plantation on the site.
- 5.5.86 Surveys were undertaken by experienced professional ornithologists who followed published guidance and met (and often exceeded) the minimum required survey effort.
- 5.5.87 Long term involvement by the Applicant's ornithologists at this site and Strathy North wind farm has enabled an unparalleled level of survey information and site knowledge to be accumulated for the Proposed Varied Development assessment (covering the period 2003 to 2019). Therefore, no limitations have been identified with regards to baseline survey information.
- 5.5.88 Regarding limitations inherent in the prescribed methodology for characterising bird behaviour, such as limited detectability of certain species, RPS has addressed the potential implications to the satisfaction of Scottish Ministers for the Consented Scheme through modelling techniques (RPS 2015b)⁸. The findings demonstrated that these potential implications were not significant, and this same conclusion remains valid for the Proposed Varied Development.
- 5.5.89 The collision risk modelling process is less robust where the sample size of recorded flights is small. In such circumstances modelling can produce considerably less reliable results, further exacerbated by the characteristics of individual flights within that small sample.
- 5.5.90 In May 2019, a wildfire burned a proportion of the survey buffer to the east of the main site, although the main site itself was not affected.

5.6 Baseline Conditions

Current Baseline

Desk Study

DESIGNATED SITES

- 5.6.1 This Section describes all statutory designated sites with qualifying ornithological features that may have ecological connectivity with the site (Figure 5.1 and 5.3) (EIAR Volume 3a: Figures)).
- 5.6.2 The statutory sites described are:
- Caithness and Sutherland Peatlands SPA;
 - Caithness and Sutherland Peatlands Ramsar site;
 - Caithness Lochs SPA;
 - Lochan Buidhe Mires, Skelpick Peatlands, Strathy Bogs and West Halladale SSSIs.

CAITHNESS AND SUTHERLAND PEATLANDS SPA AND RAMSAR SITE

- 5.6.3 The Caithness and Sutherland Peatlands SPA and Ramsar sites share a boundary, in all directions, with the site (Figures 5.1, 5.2 and 5.3 (EIAR Volume 3a: Figures)). The SPA and Ramsar sites occupy the same area (as does the Caithness and Sutherland Peatlands Special Area of Conservation (SAC), considered in Chapter 9: Ecology (non-avian) (EIAR Volume 2).
- 5.6.4 All turbines and associated infrastructure of the Proposed Varied Development are outside the SPA and Ramsar site boundaries, as is the access track. In all cases, care has been taken in the design process and formulation of the CEMP to avoid direct or indirect effects on the designated sites adjacent to site.

- 5.6.5 The Proposed Varied Development includes the existing access track from the north (see EIAR Volume 3a: Figure 2.6). This links the site and the constructed Strathly North wind farm. The existing track would require modification to accommodate grid connection cabling. This would be within the originally consented corridor, as detailed in Technical Appendix 9.4 (EIAR Volume 4).
- 5.6.6 As the SPA/Ramsar site shares a boundary with the site (Figure 5.1) (EIAR Volume 3a: Figures)), the survey buffers for ornithological baseline are within the designated area and all qualifying species are regarded as having potential ecological connectivity. This follows SNH Guidance (SNH 2016)²².
- 5.6.7 This SPA qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting the following important populations of bird species listed on Annex I of the Directive during the breeding season:
- Red-throated diver
 - Black-throated diver
 - Hen harrier
 - Golden eagle
 - Merlin
 - Short-eared owl
 - Golden plover
 - Wood sandpiper
- 5.6.8 The SPA also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species during the breeding season:
- Wigeon
 - Common scoter
 - Dunlin
 - Greenshank
- 5.6.9 Further details of the qualifying species of the Caithness and Sutherland Peatlands SPA and Ramsar site are provided in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
- 5.6.10 The qualifying species are regarded as VORs of international importance and form the key part of the ornithological assessment below. Due to the possible connectivity of the site and SPA-qualifying bird populations, these species are also discussed in the Habitat Regulations Appraisal (HRA) in Technical Appendix 5.2 (EIAR Volume 5: Confidential Documents).

CAITHNESS LOCHS SPA AND RAMSAR SITE

- 5.6.11 SNH Guidance (SNH 2016)²² advises that SPAs with qualifying populations of geese and gull species should be considered for connectivity if within 25 km of a proposed development.
- 5.6.12 The Caithness Lochs SPA site is designated for the wintering wildfowl populations of whooper swan, Greenland white-fronted goose and Icelandic greylag goose, with the underlying Ramsar site designated for these species and ruff. At a distance of 26 km from the main site (Figure 5.1 (EIAR Volume 3a: Figures)), it is just beyond the screening distance for SPAs with qualifying populations of geese species.
- 5.6.13 Greylag goose and whooper swan were both recorded overflying the site, with flight activity sufficient for collision risk estimation. Despite the distance involved, this assessment used a highly precautionary approach and considered possible connectivity of qualifying features of the Caithness Lochs SPA/Ramsar.
- 5.6.14 The qualifying features of the Caithness Lochs SPA/Ramsar site are presented in detail in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

LOCHAN BUIDHE MIRES, SKELPICK PEATLANDS, STRATHY BOGS AND WEST HALLADALE SSSIs

- 5.6.15 The main site is bordered by an SSSI in all directions (Figure 5.3 (EIAR Volume 3a: Figures)). The sites are:
- Lochan Buidhe Mires SSSI; 0 km to the northwest;
 - Skelpick Peatlands SSSI; 0 km to the west;
 - Strathly Bogs SSSI; 0 km to the north and west (includes Yellow Bog, which runs north/south through the centre of the site);
 - West Halladale SSSI; 0 km to east and south (includes area of proposed access track).
- 5.6.16 These are the SSSIs that underpin the adjacent Caithness and Sutherland Peatlands SPA and therefore collectively share the same footprint.
- 5.6.17 As with the Caithness and Sutherland Peatlands SPA/Ramsar site, there is no overlap of the main site and the SSSIs, although the access track passes through the West Halladale SSSI.

Existing Records

- 5.6.18 Baseline ornithological surveys have been undertaken at the main site to inform the preceding environmental impact assessments (since 2003). This large body of information is summarised in existing reports, including the 2007 ES, 2013 ES Addendum (SSE 2013²) and the 2014 FIR (SSE 2014⁴) (for the Consented Scheme). Relevant details have been considered through the updated baseline data collation presented in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

Vantage Point Survey Results

- 5.6.19 A total of 553 target species flights, involving 23 species were recorded during VP surveys between 16/03/2018 and 13/08/2019.
- 5.6.20 Table 5.15 summarises all observed flights within the VP viewshed irrespective of whether they passed through the site (and potential collision zones of proposed turbines), and summarises the number of birds, bird seconds (flight duration [in seconds] x number of individuals) and bird seconds at PCH. Bird seconds at PCH indicates the amount of time flights were recorded at the rotor-swept height of the proposed turbines.

Table 5.15: Total Number of Target Species Flights Mapped Across all VP Surveys 2018-19				
Species	Number flights recorded during VP surveys	Number of birds	Total bird seconds	Total bird seconds at PCH
Whooper swan	18	195	18,735	18,705
Pink-footed goose	70	5,070	59,6940	504,120
Greylag goose	41	508	53,280	37,725
Mallard	13	24	1,170	600
Teal	8	18	1,395	0
Goldeneye	1	2	60	0
Red-throated diver	6	7	870	855
Black-throated diver	20	25	1,950	1,440
Osprey	2	2	510	255
White-tailed eagle	19	20	4,755	3,615

Table 5.15: Total Number of Target Species Flights Mapped Across all VP Surveys 2018-19

Species	Number flights recorded during VP surveys	Number of birds	Total bird seconds	Total bird seconds at PCH
Golden eagle	16	18	6,285	5,415
Hen harrier	36	36	4,515	660
Peregrine	1	1	75	0
Merlin	17	19	855	210
Golden plover	51	72	3,060	810
Dunlin	24	36	1,800	225
Common sandpiper	1	1	60	0
Greenshank	198	212	8,925	1,725
Curlew	8	8	510	255
Whimbrel	2	3	375	375
Woodcock	1	1	30	0
Snipe	3	3	75	60
Barn owl	1	1	15	0

Note that these data include all flights recorded from VP surveys in period 16/03/2018 and 13/08/2019. The data for the flights 'at risk' (Table 5.16,) may omit those flights that occur before the defined breeding season of 2018 and/or after the defined breeding season of 2019 (see footnote in Table 5.16)

The PCH values are based on Vestas Enventus V162 5.6 MW turbines, which would be broadly in line with the final turbine model selected.

- 5.6.21 Those species where flight activity surveys yielded at least three 'at risk' flights are presented in Table 5.16. 'At risk' flights are those that are: i) within the 2 km viewshed; ii) at PCH: and, iii) cross the PCZ of proposed turbines. The turbine envelope is a 200 m radius around the proposed turbine. These are the flights that provide data for collision risk modelling.

Table 5.16: Number of 'At Risk' Target Species Flights Mapped Across all VP Surveys 2018-19

Species	Season	Start Date	End Date	No. Collision Risk Flights	No. Collision Risk Birds	Total Time PCH Seconds
Whooper swan	2018 Breeding	01/04/2018	31/08/2018	3	17	679
	2018-19 Non-breeding	01/09/2018	31/03/2019	14	151	5,109
	2019 Breeding	01/04/2019	31/08/2019	0	0	0
	Total			17	168	5,788
Pink-footed goose	2018 Breeding	01/05/2018	31/08/2018	2	20	204
	2018-19 Non-breeding	01/09/2018	30/04/2019	10	725	26,822
	2019 Breeding	01/05/2019	31/08/2019	0	0	0

Table 5.16: Number of 'At Risk' Target Species Flights Mapped Across all VP Surveys 2018-19

Species	Season	Start Date	End Date	No. Collision Risk Flights	No. Collision Risk Birds	Total Time PCH Seconds
	Total			20	745	27,026
Greylag goose	2018 Breeding	01/04/2018	15/08/2018	13	210	6,126
	2018-19 Non-breeding	16/08/2018	31/03/2019	2	10	419
	2019 Breeding	01/04/2019	15/08/2019	4	38	3,625
	Total			19	258	10,170
Red-throated diver	2018 Breeding	01/05/2018	15/09/2018	2	3	135
	2018-19 Non-breeding	16/09/2018	30/04/2019	0	0	0
	2019 Breeding	01/05/2019	15/09/2019	1	1	12
	Total			3	4	147
Black-throated diver	2018 Breeding	01/05/2018	15/09/2018	5	7	185
	2018-19 Non-breeding	16/09/2018	30/04/2019	0	0	0
	2019 Breeding	01/05/2019	15/09/2019	1	1	42
	Total			6	8	227
White-tailed eagle	2018 Breeding	15/02/2018	31/08/2018	4	4	132
	2018-19 Non-breeding	01/09/2018	14/02/2019	4	5	1,501
	2019 Breeding	15/02/2019	31/08/2019	2	2	300
	Total			10	11	1,933
Golden eagle	2018 Breeding	16/03/2018	31/08/2018	1	1	96
	2018-19 Non-breeding	01/09/2018	15/03/2019	2	2	24
	2019 Breeding	16/03/2019	31/08/2019	2	2	5
	Total			5	5	125
Hen harrier	2018 Breeding	16/03/2018	31/08/2018	5	5	50
	2018-19 Non-breeding	01/09/2018	15/03/2019	0	0	0
	2019 Breeding	16/03/2019	31/08/2019	9	9	173

Table 5.16: Number of 'At Risk' Target Species Flights Mapped Across all VP Surveys 2018-19

Species	Season	Start Date	End Date	No. Collision Risk Flights	No. Collision Risk Birds	Total Time PCH Seconds
	Total			14	14	223
Greenshank	2018 Breeding	01/04/2018	31/07/2018	11	13	200
	2018-19 Non-breeding	01/08/2018	31/03/2019	0	0	0
	2019 Breeding	01/04/2019	31/07/2019	18	18	73
	Total			29	31	273

Note: VP surveys were undertaken between 16/03/2018 and 13/08/2019. Therefore, for some species there are flights recorded from VPs that occurred before the start of the 2018 breeding season or after the end of the 2019 breeding season (see start/end date columns). These flights are not included in this table. All other tables/text discussing VP data involves all flights recorded for the duration 16/03/2018 to 13/08/2019.

Breeding Bird Survey Results

- 5.6.22 Full details of breeding bird survey results are given in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). The paragraphs below provide a summary of these survey findings.

BREEDING DIVERS

There were two confirmed pairs of breeding red-throated diver within the 1 km survey buffer of the main site in both 2018 and 2019, with a further territory identified in 2018 where breeding was unconfirmed. This matched the outcome for black-throated diver, with results shown in Table 5.17 and Figure 5.1.1 to 5.1.4 of Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).

Table 5.17: Number of Breeding Divers Recorded During Diver Surveys 2018-19

Species	Number of Confirmed Breeding Pairs		Number of Probable Breeding Pairs	
	2018	2019	2018	2019
Red-throated diver	2	2	1	0
Black-throated diver	1	1	1	0

BREEDING DIVER FOCAL VP SURVEY RESULTS

- 5.6.23 A total of 197 diver flights were recorded during focal VP watches at breeding lochs (159 red-throated diver and 38 black-throated diver).
- 5.6.24 A summary of these flights is presented in Table 5.18.

Table 5.18: Number of Flights Recorded During Breeding Diver Focal VP Surveys 2018-19

	Number flights recorded	Number of birds	Total bird seconds	Total bird seconds at PCH
Black-throated diver 2018	6	10	885	75
Red-throated diver 2018	24	32	4,050	1,650
Black-throated diver 2019	32	40	3,555	1,605
Red-throated diver 2019	135	170	21,330	10,935

BREEDING RAPTORS SURVEY RESULTS

- 5.6.25 The Schedule I/Annex I raptors (including owls) encountered within the main site and 2 km survey buffer, across all surveys, are listed in Table 5.19, along with the number of breeding territories. Larger raptor species (notably golden eagle and white-tailed eagle) were recorded beyond the 2 km survey buffer, being visible out to a distance of several kilometres. Locations of nests and potential territories of breeding raptors is given in Figure 5.1.5 to 5.1.11 of the Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents).
- 5.6.26 Golden eagle used the regular nest site to the south of the site.
- 5.6.27 Merlin was proven to be breeding within the 2 km survey area in both 2018 and 2019. Breeding activity by merlin within the conifer plantation of the main site was almost certain in both 2018 and 2019, indicated by the presence of regular fresh plucks at the same area in both years. The nest found in 2018 was in a conifer within commercial plantation and the 2019 territory within the main site is assumed to be tree-nesting. In 2018 there was also a territory 2 km to the south, at Dry Burn forest. In 2019, there was also continued territorial activity at this second location, with fresh plucks at a third location approximately 2 km to the southwest.
- 5.6.28 Hen harrier did not breed within the main site in either 2018 or 2019. However, there was considerable activity within the 2 km survey buffer at a location where hen harrier has nested in previous years. Nesting in 2018 was strongly implied by an alarm-calling bird in this area. It is probable that nesting was at least attempted in this area in both years (and sightings suggest that the male bird may have been polygynous with additional females nesting outside the survey area).
- 5.6.29 There was only a single record of short-eared owl during all 2018 and 2019 surveys, comprising an incidental record of a single perched bird in June 2018.
- 5.6.30 Other notable Schedule I/Annex I raptors encountered on-site included white-tailed eagle, red kite, peregrine and barn owl. Sightings of barn owls and signs suggest that this species may have bred on the main site, and at a further site within the 2 km survey buffer. There was no activity indicative of breeding of white-tailed eagle, red kite or peregrine. Sightings of Schedule 1/Annex 1 raptor territories are summarised in Table 5.19.

Table 5.19: Summary of all Schedule I/Annex I Raptors Recorded During Baseline Surveys 2018-19

Species	Number of Confirmed Breeding Pairs		Number of Probable/Possible Breeding Pairs		Notes
	2018	2019	2018	2019	
Osprey	0	0	0	0	Bird observed foraging within 2 km survey buffer and carrying prey in 2019. Possibly breeding nearby (3 records during breeding raptor surveys and 2 records during VP surveys).
White-tailed eagle	0	0	0	0	There was no nesting on site. Surveys and information from the Highland Raptor Study Group suggested there was no nesting within at least 6 km from the site either in 2018 or 2019.
Golden eagle	1	1	0	0	Nested at regular location to the south of the main site.
Red kite	0	0	0	0	Single record during breeding raptor survey (June 2019).

Table 5.19: Summary of all Schedule I/Annex I Raptors Recorded During Baseline Surveys 2018-19

Species	Number of Confirmed Breeding Pairs		Number of Probable/Possible Breeding Pairs		Notes
	2018	2019	2018	2019	
Hen harrier	1	1	0	0	Two confirmed territories within 2 km survey buffer in 2018 and 2019, although the 2019 territory classification as confirmed takes a precautionary approach as it was a possible territory at the time of the moorland fire (May 2019).
Peregrine	0	0	0	0	Not breeding within main site/survey area. Only record 2018-19 was of single bird in flight during breeding raptor surveys.
Merlin	1	1	1	2	Breeding territory strongly inferred within the site plantation (fresh pluck sites in plantation in 2018 and 2019). Breeding confirmed within 2 km survey buffer in 2018 (one location) and 2019 (two locations, with a third probable).
Short-eared owl	0	0	0	0	Only a single record within site/survey area.
Barn owl	0	0	1	1	Pellets and splash found at rocky outcrop within 2 km survey buffer (2018) and building inside main site (2019). Whether nest location or simply a roost site was not determined.

BREEDING WADERS

- 5.6.31 Table 5.20 shows the results of territory analysis following the four moorland breeding bird survey visits. All of these territories are within the 1 km buffer of the main site.

Table 5.20: Number of Territories of Breeding Waders Within the 1 km Survey Buffer of the Main Site 2018-19

Species	Number of Territories 2018	Number of Territories 2019	Mean number of Territories
Golden Plover	16	23	18
Dunlin	11	9	10
Common Sandpiper	3	4	3.5
Greenshank	16	16	16
Curlew	2	1	1.5
Snipe	2	5	3.5
Wood Sandpiper	0	0	0

- 5.6.32 There was a single incidental record of an individual wood sandpiper, flushed from a pool within the survey buffer during a breeding diver survey (July 2018). There were no further records of this species in either year.

- 5.6.33 The number of golden plover territories in 2019 is notable and is the highest number recorded when compared with all previous surveys. Whilst the reasons for this increase are not clear, it is possible that the effects of the wildfire in May 2019 may have influenced numbers. Golden plover density has been shown to be greater on moorland where heather burning occurs (Tharme *et al.* 2001)⁵¹; although in that instance the associated gamekeeping and increased predator control may also explain the increased density. Alternatively, numbers may have been augmented by displaced birds from further north where the effects of the fire on the blanket bog were more severe.
- 5.6.34 Table 5.21 gives the 2018 and 2019 survey results of SPA-qualifying waders at the main site.
- 5.6.35 A key consideration is the number of territories within 500 m of proposed turbines, as this is the distance at which construction/decommissioning disturbance effects may occur and the distance across which SNH has previously stated displacement effects may also occur during site operation. These issues are discussed further in the assessment of effects.

Table 5.21: Number of Territories of Breeding Waders from 2018 and 2019 Baseline									
Year/ Study area buffer	Estimated Number of Pairs Within 1 km			No. Within Main Site			No. Within 500 m of Turbine		
	Greenshank	Golden plover	Dunlin	Greenshank	Golden plover	Dunlin	Greenshank	Golden plover	Dunlin
2018/ 1 km	16	16	11	2	0	0	4	1-2	4
2019/ 1 km	16	23	9	1	0	0	3	1	0

OTHER NOTABLE BREEDING SPECIES

- 5.6.36 Wigeon was proven to breed within the survey area, with females seen with broods of two chicks during diver surveys in July and August 2019. Breeding wigeon is a qualifying feature of both the Caithness and Sutherland Peatlands SPA and Ramsar site.
- 5.6.37 Teal was proven breeding in both 2018 and 2019, with several females with broods seen within the survey area, mainly during diver surveys. Breeding teal are a component of the qualifying breeding bird assemblage of the Caithness and Sutherland SPA and Ramsar site.
- 5.6.38 Greylag goose was proven breeding within the survey area, observed nesting during diver surveys in 2019. Breeding greylag goose is a qualifying species of the Caithness and Sutherland Peatlands Ramsar site.

Collision Risk Modelling

- 5.6.39 Flight activity over the 2018 breeding season, 2018/2019 non-breeding season and the 2019 breeding season was quantified using standard VP flight survey results. From these data, collision risk modelling was carried out for target species where over three independent flights had been recorded.
- 5.6.40 The non-breeding species for which collision risk was calculated were whooper swan, pink-footed goose, and migratory greylag goose.
- 5.6.41 For breeding season interests (i.e. species absent from the main site plus surrounding area outside the breeding season), collision risk modelling was completed for red and black-throated divers, hen harrier, merlin and greenshank. It was also carried out for breeding greylag geese.

⁵¹ Tharme, A. P., Green, R. E., Baines, D., Bainbridge, I. P. and O'Brien, M. (2001) The Effect of Management for Red Grouse Shooting on the Population Density of Breeding Birds on Heather-Dominated Moorland. *Journal of Applied Ecology*. 38. p.439-457.

- 5.6.42 For species resident during the breeding season and with non-breeding individuals also present throughout the year, this was completed for golden and white-tailed eagle.
- 5.6.43 As the number of flights recorded for other species was less than three, flight activity was sufficiently low that collision risk was evidently limited and concluded to be negligible.

Future Baseline

- 5.6.44 Felling of the Strathy South conifer plantation is proposed in a phased process over a four-year period with all forestry removed from site to allow for restoration of peatland habitats. As such, the future baseline of the main site as result of the Proposed Varied Development would be substantially different from that of the current plantation. The Strathy South Wind Farm Outline HMP is provided in Technical Appendix 9.5 (EIAR Volume 4) and details the proposals for restoration to return habitats to those similar to the surrounding Caithness and Sutherland Peatlands SAC. Technical Appendix 9.6 (EIAR Volume 4) details the proposed methods and rationale for phased forest felling. The proposed Phased Forest Felling Plan is illustrated on Figure 9.5 (EIAR Volume 3a: Figures).
- 5.6.45 The future baseline at the time of commencement of the Proposed Varied Development's operation would therefore be one of a partially felled conifer plantation, of which some areas would have restoration activities ongoing. As the site progresses all plantation forest would be successively felled and these areas would come under restoration using the most appropriate techniques as determined by on-site investigation.
- 5.6.46 In the event that the Proposed Varied Development does not receive consent, the potential outcomes largely depend on the timber market. There are local instances (Achrugan Forest, to the north of Strathy North wind farm) where severe wind blow has taken place and the windblown trees remain *in situ*. In such circumstances, the site would remain unsuitable for moorland breeding waders for a number of decades until the timber broke down over time. The presence of the windblown timber and underlying drainage ditches would continue to have indirect effect on the adjoining bird populations and peatland hydrology of the Caithness and Sutherland Peatlands SPA and SAC respectively. Alternative, if timber prices merit it, the conifer plantation would be harvested as it reached economic maturity. The land use after that is a matter of conjecture as it would depend on the various landowners' particular interests. It is unlikely re-planting would attract grant aid, and the future use could cover a wide spectrum, from an alternative wind farm development, to leaving woodland to recolonise without intervention (resulting in regeneration of conifer (largely Sitka) thicket and forest), to peatland restoration for conservation management. The baseline bird interest would vary considerably, depending on the land use option that was decided upon by each landowner (Figure 5.4 (EIAR Volume 3a: Figures)).
- 5.6.47 The progression of the Strathy North wind farm HMP will have implemented further conifer plantation removal, with replacement native riparian woodland being encouraged along the western flank of the River Strathy, where it runs adjacent to the Strathy North wind farm.
- 5.6.48 The proposed Strathy Wood wind farm is immediately adjacent to the site. The revised application for 13 turbines was submitted to the ECU on 31st July 2019 and also includes an HMP. Commitments include woodland restructuring and habitat enhancement, primarily involving blanket bog restoration and removal of non-native commercial forestry and reinstatement of native broadleaved woodland, with a 20 ha area at the southern end of the former plantation set aside as a Hen Harrier Enhancement Area.

Identified Sensitive Receptors

- 5.6.49 Sensitive receptors (VORs) remain the same as identified for the Consented Scheme. This Chapter assesses effects of the Proposed Varied Development on these VORs and, where appropriate, proposes mitigation to minimise predicted effects on these receptors.

- 5.6.50 As already noted, the criteria used to identify bird species of conservation value and assign a level of importance are described in Table 5.12.

VORs that are present in populations of international or national importance are of high sensitivity. VORs present in populations of regional or district importance are of medium sensitivity. VORs present in populations in local or negligible importance are of low sensitivity. The importance of the site for a particular species will also ultimately inform the sensitivity category, to provide as representative sensitivity categorisation as possible for the assessment.

Valued Ornithological Receptors of International Importance

- 5.6.51 All named qualifying species of the Caithness and Sutherland Peatlands SPA/Ramsar site were considered VORs of International Importance, given the SPA/Ramsar site's proximity and the clear potential for connectivity with the main site.
- 5.6.52 Taking a precautionary approach, the possible connectivity of the Caithness Lochs SPA/Ramsar has also been considered in this assessment, despite it being 26 km from the main site (i.e. 1 km over the potential connectivity distance for its qualifying species). The Caithness Lochs SPA is designated for the wintering wildfowl populations of Icelandic greylag goose, whooper swan and Greenland white-fronted goose, and the Ramsar is also designated for spring populations of ruff. However, published connectivity distances for wintering Icelandic greylag goose is 15-20 km, making connectivity with the site unlikely (SNH 2016)²². Nonetheless, wintering Icelandic greylag goose have been included as a sensitive VOR of International importance to ensure any potentially significant effect is given due consideration. Published connectivity distances for whooper swan are less than 5 km, and therefore, even taking a precautionary approach, there is no connectivity between the site and the Caithness Lochs SPA for this species.
- 5.6.53 Neither Greenland white-fronted goose or ruff were recorded during any surveys at the main site so are of Negligible importance and they are not considered further in this assessment.

Site Importance for VORs of International Importance

- 5.6.54 Wigeon, red-throated diver, black-throated diver, hen harrier, merlin, golden plover, dunlin and greenshank were all found to be breeding within the survey area during baseline surveys in 2018-2019, and golden eagle in the wider area. Therefore, the main site is considered to be of international importance for these species, which are considered to be of high sensitivity.
- 5.6.55 There was only a single record of short-eared owl during the 2018 and 2019 baseline surveys, with no confirmed breeding within 2 km of the main site. There has been no proven breeding of this species on the main site or survey area since surveys first began in 2003. Therefore, even though this species can sometimes be difficult to detect when breeding and under-recorded despite significant survey effort, it does appear that the main site and survey area are of very low value for short-eared owl. Despite the findings of the baseline surveys, however, short-eared owl has been treated as a highly sensitive receptor, with the site assigned national importance. This is because the number and distribution of breeding short-eared owl can fluctuate significantly between years and both SNH and the RSPB Scotland have raised the possibility of this species becoming attracted to the main site as a result of the proposed habitat improvement.
- 5.6.56 There was a single record of wood sandpiper within the survey area during 2018 and 2019 (a single bird flushed from a pool during breeding diver surveys in July 2018). RSPB Scotland raised wood sandpiper as a species requiring particularly careful consideration, in case there was scope for significant under-recording. Despite repeated and extensive surveys, and the birds being quite conspicuous at certain times of year, there are very few records of this species since surveys began in 2003. Prior to this recent baseline, there have been a total of five records; single birds in 2003, 2010, 2012 and 2014, and a pair alarm-calling in 2011. Despite indications of territorial behaviour (display and alarm calls), it is considered unlikely that any of these records relate to breeding birds because this species is very vocal and wide-ranging when defending nest or young and it is known

to display on migration and when prospecting potential nest sites. Wood sandpiper is a rare breeding bird in the UK, with an estimated 11-27 pairs (Musgrove *et al.* 2013³⁴) and the adjacent SPA is estimated to support up to 40% of the UK population. Despite the few records and lack of breeding records within the main site and survey area, there is suitable habitat for this species to breed and it is therefore possible it could breed within the main site during the operational life of the Proposed Varied Development. Therefore, this species has been treated as a highly sensitive receptor, with the site assigned National importance.

- 5.6.57 There were no observations of common scoter on or over the main site or survey area during the 2018 and 2019 baseline surveys. RSPB Scotland raised common scoter as a species requiring particularly careful consideration, also as it considered there was scope for significant under-recording. To assist with this assessment, RSPB and SNH provided data on breeding distribution. This was considered in tandem with the 2018 and 2019 survey findings, and survey results from Strathy South, Strathy North and Strathy Wood wind farms. Common scoter has only been recorded three times in total over 16 years across the combination of these wind farm sites. No breeding common scoter have been recorded breeding within 2 km of the main site, Strathy North wind farm or Strathy Wood wind farm over this period. Therefore, the main site is considered as of Negligible importance for this qualifying feature.
- 5.6.58 There were no observations of Arctic skua using the main site or survey area during the 2018 and 2019 baseline surveys. The species had not been recorded over 16 years across the combination of Strathy South, Strathy North and Strathy Wood wind farms. Therefore, the main site is considered as of Negligible importance for this qualifying feature.
- 5.6.59 Greylag goose was proven to breed within the survey area during the 2018 and 2019 baseline surveys, for the first time since surveys began in 2003. However, the conservation value of this breeding population within the Caithness and Sutherland Peatlands Ramsar site has been assessed in terms of its current breeding population, rather than the designated 1999 population (numbering 30 breeding pairs). There has been a large increase in number of greylag goose breeding in northern Scotland in recent decades (numbering 10,000 pairs in 1997 and 34,500 in 2008-9)³³. The Ramsar designated population is a legacy of a time when the north Scotland population numbered low hundreds and represented the entire British population of 'native' greylag goose. In light of the substantial increase in numbers, the Ramsar-designated population of 30 pairs is somewhat obsolete in terms of representing a population of conservation value. Another issue is that greylag goose breeding in northern Scotland can no longer be regarded with confidence as forming the remnant 'native' population (which used to be found across Britain). Research indicates that the north Scotland population is no longer distinct from the 'feral' greylag population, which has arisen primarily from introductions by wildfowling between the 1930s and 1960s. Both populations have increased in number and distribution, and resultantly where they mix it is impractical to make a distinction (Mitchell *et al.* 2012)⁵². Despite these circumstances, however, greylag goose has not been de-selected from the Ramsar citation of designated features and site condition monitoring for the feature has been undertaken as recently as June 2018 (Favourable Maintained). In light of this, the assessment in this chapter takes a precautionary approach and treats breeding greylag goose as highly sensitive VOR of International importance.
- 5.6.60 There is a low probability of site connectivity with qualifying features of the Caithness Lochs SPA. The site is not used for roosting or foraging by large aggregations of greylag goose and therefore appears to be of limited value for the designated population. However, as there were 41 flights over the main site and the concomitant collision risk makes an assessment of effects on this species prudent. A large proportion of flights were of birds over-flying the site in late April to early May (44% of flights and 68% of individuals were in the period 19/04 to 10/05 each year), indicating that a substantial proportion of these are likely to be Icelandic birds on migration. Therefore, if these

⁵² Mitchell, C., Hearn, R. and Stroud, D. (2012) The Merging Populations of Greylag Geese Breeding in Britain. *British Birds* 105: 498-505.

migrating Icelandic geese are placed in the context of the Caithness Lochs SPA (there are no data available for Caithness and Sutherland Peatlands NHZ) the number of birds moving through late April to early May (194 in 2018 and 151 in 2019) would represent an average 2% of the SPA population of 8,730 individuals. Therefore, the main site is valued as medium sensitivity for Icelandic greylag goose (of Regional importance).

- 5.6.61 The list of VORs of International importance and associated site value of importance is presented in Table 5.22.

Table 5.22: Identification of VORs: Populations of International Importance; SPA/Ramsar Qualifying Features with Connectivity to the Main Site				
Species (VOR)	VOR Level of Importance	Reason for VOR Level of Importance	Site Level of Importance	Rationale for Site Level of Importance¹
Greylag goose (breeding)	International	Ramsar: designated feature	International	Although breeds on-site, conservation status of the breeding population North Scotland greylag goose has changed markedly since Ramsar designation and now is part of a much larger breeding population.
Greylag goose (non-breeding)	International	SPA feature (Caithness Lochs SPA)	Regional	Although the SPA is beyond published connectivity distances, flights over the main site during the non-breeding season may indicate connectivity.
Wigeon	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within survey area. Regularly uses main site.
Teal	International	Ramsar: Assemblage feature	National	Ramsar population of national importance. Breeds on-site. Regularly uses main site.
Common scoter	International	SPA feature & Ramsar: Assemblage feature	Negligible	Not recorded on-site/survey area.
Red-throated diver	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within survey area. Has previously bred on-site. Regularly uses main site. Main site within core range of SPA/Ramsar breeding population.
Black-throated diver	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within survey area. Regularly uses main site. Main site within core range of SPA/Ramsar breeding population.
Golden eagle	International	SPA feature & Ramsar nationally important feature	International	Breeding confirmed at location where site is within core range of SPA/Ramsar breeding population. Suitability of site and surroundings for golden eagle foraging is however low based on Golden Eagle Topographic (GET) model and levels of flight activity.
Hen harrier	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within survey area. Regularly uses main site. Main site within core range of SPA/Ramsar breeding population.

Table 5.22: Identification of VORs: Populations of International Importance; SPA/Ramsar Qualifying Features with Connectivity to the Main Site

Species (VOR)	VOR Level of Importance	Reason for VOR Level of Importance	Site Level of Importance	Rationale for Site Level of Importance ¹
Merlin	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within site and survey area. Regularly uses main site. Main site within core range of SPA/Ramsar breeding population
Golden plover	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within site and survey area. Regularly uses main site. Main site within core range of SPA/Ramsar breeding population
Dunlin	International	SPA qualifying feature and Ramsar: Designated feature	International	Breeding confirmed within main site and survey area. Regularly uses main site. Site within core range of SPA/Ramsar breeding population
Wood sandpiper	International	SPA feature & Ramsar: Assemblage feature	National	Recorded very rarely on-site/survey area. Breeding never proven but suitable habitat
Greenshank	International	SPA feature & Ramsar: Assemblage feature	International	Breeding confirmed within main site and survey area. Regularly uses main site. Main site within core range of SPA/Ramsar breeding population
Curlew	International	Ramsar: Assemblage feature	National	Single territory in both 2018 and 2019. Main site marginal for Ramsar population.
Arctic skua	International	Ramsar nationally important feature	Negligible	Not recorded.
Short-eared owl	International	SPA feature & Ramsar nationally important feature	National	Rarely recorded on-site/survey area. High probability that SPA breeding population core range will include the main site, at least sporadically.
¹ Site importance selection criteria; 1) SPA qualifying feature which breeds on-site (including survey area) = International importance 2) Ramsar: Designated feature which breeds on-site (including survey area) = International importance 3) Ramsar: Assemblage feature which breeds on-site (including survey area) = National importance 4) SPA/Ramsar species regularly using site during breeding season (including survey area) = International importance 5) SPA/Ramsar absent from site = Negligible importance				

Valued Ornithological Receptors of National Importance

5.6.62 All SSSI-qualifying bird species and Schedule I bird species are VORs of national importance. As the Lochan Buidhe Mires, Skelpick Peatlands, Strathy Bogs and West Halladale SSIs all border the site and overlap the survey areas, all species have potential connectivity with the Proposed Varied Development.

- 5.6.63 The majority of SSSI ornithological features are also features of the SPA/Ramsar and their valuation as sensitive species is described in VORs of International Importance and listed in Table 5.23. Peregrine is the only SSSI qualifying species that is not also SPA/Ramsar qualifying.

Site Importance for Valued Ornithological Receptors of National Importance

- 5.6.64 The results from the 2018 and 2019 surveys show that peregrine very rarely used the main site, with only a single record during VP surveys. However, given the proximity of the SSSI, the main site is considered of medium sensitivity for this species (Regional importance).
- 5.6.65 Osprey did not breed on the main site and whilst there were signs that osprey may have bred off-site nearby, flights were still only recorded very infrequently over the 2018 and 2019 survey period. The species is sensitive to turbine collision and is scarce in a regional context (NHZ population of eight pairs). Therefore, any effects from turbine collision would possibly have an effect at a regional population level and therefore the main site is considered of medium sensitivity for these species (regional importance).
- 5.6.66 White-tailed eagle did not breed on site nor were there signs of breeding activity within at least 6 km of outer turbines. Flight activity was infrequent, particularly in 2019. In light of this, and the main site's distance from the coast and its lack of suitable foraging or nesting habitat, the site is of considered of medium sensitivity for this wide-ranging species (regional importance). The removal of the Strathy South conifer plantation as part of the HMP would reduce the site's importance for this species even further, as this clearance progressed through construction and early years of the Proposed Varied Development's operational life. As the white-tailed eagle population grows and extends its range across the UK, the relative importance of any non-breeding site where birds are recorded will also progressively diminish.
- 5.6.67 Over 2018 and 2019, there were indications that barn owl may breed either on-site or within the survey area (or at least uses the site regularly). This Schedule 1 species is potentially sensitive to the effects of disturbance and the main site is therefore considered of medium sensitivity for these species (regional importance).
- 5.6.68 Red kite and whimbrel are Schedule 1 species where records on-site comprise a wandering individual (red kite; one record) and scarce passage birds (whimbrel; one record of two birds over-flying the main site). Therefore, the main site is considered of low sensitivity (Negligible importance) for these species, based on the survey data.

Table 5.23: Identification of VOR: Populations of National Importance; SSSI features and Schedule I Species (which are not also features of SPA/Ramsar sites)

Species (VOR)	VOR Level of Importance	Reason for VOR Level of Importance	Site Level of Importance	Rationale for Site Level of Importance
Osprey	National	Schedule I	Regional	Sightings of birds hunting over main site and carrying prey indicated likelihood of breeding effort nearby (off-site).
White-tailed eagle	National	Schedule I	Regional	Absence of any breeding activity on site or within at least 6 km around the site underlines lack of site importance for this species. Flight activity infrequent in 2018 and more so in 2019. Sightings mainly non-adult individuals that form part of the wide-ranging non-breeding Scotland/UK population, with no affinity to the site itself.

Table 5.23: Identification of VOR: Populations of National Importance; SSSI features and Schedule I Species (which are not also features of SPA/Ramsar sites)

Species (VOR)	VOR Level of Importance	Reason for VOR Level of Importance	Site Level of Importance	Rationale for Site Level of Importance
Peregrine	National	SSSI feature and Schedule I	Regional	Despite proximity of SSSI, peregrine rarely observed using main site and survey area (one record 2018-19).
Barn owl	National	Schedule I	Regional	Possibly breeding.
Red kite	National	Schedule I	Negligible	Non-breeding visitor (1 individual).
Whimbrel	National	Schedule I	Negligible	Non-breeding passage migrant, recorded in negligible numbers.

Valued Ornithological Receptors of Regional Importance

- 5.6.69 The distances between the main site and any SPA for whooper swan and pink-footed goose is beyond the range where connectivity is likely. The nearest SPA for pink-footed goose is the Moray and Nairn Coast SPA, c.85 km southwest of the main site.
- 5.6.70 However, whooper swan and pink-footed goose have both been identified for inclusion in the CRM due to the number of transits over the main site, including within the PCZ. Therefore, this assessment has adopted the same precautionary approach as described above for Icelandic greylag goose in VORs of International Importance.
- 5.6.71 All flights of whooper swan were in March-April (spring migration) and September to November (autumn migration) over the 2018 to 2019 survey period. The largest number in any migrating season was 86 (autumn 2018). This is 45% of the NHZ population (190 individuals) and 36% of the qualifying population of the Caithness Lochs SPA (240 individuals). Whooper swan were not observed to use the main site for roosting or foraging and the observed numbers involve migrating birds passing over (rather than regularly commuting birds moving between roost areas and feeding areas). Therefore, a precautionary and appropriate approach would be to value the main site as of Regional importance and medium sensitivity for whooper swan.
- 5.6.72 All flights of pink-footed goose occurred yearly between 19/04 and early 10/05 (spring migration) and between the 16/09 and 18/10 (autumn migration) over the 2018 to 2019 survey period. The largest number in any migrating season was 2,543 (spring 2018). This total exceeds the NHZ total (2,070 individuals), and over 1% of the estimated winter population of Scotland (200,000 individuals, Forrester *et al.* (2007)³³. Therefore, a significant number of pink-footed goose passed over the main site, although a pragmatic approach is required to ascribing value. The pink-footed geese were not observed to use the site for roosting or foraging and the observed numbers involve migrating birds passing over (rather than regularly commuting birds moving between roost areas and feeding areas). Therefore, to ascribe national or international value on the basis of numbers alone would exaggerate the importance of the main site, so a site value of Regional importance and medium sensitivity was considered appropriate for pink-footed goose.

Potential Valued Ornithological Receptors Not Assessed/Scoped-out

- 5.6.73 In accordance with convention and SNH Guidance, passerine species, which are typically semi-migratory and therefore only present during the breeding season, were not assessed for the Proposed Varied Development. This group of birds (which includes crossbill, a VOR of National importance due to its Schedule 1 status) is not considered susceptible to effects of wind farm development. Passerines are typically common breeding bird present throughout the main site's conifer plantation and are ascribed a low sensitivity. The Bird Protection and Mitigation Plan, as part of the CEMP, and the deployment of an ornithologist and ECoW are measures proposed to

mitigate disturbance and nest impacts on these species, through pre-felling and pre-construction breeding bird checks.

- 5.6.74 This assessment screens-out several species which are considered of low sensitivity and not requiring further assessment, being screened-out: -
- Screened-out by 2007 ES, with this assessment following same approach (BoCC rating based on current iteration, BoCC4): twite (Red-listed), red grouse, kestrel, bullfinch, lesser redpoll (Amber-listed), buzzard, common crossbill (Green-listed);
 - Amber-listed species recorded 2018-19: mallard, goldeneye, common sandpiper, snipe, common gull, tawny owl, willow warbler and meadow pipit;
 - Green-listed species recorded 2018-19: tufted duck red-breasted merganser, cormorant, little grebe, sparrowhawk and ringed plover.

5.7 Predicted Significant Effects

The following section discusses potentially significant effects of the Proposed Varied Development on the VORs identified by the 2018-19 baseline surveys. These predicted effects, their duration, magnitude and significance are detailed below for the construction, operational and decommissioning phases of the Proposed Varied Development, and are considered cumulatively with the developments in Strathy glen and more widely, for the Caithness and Sutherland Peatlands SPA/Ramsar site.

- 5.7.1 The predicted significant effects of the Proposed Varied Development are comparable to those identified for the Consented Scheme, both in terms of magnitude of change and significance of effect. These are:
- the effect on VORs of displacement from habitat within the main site as a result of construction (temporary and permanent);
 - construction disturbance to VORs, albeit with one location where a potential source of construction disturbance would be present outside the areas considered for the Consented Scheme, namely for the up-grading of the Yellow Bog track;
 - operational disturbance; and,
 - collision risk once the turbines were operational, as a result of flights across the main site, following clearance of the conifer plantation and restoration of habitats on-site.

Predicted Construction Effects

- 5.7.2 Table 5.24 summarises these predicted effects on VORs from construction of the Proposed Varied Development.

Table 5.24: Summary of Predicted Significant Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Construction	
VOR	Predicted Significant Effects of Proposed Varied Development
Whooper swan	Site is of Regional Importance (medium sensitivity). Site is not used by foraging or roosting whooper swan so no effects from disturbance predicted. Therefore Negligible magnitude of change and Minor significance (not significant) predicted.
Pink-footed goose	Site is of Regional Importance (medium sensitivity). Site is not used by foraging or roosting pink-footed geese so no effects from disturbance predicted. Therefore Negligible magnitude of change and Minor significance (not significant) predicted.
Greylag goose (breeding)	Breeding proven in 2018-19 and site is of International Importance (high sensitivity). Breeding activity on waterbodies >500 m from construction activity. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted.

Table 5.24: Summary of Predicted Significant Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Construction

VOR	Predicted Significant Effects of Proposed Varied Development
Icelandic Greylag goose (non-breeding)	Site is of Regional Importance (medium sensitivity). 2018-19 surveys show no significant change in distribution/activity in relation to site. Site not used by foraging or roosting greylag goose and therefore of low sensitivity with respect to disturbance. Therefore Negligible magnitude of change and Minor significance (not significant) predicted.
Wigeon	Breeding proven in 2018-19 and site is of International Importance (high sensitivity). Breeding activity on waterbodies >500 m from construction activity. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted.
Teal	Breeding proven in 2018-19 and site is of National Importance (high sensitivity). Breeding activity on waterbodies >500 m from construction activity. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted.
Common scoter	Not recorded during 2018-19 surveys and not breeding on site or survey area. Site is of No Importance (low sensitivity). Therefore No magnitude of change and Minor/none significance (not significant) predicted.
Red-throated diver	Breeding proven in 2018-19 and site is of International Importance (high sensitivity). 2018-19 surveys show no significant change in breeding distribution/activity in relation to site. Breeding activity on waterbodies >500 m from construction activity. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted (when prescribed mitigation implemented).
Black-throated diver	Breeding proven in 2018-19 and site is of International Importance (high sensitivity). 2018-19 surveys show no significant change in breeding distribution/activity in relation to the site. Breeding activity on waterbodies >500 m from construction activity. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted (when prescribed mitigation implemented).
Osprey	Site of Regional Importance (medium sensitivity). Birds observed during 2018-19 were not breeding within 2 km of site. Lochs where birds observed foraging >1 km from construction. Therefore of medium sensitivity with respect to disturbance and Negligible magnitude of change and Minor significance (not significant) predicted.
White-tailed eagle	Site is of Regional Importance (medium sensitivity). Birds observed during 2018-19 were not breeding within 6 km of site with infrequent flight activity on site. Therefore of medium sensitivity with respect to disturbance and Negligible magnitude of change and Minor significance (not significant) predicted.
Golden eagle	Breeding proven in 2018-19 and site is of International Importance (high sensitivity). Nearest nest location is same as used during previous assessments (c. 3 km from nearest turbine). 2018-19 surveys show no significant change in breeding distribution/activity in relation to site and consequently disturbance to foraging eagles is anticipated to be negligible. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted.
Hen harrier	Site is of International Importance (high sensitivity). Not found to breed within site (core survey area) during 2018-19. Remains a possibility of birds nesting within site during construction. When mitigation implemented, there is potential for Slight magnitude of change and Moderate significance (not significant) predicted.
Peregrine	Site is of Regional Importance (medium sensitivity). Not breeding within 2 km of site. Therefore of low sensitivity with respect to disturbance and Negligible magnitude of change and Minor significance (not significant) predicted.
Merlin	Site is of International Importance (high sensitivity). Evidence of tree-nesting merlin breeding during 2018-19 surveys (in trees to be felled). Therefore, there is a possibility of disturbance to nesting birds during construction. When mitigation implemented, slight magnitude of change and Moderate significance (not significant) predicted.

Table 5.24: Summary of Predicted Significant Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Construction

VOR	Predicted Significant Effects of Proposed Varied Development
	Note that this assessment is for disturbance to an ongoing breeding attempt; the tree nest location(s) would be lost as a result of construction (felling).
Golden plover	Site is of International Importance (high sensitivity). 2018-19 surveys show no territories within site but 1-2 breeding territories within 500 m of proposed outer turbine locations. Therefore potential disturbance to breeding birds during construction. When mitigation implemented, slight magnitude of change and Moderate significance (not significant) predicted.
Dunlin	Site is of International Importance (high sensitivity). 2018-19 surveys show no territories within site but up to 4 breeding territories within 500 m of proposed turbine locations. Therefore potential disturbance to breeding birds during construction. When mitigation implemented, slight magnitude of change and Moderate significance (not significant) predicted.
Wood sandpiper	Site is of National Importance (high sensitivity). Single incidental record during 2018-19 surveys and not breeding on site or survey area. Therefore Negligible magnitude of change and Moderate/minor significance (not significant) predicted.
Greenshank	Site is of International Importance (high sensitivity). 2018-19 surveys show 1-2 territories within site and 3-4 breeding territories within 500 m of proposed turbine locations. Therefore potential disturbance to breeding birds during construction. When mitigation implemented, slight magnitude of change and Moderate significance (not significant) predicted.
Curlew	Site is of National Importance (high sensitivity). All territories (2 in 2018, 1 in 2019) within wader survey buffer at distance >500 m from site boundary and >1 km from proposed turbines. Therefore, effects from disturbance predicted as Negligible magnitude of change and Moderate/minor significance (not significant).
Arctic skua	Not recorded during 2018-19 surveys and not breeding on-site or within survey area. Site is of No Importance (low sensitivity). Therefore No magnitude of change and Minor/none significance (not significant) predicted.
Short-eared owl	Site is of National Importance (high sensitivity). Not confirmed breeding on site or survey area during 2018-19 surveys or any previous surveys. Therefore, effects from disturbance predicted as Negligible magnitude of change and Moderate/minor significance (not significant). Pre-construction mitigation will ensure species.
Barn owl	Site is of Regional Importance (medium sensitivity). Breeding not proven but possible. Site was at least used by roosting birds in baseline 2018-19. Potential for disturbance during construction, to be mitigated by pre-construction surveys. When mitigation implemented, Negligible magnitude of change and Minor significance (not significant) predicted.

- 5.7.3 The construction activity associated with the Proposed Varied Development would not cause significantly greater disturbance effects than the Consented Scheme (in the form of construction noise, traffic movement, vibration, dust and visual disturbance), since the only notable difference is activity at the Yellow Bog track. Given the visual screening provided by the existing bunds, embankments and natural topography, and the limited number of breeding VORs within 500 m of the Yellow Bog track, the assessment of predicted effects on the 2018-2019 baseline bird interest to the north and south of the track concluded construction activity would not cause more disturbance to avian receptors than have previously been assessed for the Consented Scheme.
- 5.7.4 The potential negative effect on VORs from construction is disturbance to Annex 1 or Schedule 1 breeding birds or damage to any birds' active nests. Legislation is in place that makes such disturbance an offence, and therefore the measures necessary to prevent such disturbance effects are categorised as embedded mitigation, since they are standard practice to enable compliance

with wildlife legislation. Under these circumstances, it is not considered appropriate to complete the assessment of disturbance effects without such embedded mitigation measures being in place.

- 5.7.5 The embedded mitigation measures to avoid disturbance effects on VORs are also referred to in more detail in Section 5.8 of this Chapter. In summary however, they are:
- where feasible to do so, complete vegetation clearance/forest felling outside the bird breeding season, particularly in areas of known sensitivity for breeding birds.
 - where this is not feasible, prior to the bird breeding season, where appropriate to do so, implement measures to discourage birds nesting in areas to be cleared for construction.
 - completing pre-construction breeding bird checks ahead of vegetation clearance/forest felling, and if nests are located, put in place effective buffers (depending on lines of sight and species) to prevent disturbance and/or nest damage (in the case of Annex 1/Schedule 1 species) or damage to active nests (in the case of other species).
 - implement other targeted species-specific measures such as for red-throated diver, involving traffic management measures (e.g. no sounding of horns) along the common access route in proximity to sensitive locations).
 - deployment of an ECoW to support implementation of disturbance buffers, including providing toolbox talks to site staff, to prevent disturbance to Annex 1 or Schedule 1 species, and damage to active nests.
- 5.7.6 The following assessments of the construction effects of the Proposed Varied Development against the 2018-2019 baseline therefore incorporate consideration of these measures.
- 5.7.7 With the exception of breeding merlin, the distribution of breeding raptors and divers in relation to the site remains similar to the baseline for the Consented Scheme. Therefore, the mitigation for the Proposed Varied Development summarised above and outlined in Section 5.8 is sufficient to predict that the magnitude of change would be **slight** (for hen harrier) or **negligible** for other raptors. In combination with the high sensitivity of these species, the predicted effects would be **moderate** (for hen harrier) or **moderate/minor** for raptors and divers and **not significant**.
- 5.7.8 For merlin, the 2018 and 2019 surveys indicate that there is one merlin territory within the plantation woodland of the main site. Therefore, the potential for disturbance to breeding merlin is of **moderate** magnitude. Application of the committed mitigation measures, in particular pre-construction nest-check, tree felling and construction outside the breeding season and the retention of trees for screening and nest protection are deemed sufficient to conclude that the likelihood of disturbance during construction would be **slight**. In combination with the high sensitivity of this species, the predicted effects would be **moderate** and **not significant**.
- 5.7.9 Short-eared owl was recorded only once in 2018-2019, but nesting is unpredictable compared to other raptors, and this species' population and distribution can vary markedly between years. It could therefore conceivably be breeding in locations where construction disturbance would cause impacts. This would, however, be mitigated by pre-construction surveys followed by appropriate exclusion zones if occupied territories are encountered (as described above in place through the Bird Protection and Mitigation Plan, as part of the CEMP). Therefore, with these mitigation measures in place, disturbance effects during construction would be of **negligible magnitude** and for high-sensitivity short-eared owl of **moderate/minor significance** and **not significant**.
- 5.7.10 Barn owl were recorded roosting (possibly breeding) on-site in 2018-19. There is no construction activity intended in proximity to this location, and with the Bird Protection and Mitigation Plan mitigation measures in place, disturbance effects during construction would be of **negligible magnitude** for the moderate-sensitivity barn owl of **minor significance**. The resulting effect would be **not significant**.
- 5.7.11 For breeding waders (golden plover, dunlin and greenshank) there is potential for **slight** magnitude of change from the Proposed Varied Development from disturbance during construction.

Territories of these waders are within 500 m of proposed turbine locations in 2018-19 (numbered 1-2 for golden plover, up to 4 for dunlin and 3-4 for greenshank). Detailed mitigation outlined in the Bird Protection and Mitigation Plan (produced for the Consented Scheme would be adopted for the Proposed Varied Development) would mitigate disturbance effects for these species and therefore a slight magnitude of change is a highly precautionary assessment. In combination with the high sensitivity of these species the significance of this magnitude of change would be **moderate** and **not significant**.

- 5.7.12 Greylag goose (breeding), wigeon and teal were confirmed as breeding within the survey area from observations of nesting birds, broods or adults exhibiting distraction behaviour. All of these observations were on lochs greater than 500 m from any proposed construction and it is therefore concluded that the magnitude of change would be **negligible**. In combination with the high or medium sensitivity of these species, the predicted effects would be **moderate/minor** for wigeon and teal) and **minor** for greylag goose and **not significant**.
- 5.7.13 As a precautionary measure, the site has been classed as regionally important for whooper swan, pink-footed goose and Icelandic greylag goose (non-breeding) (medium sensitivity). All these species were recorded in transit over the site and therefore the magnitude of change would be **negligible**. In combination with the medium sensitivity of these species, the predicted effects during construction would be **minor** and **not significant**.
- 5.7.14 The remaining species assessed (common scoter, osprey, white-tailed eagle, peregrine, wood sandpiper, curlew) all showed very little or no activity within the zone of disturbance potential. Therefore, disturbance effects during construction are predicted to be of **negligible magnitude** and **not significant** for these VORs.
- 5.7.15 Overall, therefore, no significant effects have been predicted from the construction phase of the Proposed Varied Development, provided the same mitigation as the Consented Scheme is implemented (Table 5.24). This would be put in place through the measures summarised above and referred to in Section 5.8.

Predicted Operational Effects

- 5.7.16 Tables 5.24 and 5.25 summarise the predicted effects on VORs from the operational phase of the Proposed Varied Development.
- 5.7.17 The taller turbines and longer rotor blades proposed are the most significant change when compared to the Consented Scheme in relation to VORs as noted in paragraph 5.2.6. The effects that could potentially differ in magnitude and significance but mainly relate to operational displacement and modelled mortality through turbine collision.
- 5.7.18 These potential effects are discussed below, with the magnitude and significance of predicted effects summarised in Tables 5.26 and 5.27. A comparison of predicted effects of the Proposed Varied Development and the Consented Scheme is presented in Section 5.10.

Displacement Effects

POSSIBLE DISPLACEMENT EFFECTS ON BREEDING RAPTORS

- 5.7.19 From the 2018-19 baseline surveys, there are three species of raptor breeding (or possibly breeding) either on the main site (merlin), within the Strathy South raptor survey area (hen harrier), or within a 6 km core territory (in the case of golden eagle). These species are all SPA qualifying features and are therefore treated as high sensitivity receptors in the following assessment.

MERLIN

- 5.7.20 Merlin were considered to be nesting within the Strathy South conifer plantation in both 2018 and 2019, indicated by regularly used plucking sites (with freshly plucked avian prey and fresh pellets).

Although a precise nest location was not confirmed, the evidence from pluck sites is sufficient to confirm possible breeding (Hardey *et al.* 2013²⁹) and it is assumed that the birds nested in an unused crow nest along the plantation edge.

- 5.7.21 Studies of merlin territory and nest site fidelity show a dynamic picture. Territory occupancy can be highly variable, with occupancy ranging between 40% and 60% (Newton *et al.* 1978)⁵³. However, Bibby (1986)⁵⁴ argues that fidelity to territory can be much stronger, with some sites extremely attractive and used continuously, with others known to be used only once. Bibby provides evidence that fidelity to particular territories is related to habitat quality and breeding success. In a detailed study, Wright (2003)⁵⁵ showed that individual birds show great variation in territory selection, often choosing different territories between years (so continually occupied territories may well involve different birds in consecutive years). Wright also states that individual territories contain a number of alternative nesting sites (which may sometimes be used simultaneously, showing that territorial boundaries are somewhat fluid). Rebecca *et al.* (1992)⁵⁶ also found that merlin have alternative nest sites within a single territory, with alternative nest locations up to 3.5 km apart. Although this was at a site where numbers were artificially low due to illegal persecution and therefore these nest locations may be used by neighbouring territorial birds at higher population densities. The same study also found that merlin using old crow nests were more likely to re-use the nests in subsequent years than ground nesting merlin re-using the same nest scrapes. However, Hardey *et al.* (2013)²⁹ states that re-use of crow nests located in Sitka spruce is less likely than in broadleaved trees or Scot's pine.
- 5.7.22 Therefore, the importance of a particular nest location over the long-term is complex, with various factors such as territory density having an influence. However, merlin evidently show less fidelity to specific territories or nest locations than some other raptor species. Importantly, territories are likely to contain a number of potential nest sites, so the loss of the nest location(s) used in 2018-19 does not necessarily mean that merlin would be displaced from the territory or the wider area. This is particularly the case when it is considered that merlin are by no means obligate tree-nesting species. In fact, nesting in thicket-stage commercial conifer plantations is a relatively recent behaviour, and most frequent in certain regions such as southwest Scotland (Rebecca 2011)⁵⁷. A review of nest selection during the National Merlin Survey 1993-4 found that ground-nesting is by far the most frequent behaviour (66% of nests in the Northwest Highlands and Outer Hebrides were on the ground, compared to 14% tree nests, of which only 1% were in commercial conifer locations (Rebecca (2011)⁵⁷). Hardey *et al.* (2013)²⁹ states that merlin using the same territory will alternate between tree nests and ground nests between seasons.
- 5.7.23 In conclusion, the loss of the nest location and felling of trees would not necessarily lead to displacement of breeding merlin from the territory within the main site. There are potential alternative nest sites on the ground or using boulders/rock faces that would be available post-felling and the evidence is that merlin will readily use a range of such nest locations within a territory across different breeding seasons.
- 5.7.24 Therefore, aside from the removal of the conifer plantation, the next consideration is whether breeding merlin would be deterred from using the territory by the Proposed Varied Development. Despite being a well-studied species, there is little published information on merlin response to disturbance (Ruddock and Whitfield 2007²³), although the authors cite examples of birds both deserting breeding sites in response to disturbance and habituating readily to human activity.

⁵³ Newton, I., Meek, E.R. and Little, B. (1978) Breeding Ecology of Merlin in Northumberland. *British Birds* 71: 376-398.

⁵⁴ Bibby, C.J. & Natrass, M. (1986) Breeding Status of Merlin in Britain. *British Birds* 79: 170-185.

⁵⁵ Wright, P.M. (2003) Recruitment, Site Fidelity and Dispersal of Merlins *Falco columbarius* from the Southeast Yorkshire Dales, England'. *Ringling & Migration*. 21:227-233.

⁵⁶ Rebecca, G.W., Cosnette, B.L., Hardey, J.J.C. and Payne, A.G. (1992) Status, Distribution and Breeding Biology of the Merlin in North-East Scotland, 1980-1989. *Scottish Birds*. 16:165-183.

⁵⁷ Rebecca, G.W. (2011) Spatial and Habitat Related Influences on the Breeding Performance of Merlins in Britain. *British Birds* 104(4): 202-216.

Based on expert opinion and available evidence however, the authors indicate a 500 m buffer as sufficient to prevent disturbance to nesting merlin. Published information on merlin response to operational wind farms is also lacking, although there are several examples of merlin continuing to occupy breeding territories in close proximity to constructed wind farms in Scotland, for example at Blacklaw wind farm.

- 5.7.25 The location of the pluck-sites was greater than 500 m from any proposed infrastructure and is within the proposed northwest habitat corridor within the main site. Therefore, if this is taken as the centre of the territory, operational disturbance through the life of the Proposed Varied Development should be minimal.
- 5.7.26 In summary, although it is assumed that the felling of plantation woodland would result in the loss of a nesting location, there is evidence that suggests a nest location is in itself of limited importance for the ongoing viability of a merlin territory. Even in undisturbed circumstances, merlin regularly change territory between seasons and are more likely than not to use alternative nest locations within a territory between seasons.
- 5.7.27 The distance between the territory and the Proposed Varied Development, at over 500 m, is such that there is a strong likelihood that birds would continue with territory occupancy and be tolerant of the operational Proposed Varied Development. Indeed, there would be considerably more open ground, favoured by hunting merlin, within the core range of the breeding birds.
- 5.7.28 The assumed territory, within the main site, is outside the SPA. The SPA designated population is 54 breeding pairs, (4% of GB population, as estimated 1993 and 1994), although there was an average of just 11 pairs of within the SPA in 2000s (Stroud *et al.* 2016)³⁹. If merlin were displaced by the Proposed Varied Development then it is most likely they would move territory on to the adjacent SPA, as there is clearly capacity for a higher density of territories when the recent average is compared to the designated population. However, as a worse-case scenario, the loss of a single territory of merlin would represent 1.85% of the SPA population.
- 5.7.29 Therefore, the effect of potential displacement of merlin as a result of the Proposed Varied Development is considered to lead to a **slight magnitude of change**, which for a high sensitivity receptor, is of **moderate significance** and **not significant**.

HEN HARRIER

- 5.7.30 Breeding by hen harrier in 2018 and 2019 was within 1 km of the site. Several studies indicate displacement of nesting hen harriers due to wind farms is of the magnitude of 200-300 m from turbine locations (reviewed in WINDHARRIER 2015)⁵⁸. Equally, key studies also show that both breeding and foraging hen harrier (particularly the latter) show no sign of displacement due to wind farms (Madders and Whitfield (2006)⁵⁹, Haworth (2012)⁶⁰). Taking a highly precautionary view therefore, there is potential that hen harrier could be displaced from possible nest sites due to the presence of the Proposed Varied Development, as the location falls within the 750 m disturbance buffer identified for this species by Ruddock and Whitfield (2007)²³. As a result, there is predicted to be a **slight magnitude of change**, resulting in an effect of **Moderate significance** for a high sensitivity receptor that is predicted for disturbance/displacement during operation. This is **not significant**.

⁵⁸ WINDHARRIER. (2015) The Interactions Between Hen Harriers and Wind Turbines. WINDHARRIER Final Project Report. School of Biological, Earth and Environmental Sciences at University College Cork.

⁵⁹ Madders, M. and Whitfield, P. (2006) Upland Raptors and the Assessment of Wind Farm Impacts. Ibis 148:43-56.

⁶⁰ Haworth Conservation. (2012) A Review of the Impacts of Terrestrial Wind Farms on Breeding and Wintering Hen Harriers. Haworth Conservation.

GOLDEN EAGLE

- 5.7.31 A pair of golden eagles was proven breeding at distances of approximately 3 km from nearest proposed turbine. Of the two traditional nest sites identified during baseline surveys since 2003, this is the closest to the main site.
- 5.7.32 Recommended buffer distances for breeding UK golden eagle are 750-1,500 m (McGrady *et al.* 1997)⁶¹ and 900-1,100 m (Petty 1998)⁶². Therefore, it is predicted that the nesting golden eagle would not be subject to disturbance from the Proposed Varied Development.
- 5.7.33 Golden eagle displacement effects from wind farms have been relatively well studied. Walker *et al.* (2005)⁶³ showed golden eagle avoided former foraging areas in Kintyre when a wind farm was constructed. However, in this study it was again difficult to isolate the concurrent effects of land management (clear-felling of forestry and habitat creation for eagles in adjacent areas). More recently and more conclusively, however, significant insights have become available from satellite tagging of golden eagles in Scotland. These data demonstrate clearly that eagles avoid wind turbines almost exclusively, although they will occasionally traverse wind farm areas at height, above rotor swept height (Fielding *et al.* 2019)⁶⁴. The Golden Eagle Topography model, derived from satellite tagging data from juvenile eagles, also identifies the Strathly South site as being of relatively low suitability for use by golden eagle in flights.
- 5.7.34 Therefore, it is highly probable that the Proposed Varied Development would be avoided during operation. This is a favourable outcome with regard potential collision.
- 5.7.35 Exotic conifer plantations are also widely recognised as creating adverse conditions for territory-holding golden eagle. Initially this is due to a decrease in carrion availability within the territory, as deer and sheep become less available, followed by complete loss of foraging ground as the canopy closes.
- 5.7.36 Although the conifer plantation on-site has a relatively open structure (in terms of widely spaced rides and open areas, particularly around bog pool systems), the planted trees are beyond closed thicket-stage and offer no opportunities for hunting golden eagle.
- 5.7.37 Therefore, although breeding golden eagle are likely to show avoidance of the Proposed Varied Development, baseline data indicates that the area of the main site is rarely used by foraging birds in any case, in part due to the cover of post-thicket-stage conifer plantation but also due to topography being poorly suited to their requirements (as revealed by Golden Eagle Topography modelling). Therefore, the effect of displacement is predicted to be a **negligible magnitude of change**, resulting in an effect of **moderate/minor significance** for a high sensitivity receptor that is **not significant**.

POSSIBLE DISPLACEMENT EFFECTS ON BREEDING WADERS

- 5.7.38 During consultation for the Consented Scheme, SNH proposed a displacement buffer of 500 m around the proposed turbines as the distance across which breeding peatland waders of the Caithness and Sutherland Peatlands SPA may be displaced.
- 5.7.39 This assessment for the Proposed Varied Development has continued to use the 500 m buffer distance recommended by SNH to estimate potential impacts from displacement for breeding waders. On that basis the potential number and proportion of SPA population potentially

⁶¹ McGrady, M.J., McLeod, D.R.A., Petty, S.J., Grant, J.R. and Bainbridge, I.P. (1997) Research Information Note 292: Golden Eagles and Forestry. Surrey: Forestry Commission Research Agency.

⁶² Petty, S.J. (1998) Ecology and Conservation of Raptors in Forests. Forestry Commission Bulletin 118. HMSO. London.

⁶³ Walker, D., McGrady, M., McCluskie, A., Madders, M. and McLeod, D.R.A. (2005) Resident Golden Eagle Ranging Behaviour Before and After Construction of a Windfarm in Argyll. Scottish Birds. 25. p.24-40.

⁶⁴ Fielding, A.H., Haworth, P.H., Benn, S., Dennis, R., Weston, E., Grant, J., Etheridge, B. and Whitfield, D.P. (2019) Responses of Satellite Tagged Golden Eagles to Wind Farms in Scotland: Macro-avoidance Rather Than Risk of Collision'. Proceeding of the Conference on Wind Energy and Wildlife Impacts 27th-30th August, Stirling, Scotland.

displaced for waders found to have territories within 500 m of proposed turbine locations is presented in Table 5.25.

Table 5.25: Number of Breeding Waders within 500 m of Proposed Turbines, Potentially Displaced by Operational Effects						
Species	Territories within 500 m of Proposed Turbines			SPA Population (breeding pairs)	% SPA Population Potentially Displaced	Effect
	2018	2019	Peak 2018-2019			
Golden plover	1-2	1	2	1,064	0.09	Not expected to affect the feature/population, with no detectable decline in population. Therefore, effect of displacement is of Negligible magnitude of change which for a high sensitivity receptor is of Minor significance .
Dunlin	4	0	4	1,860	0.11	
Greenshank	4	3	4	653	0.30	

- 5.7.40 Golden plover are well studied as a species and in relation to wind farm effects, with some research concluding no effect (Whitfield *et al.* 2010⁶⁵, Douglas *et al.* 2011)⁶⁶, other studies concluding that golden plover actively avoid wind farms (Sansom *et al.* 2016)⁶⁷, and others detecting effects up to a distance of 500-800 m (Drewitt and Langston 2006)⁶⁸. Pearce-Higgins *et al.* (2009)⁶⁹ found significant reductions in densities of breeding golden plover in the vicinity of operational wind farms (by 38.9% within 500 m of turbine array). However, a later study by the same lead author (Douglas *et al.* 2011⁷⁰) found no difference in abundance or distribution as a result of an operational wind farm when compared to a control site.
- 5.7.41 Therefore, assessing a magnitude of change based on an assumption of total displacement up to 500 m is a highly precautionary approach. Despite this, the significance of effect predicted from the Proposed Varied Development, as reported in Table 5.25 above, would have a **negligible effect** on the viability of the SPA populations and would not be **significant**.

BENEFICIAL EFFECTS FOR BREEDING WADERS

- 5.7.42 The predicted adverse effects from displacement as a result of the Proposed Varied Development are predicted to be less than the gains which would be delivered from the Outline HMP (EIAR Volume 4: Technical Appendix 9.5). The removal of conifer plantation and reinstatement of blanket bog and associated habitats is predicted to be of benefit to SPA-qualifying waders, for the reasons outlined below.
- 5.7.43 There is evidence that moorland waders avoid the edges of conifer plantations. Stroud *et al.* (1990)⁷¹ found, at study sites mainly in Sutherland, that golden plover numbers declined at distances up to 400 m from forestry edge, with this effect over larger distances for dunlin. Greenshank showed the same trend, although this was not statistically significant. Wilson *et al.*

⁶⁵ Whitfield, D.P., Green, M. and Fielding, A.H. (2010) Are Breeding Eurasian Curlew *Numenius arquata* Displaced by Wind Energy Developments? Unpublished Report by Natural Research Projects Limited. Banchory, Scotland.

⁶⁶ Douglas, D.J.T., Bellamy, P.E. and Pearce-Higgins, J.W. (2011) Changes in the Abundance and Distribution of Upland Breeding Birds at an Operational Wind Farm. Bird Study. 58(1). p.37-43.

⁶⁷ Sansom, A., Evans, R. and Roos, S. (2016) Population and Future Range Modelling of Reintroduced Scottish White-Tailed Eagles (*Haliaeetus albicilla*). Scottish Natural Heritage Commissioned Report No. 898.

⁶⁸ Drewitt, A.L. and Langston, R.H.W. (2006) Assessing the Impacts of Wind Farms on Birds. Ibis 148: 29-42.

⁶⁹ Pearce-Higgins, J.W., Langston, S.L., Bainbridge, I.P. and Bullman, R. (2009) The Distribution of Breeding Birds Around Upland Wind Farms. Journal of Applied Ecology 46: 1323-1331.

⁷⁰ Douglas, D., Bellamy, P. and Pearce-Higgins, J. (2011) Changes in the Abundance and Distribution of Upland Breeding Birds at an Operational Wind Farm, Bird Study, 58:1, 37-43.

⁷¹ Stroud, D.A., Harding, N.J. and Reed, T.M. (1990) Do Moorland Breeding Waders Avoid Plantation Edges? Bird Study, 37:3, 177-186.

(2014)⁷² studied this edge-effect within the Caithness and Sutherland SPA (at Forsinard Flows) and found that proximity to conifer plantations had adverse impacts on breeding golden plover and dunlin (but not greenshank) over distances of up to 700 m. The authors also concluded that all three species strongly selected areas of flat, open ground with numerous bog pools and good condition blanket bog habitat. Therefore, conifer removal, sensitive placing of infrastructure to avoid bog pool systems and positive management of blanket bog within the proposed HMP areas would all contribute to provide significant benefit to breeding golden plover, dunlin and greenshank. The result of plantation removal and peatland restoration would be a positive **slight magnitude of change**, which for high sensitivity receptor would be a positive effect of **moderate significance** in terms of habitat improvement from the Proposed Varied Development. This is **not significant** as an effect in EIA terms but represents important habitat enhancement for these receptors of high sensitivity.

POSSIBLE DISPLACEMENT EFFECTS ON BREEDING DIVERS

- 5.7.44 Published guidance on disturbance distances for red-throated diver and black-throated diver (reviewed by Ruddock and Whitfield (2007)²³) give a preliminary figure of 300-900 m safe working distance from nests. Anecdotal evidence suggests that breeding red-throated diver can habituate to regular disturbance (such as road traffic) at short distances.
- 5.7.45 As the lochs regularly used by breeding divers during the 2018-19 baseline survey and across most of the earlier survey years are beyond 900 m from the nearest Proposed Varied Development turbine, it is predicted that disturbance and subsequent displacement effects would lead to **negligible magnitude of change**, which for a high sensitivity receptor would result in an effect of **Moderate/minor significance**. This is **not significant**.

POSSIBLE DISPLACEMENT EFFECTS ON OTHER BREEDING SPECIES

- 5.7.46 The remaining VORs in Table 5.27 were all either breeding at locations distant from the main site, where displacement effects would be negligible, or were not breeding on-site. Those VORs breeding off-site use the main site to such a limited extent, that any potential displacement from foraging areas would be negligible. Therefore, no significant displacement effects are predicted for these species.

Collision Effects

- 5.7.47 The magnitude of change and significance of effect predicted for VORs with different levels of sensitivity as a result of potential collision risk have been summarised in Table 5.26. The detail of the collision risk modelling that supports these findings is contained in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). The highest magnitude of change predicted was for white-tailed eagle (moderate), with slight change predicted for whooper swan, pink-footed goose and breeding greylag goose. All remaining VORs are predicted to have a magnitude of change of negligible or none as a result of collision risk. All collision estimates were not significant with the greatest significance of effect being moderate that has been assigned to white-tailed eagle and breeding greylag goose.
- 5.7.48 The CRM outputs and resulting predicted collision rates are discussed in the context of population effects in Table 5.27. This consideration of population effects is at relevant scales, whether the site, NHZ, SPA regional or UK, for example. Also, the effect of the added mortality from wind turbine collisions has been assessed against species population trends, where available.

⁷² Wilson, J.D., Anderson, R., Bailey, S., Chetcuti, J., Cowie, N.R., Hancock, M.H., Quine, C.P., Russell, N., Stephen, S. and Thompson, D.B.A. (2014) Modelling Edge Effects of Mature Forest Plantations on Peatland Waders Informs Landscape-Scale Conservation. *Journal of Applied Ecology* 51: 204-213.

Table 5.26: Summary of Predicted Collision Effects for VORs Recorded during 2018-19 Baseline

SPA/Ramsar feature	Non-SPA	VOR Sensitivity	Magnitude	Significance	Significant Effect
	White-tailed eagle	Medium	Moderate	Moderate	No
Greylag goose (breeding)		High	Slight	Moderate	No
	Whooper swan	Medium	Slight	Moderate/minor	No
	Pink-footed goose	Medium	Slight	Moderate/minor	No
Wigeon		High	Negligible	Moderate/minor	No
Red-throated diver		High	Negligible	Moderate/minor	No
Black-throated diver		High	Negligible	Moderate/minor	No
Golden eagle		High	Negligible	Moderate/minor	No
Hen harrier		High	Negligible	Moderate/minor	No
Merlin		High	Negligible	Moderate/minor	No
Golden plover		High	Negligible	Moderate/minor	No
Dunlin		High	Negligible	Moderate/minor	No
Greenshank		High	Negligible	Moderate/minor	No
Curlew		High	Negligible	Moderate/minor	No
Short-eared owl		High	Negligible	Moderate/minor	No
Teal		Medium	Negligible	Minor	No
	Greylag goose (non-breeding)	Medium	Negligible	Minor	No
	Osprey	Medium	Negligible	Minor	No
	Peregrine	Medium	Negligible	Minor	No
	Barn owl	Medium	Negligible	Minor	No
Common scoter		Low	None	None	No
Wood sandpiper		High	None	None	No
Arctic skua		Low	None	None	No

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
Whooper swan	Potential effects from disturbance/displacement	Site is of Regional Importance (medium sensitivity) for this species. Site is not used by foraging or roosting whooper swan so no effects from disturbance predicted. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (non-breeding seasons 2018/2019) of 1.1274 birds per annum (assuming 99.5% avoidance rate /turbines active 85% of time). Equates to 56.4 birds in the 50 year operational life of the Proposed Varied Development. Whooper swans are almost exclusively migratory birds in Scotland, part of the population of over 10,000 that winter in the UK. Against this population, an extra annual mortality of 1.1274 birds a year is negligible, as would be the predicted 50 year total of 56.4 bird collisions. Taking the unrealistic assumption that all whooper swans flying over the main site were over-wintering birds solely from NHZ, the collision mortality would be equivalent to 0.59% of NHZ population (190) per annum, or 59.4% over 50 years. This is considered highly over-precautionary, and the population of birds moving over the main site is likely to primarily be long-distance migrating birds on route to and from their Icelandic breeding grounds, together with a small proportion from over-wintering local flocks. The main site is beyond connectivity distance from the Caithness Lochs SPA and therefore collision mortality is not assessed against the Caithness Lochs SPA qualifying population. The predicted effect from collision is therefore, slight magnitude of change for a medium sensitivity receptor is a predicted effect of moderate/minor significance (not significant).
Pink-footed goose	Potential effects from disturbance/displacement	The site is of Regional Importance (medium sensitivity) for this species. The main site is not used by foraging or roosting Pink-footed goose so no effects from disturbance predicted. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (non-breeding seasons 2018/2019) of 1.3290 birds per annum (assuming 99.8% avoidance rate /turbines active 85% of time). Equates to 66.5 birds in the 50 year operational life of the Proposed Varied Development. Pink-footed geese recorded during the 2018 to 2019 surveys for the main site are primarily long-distance migrants. A precautionary assumption that the birds recorded flying over the main site are all local over-wintering birds would give a collision rate equivalent to 0.06% of NHZ population (2,070) per annum, or 3.22% over 50 years. Given a UK wintering population in excess of 150,000 pink-footed geese, the actual population effect from collision is predicted to be substantially less. Therefore, slight magnitude of change for a medium sensitivity receptor is a predicted effect of moderate/minor significance (not significant).

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
Greylag goose (breeding)	Potential effects from disturbance/displacement	Breeding proven in 2018-19 and site is of International Importance (high sensitivity). Breeding activity on waterbodies >500 m from turbine locations. Therefore, Negligible magnitude of change and Moderate/minor significance (not significant) predicted for disturbance/displacement.
	Potential effects from collision	Predicted significance of collision effects; collision rate (mean of 2018 and 2019 breeding season) of 0.32 birds per breeding season (assuming 99.8% avoidance rate /turbines active 85% of time). Equates to 16.20 birds in the 50 year operational life of the Proposed Varied Development. If set against the out-dated original Ramsar population of 30 pairs, this would equate to 1.1% of per annum or 54% over 50 years. However, the recent expansion of the northwest Scotland population and the more southern population means breeding greylag are treated as one population, with a combined current estimated British population of approximately 140,000 pairs and northern Scotland population of 34,500 pairs ³³ . Over 50 years wind farm operational lifespan, given the productivity and rate of population expansion in recent years, annual losses again would be set against this far higher population level. Whilst recognising its local Ramsar status, therefore a slight magnitude of change for a high sensitivity receptor gives a predicted effect of Moderate significance (not significant).
Greylag goose (non-breeding)	Potential effects from disturbance/displacement	The site is of Regional Importance (medium sensitivity). 2018-19 surveys showed no substantial change in distribution/activity in relation to the main site. The main site is not used by foraging or roosting non-breeding greylag goose and therefore of low sensitivity with respect to disturbance. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for disturbance/displacement effects.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (non-breeding seasons 2018/2019) of 0.02 birds per annum (assuming 99.8% avoidance rate /turbines active 85% of time). Equates to 0.98 birds in the 50 year operational life of the Proposed Varied Development. Equivalent to 0.0003% of Caithness Lochs SPA population (7,190) per annum, or 0.01% over 50 years. Therefore, Negligible magnitude of change for a receptor of medium sensitivity is a predicted effect of Minor significance (not significant).
Wigeon	Potential effects from disturbance/displacement	Breeding was proven in 2018-19 and the main site is of International Importance (high sensitivity). Breeding activity on waterbodies >500 m from operational activity. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for disturbance/displacement effects.
	Potential effects from collision	No flights recorded from VP surveys. Therefore, Negligible magnitude of change and Moderate/minor significance (not significant) predicted for collision effects.

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
Teal	Potential effects from disturbance/displacement	Breeding was proven in 2018-19 and site is of National Importance (medium sensitivity). Breeding activity on waterbodies >500 m from the main site. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for disturbance/displacement effects.
	Potential effects from collision	No flights recorded from VP surveys. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for collision effects.
Common scoter	Potential effects from disturbance/displacement and collision	Not recorded during 2018-19 surveys and not breeding on the main site or survey area. Site is of Negligible Importance (low sensitivity). Therefore, no effect (change) predicted (not significant) for both disturbance/displacement and collision.
Red-throated diver	Potential effects from disturbance/displacement	Breeding was proven in 2018-19 and site of International Importance (high sensitivity). 2018-19 surveys show no significant change in breeding distribution/activity in relation to the main site. Breeding activity on waterbodies >500 m from operational activity. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for disturbance/displacement during operation.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (mean of 2018 and 2019 breeding season) of 0.004 birds per annum (assuming 99.5% avoidance rate /turbines active 85% of time). Equates to 0.19 birds in the 50 year operational life of the Proposed varied Development. Equivalent to 0.004% of Caithness and Sutherland Peatlands SPA population (46 pairs (92 individuals)) per annum, or 0.19% over 50 years. Therefore, Negligible magnitude of change for a receptor of high sensitivity is a predicted effect of Moderate/minor significance (not significant).
Black-throated diver	Potential effects from disturbance/displacement	Breeding proven in 2018-19 and the site for the Proposed Varied Development is of International Importance (high sensitivity). 2018-19 surveys show no significant change in breeding distribution/activity in relation to site. Breeding activity on waterbodies >500 m from operational activity. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for disturbance/displacement during operation.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (mean of 2018 and 2019 breeding season) of 0.0266 birds per annum (assuming 99.5% avoidance rate /turbines active 85% of time). Equates to 1.3 birds in the 50 year operational life of the Proposed Varied Development. Equivalent to 0.05% of Caithness and Sutherland Peatlands SPA population (26 pairs [52 individuals]) per annum, or 2.5% over 50 years. Therefore, Negligible magnitude of change for a receptor of high sensitivity is a predicted effect of Moderate/minor significance (not significant).

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
Osprey	Potential effects from disturbance/displacement	The site for the Proposed Varied Development is of Regional Importance (medium sensitivity). Birds observed during 2018-19 were not breeding within 2 km of the main site. Lochs where birds observed foraging >1 km from operation. Therefore, of low sensitivity with respect to disturbance and Negligible magnitude of change and Minor significance (not significant) predicted.
	Potential effects from collision	Two flights in total during VP surveys 2018-19. Very low number of transits insufficient for CRM. Therefore, Negligible magnitude of change and Minor significance (not significant) for collision effects.
White-tailed eagle	Potential effects from disturbance/displacement	The site for the Proposed Varied Development is of Regional Importance (medium sensitivity). Birds observed during 2018-19 were not breeding within 2 km of the main site, and survey coverage for this species extended beyond 6 km. Therefore, of low sensitivity with respect to disturbance and Negligible magnitude of change and Minor significance (not significant) for disturbance/displacement during operation.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (mean of 2018 and 2019 breeding seasons plus non-breeding season 2018/2019) of 0.9325 birds per annum (assuming 95% avoidance rate /turbines active 85% of time), albeit a figure modelled from few flights and therefore of limited reliability. It would equate to approximately 47 birds in the 50 year operational life of the Proposed Varied Development. Elsewhere in its range (notably at Smola, in Norway), the species is known to be sensitive to effects from turbine collision when nesting in close proximity to turbines and with high quality foraging habitat in close proximity to wind farms. This experience at Smola has contributed to SNH adopting a highly precautionary 95% avoidance rate to apply for this species for collision risk modelling in Scotland. The circumstances of the birds recorded at the main site are significantly different from Smola however, which may mean that a 95% avoidance rate is overly precautionary, and not realistic. As non-breeding birds, the individuals recorded on-site are not constrained in their flight movements by having to return to a nest site located in proximity to a wind farm. Furthermore, as well as the lack of nesting activity on-site or in the immediate surroundings, no breeding activity has been recorded within a minimum of 6 km from the main site. The main site also has no suitable habitat that might lead to future nesting, and this would be compounded by the removal of the conifer plantation through the Proposed Varied Development's HMP (EIAR Volume 4: Technical Appendix 9.5), which would eliminate any suitable nesting habitat. As well as the appropriateness of the avoidance rate, the other key quantitative consideration is that collision risk modelling becomes less robust with a limited sample of flights, as is the case here (particularly in 2019). Part of this weakness is that the output becomes susceptible to being overly influenced by chance characteristics of particular flights in the small sample (given these flights that may prove atypical).

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
		For these reasons alone, over-reliance on the quantitative output of collision risk modelling is not considered likely to result in a realistic assessment of the magnitude of change from collision for the Proposed Varied Development. There are also basic geographical and ecological factors to consider that limit the site's habitat suitability for this species and would therefore in reality limit the level of flight activity and collision risk. White-tailed eagles favour coastal habitats for example, but the main site is approximately 14 km south of the coast. This would tend to limit activity on-site, as would the absence of large topographic rises to generate up-drafts for the white-tailed eagles to exploit. In terms of habitat attraction, the only large lochs where birds might forage is Loch nan Clach at the northwest edge of the site, over 1.5 km from the nearest turbine. Regardless of any macro-avoidance that non-breeding birds might take from an operational wind farm, these geographical and ecological characteristics of the site are likely to limit its current and future importance for this species. Finally, in terms of assessing the population significance of collision mortality, the NHZ population is for territorial pairs (i.e. breeding), whereas the birds observed at the main site were non-breeding. As such, the context of the Caithness and Sutherland Peatlands NHZ population is not an appropriate context to assess magnitude of change. The origin of these birds is also from a much wider area, likely to encompass the breeding stronghold in western Scotland, and from eastern Scotland where there have been more recent white-tailed eagle introductions. The Highland region population in 2018 numbered 47 pairs (94 individuals), so an annual predicted collision rate of 0.9325 birds equates to 0.99% a year of the Highland population. From the 109 pair Scottish/UK total (SRSG 2019⁷³) (218 individuals), the figure is 0.43 % a year. This would equate to 49.6% of the Highland and 21.4% of UK white-tailed eagle population over 50 years. Therefore, over the course of the 50 years operational life of the Proposed Varied Development, the predicted mortality of non-breeding birds (not yet recruited into the breeding population) is less than 50% of the Regional breeding population. Over the 50 year timespan the white-tailed eagle population will continue to expand and increase, given further introductions and population growth. In reality therefore, over the 50 year lifespan of the Proposed Varied Development, the proportional predicted effect of modelled wind farm mortality would be much smaller. Therefore, Moderate magnitude of change for a medium sensitivity receptor is a predicted effect of Moderate significance (not significant).
Golden eagle	Potential effects from disturbance/displacement	Breeding proven in 2018-19 and the site for the Proposed Varied Development is of International Importance (high sensitivity). Nearest nest location same as used during previous assessments (c. 3 km from nearest turbine). 2018-19 surveys show no significant change in breeding distribution/activity in relation to site. Although golden eagles are likely to avoid the main site during operation, the site is currently afforested and little-used by foraging golden eagle. The Golden

⁷³ SRSG, (2019) Online: <http://www.scottishraptorstudygroup.org/shortearedowl.html> [accessed 19/11/2019]

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
		Eagle Topography model output for the wider area reflects the very low suitability of the landscape on and around the main site for golden eagle flight activity. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted due to disturbance/displacement during operation.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (mean of 2018 and 2019 breeding seasons plus non-breeding season 2018/2019) of 0.0085 birds per annum (assuming 99% avoidance rate /turbines active 85% of time). Equivalent to 0.09% of Caithness and Sutherland Peatlands SPA population (5 breeding pairs [10 individuals]) per annum. However, the SPA population is for territorial pairs (i.e. breeding), whereas the birds observed at the main site included non-breeding sub-adult birds. As such, the context of the Caithness and Sutherland Peatlands SPA population is not an appropriate context to assess magnitude of change. The origin of these birds is also from a much wider area, likely to encompass the wider UK population of 510 pairs (1,020 individuals plus non-breeding birds) and therefore the proportion of the SPA population effected by collision mortality would be less than 0.09% of the SPA population per annum. Over the 50 year operational life of the Proposed Varied Development, the predicted collision mortality of 55.1 birds would therefore be compared against this wider population. Therefore, Negligible magnitude of change and Moderate/minor significance (not significant) predicted.
Hen harrier	Potential effects from disturbance/displacement	The main site is of International Importance (high sensitivity). 2018-19 surveys show a decline in breeding distribution/activity in relation to the main site and reduced breeding activity at Strathy Wood compared to the 2007 to 2012 data. Several studies indicate displacement of nesting hen harriers due to wind farms is of the magnitude of 200-300 m from turbine locations (reviewed in WINDHARRIER 2015 ⁵⁸). Hen harrier have nested within this distance to the site (although well beyond the 750 m disturbance range from the nearest turbine). Taking a precautionary approach however, there is potential for displacement, although there is sufficient alternative nesting habitat outwith these distances from any part of the site. Therefore, slight magnitude of change for this high sensitivity species results in an effect of Moderate significance (not significant) being predicted due to disturbance/displacement during operation.
	Potential effects from collision	Predicted significance of collision effects; annual collision rate of 0.0161 birds per annum (assuming 99% avoidance rate /turbines active 85% of time). Equates to 0.85 birds in the 50 year operational life of the Proposed Varied Development. Equivalent to 0.06% of Caithness and Sutherland Peatlands SPA population (14 breeding pairs (28 individuals)) per annum, or 3.0% over 50 years. There is the possibility of harriers being positively attracted to the main site by the presence of brash and conifer regeneration as nest sites (therefore increasing collision risk). Mitigation measures would control this risk to avoid increased collision risk.

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
		Therefore, Negligible magnitude of change for a species of high sensitivity results in a predicted effect of Moderate/minor significance (not significant).
Peregrine	Potential effects from disturbance/displacement	The site for the Proposed Varied Development is of Regional Importance (medium sensitivity). No breeding within 2 km of the main site and very limited activity within the main site and survey area during 2018-19 surveys. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for effects of operational disturbance/displacement.
	Potential effects from collision	Only a single flight was observed during VPs 2018-19 And a very low number of transits insufficient for CRM. Therefore, Negligible magnitude of change for this medium sensitivity species results in a predicted effect of Minor significance (not significant) for collision effects.
Merlin	Potential effects from disturbance/displacement	Tree-nesting breeding merlin were recorded on site in the 2018-19 surveys. The removal of the Strathy South conifer plantation would remove this nesting habitat potentially displacing 1 breeding pair from one nest location. If this occurred it would represent 9.1% of the SPA population. However, merlin do not have strong nest-site fidelity and there is a high likelihood alternative nest sites would be used on open moorland. It is therefore unlikely that the breeding pair of merlin would be lost to the SPA population. In addition, removal of the conifer plantation and restoration of habitat would increase foraging opportunities in the medium to long term. Therefore, for this site of International Importance, a Slight magnitude of change and Moderate significance (not significant) is the predicted effect from disturbance /displacement during operation.
	Potential effects from collision	17 flights recorded during VP surveys 2018-19. 'At risk' flights insufficient for CRM. Therefore, Negligible magnitude of change for this high sensitivity species results in a predicted effect of Moderate/minor significance (not significant) for collision effects.
Golden plover	Potential effects from disturbance/displacement	2018-19 surveys show potential displacement of 1-2 territories (within 500 m of proposed turbines). Note that the turbine layout for the Proposed Varied Development is the same as the Consented Scheme and therefore the embedded mitigation would be retained. The layout avoids areas of bog pools and identified habitat corridors therefore reducing collision risk if peatland waders are potentially attracted to this habitat post-felling. Therefore, Negligible magnitude of change for this high sensitivity species results in a predicted effect of Minor significance (not significant) due to disturbance/displacement during operation (when prescribed mitigation implemented).

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
	Potential effects from collision	No flights within potential collision zone during 2018-19 surveys. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for collision effects during operation.
Dunlin	Potential effects from disturbance/displacement	2018-19 surveys show potential displacement of 4 territories in 2019 and 0 in 2018 (within 500 m of proposed turbines). Note that the layout for the Proposed Varied Development is the same as the Consented Scheme and therefore the embedded mitigation is retained. The layout avoids areas of bog pools and identified habitat corridors therefore reducing collision risk if peatland waders are potentially attracted to this habitat post-felling. Therefore, Negligible magnitude of change for this high sensitivity species results in a predicted effect of Minor significance (not significant) due to disturbance/displacement during operation (when prescribed mitigation implemented).
	Potential effects from collision	No flights within potential collision zone during 2018-19 surveys. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for collision effects during operation.
Wood sandpiper	Potential effects from disturbance/displacement and collision	Single incidental record during 2018-19 surveys. Not breeding on the main site or within the survey area. Therefore, no significant effects from disturbance/displacement or collision predicted.
Greenshank	Potential effects from disturbance/displacement	The main site is of International Importance (high sensitivity). 2018-19 surveys show potential displacement of 3-4 territories (within 500 m of proposed turbines). Note that the turbine layout for the Proposed Varied Development is the same as the Consented Scheme and therefore the embedded mitigation would be retained. The layout avoids areas of bog pools and identified habitat corridors therefore reducing collision risk if peatland waders are potentially attracted to this habitat post-felling. Therefore, Negligible magnitude of change for this high sensitivity species results in a predicted effect of Minor significance (not significant) due to disturbance/displacement during operation (when prescribed mitigation implemented).
	Potential effects from collision	Predicted significance of collision effects; annual collision rate (mean of 2018 and 2019 breeding season) of 0.0207 birds per annum (assuming 98% avoidance rate /turbines active 85% of time). Applying distance detection factor of 14.2, the predicted mortality would be 0.29 birds per annum. Equates to 14.7 birds in the 50 year operational life of the Proposed Varied Development. Equivalent to 0.02% of Caithness and Sutherland Peatlands SPA population (653 breeding pairs [1,306 individuals]) per annum, or 1.13% over 50 years. Therefore, Negligible magnitude of change for a high sensitivity receptor is a predicted effect of Moderate/minor significance (not significant).

Table 5.27: Summary of Predicted Effects of the Proposed Varied Development on VORs of High and Medium Sensitivity during Operation for the Strathy South Site

VOR	Potential Operational Effect Type	Predicted Effects of Proposed Varied Development
Curlew	Potential effects from disturbance/displacement	The site of the Proposed Varied Development is of National Importance (high sensitivity) for this species. All territories (2 in 2018, 1 in 2019) within wader survey buffer at distance >500 m from the main site and >1 km from proposed turbines. Therefore, effects from operational disturbance/displacement predicted as Negligible magnitude of change and Moderate/minor significance (not significant).
	Potential effects from collision	Eight flights were recorded during flight activity surveys 2018-19. Insufficient number 'at risk' for CRM. Therefore, Negligible magnitude of change and Moderate/minor significance (not significant) for collision effects.
Arctic skua	Potential effects from disturbance/displacement and collision	Not recorded during 2018-19 surveys and not breeding on the main site or within the survey area. The Proposed Varied Development is of Negligible Importance (low sensitivity). Therefore, no effect (change) predicted (not significant) for both disturbance/displacement and collision during operation.
Short-eared owl	Potential effects from disturbance/displacement	The site of the Proposed Varied Development is of National Importance (high sensitivity). No confirmed breeding on the main site or within the survey area during 2018-19 surveys. Therefore, effects from operational disturbance/displacement predicted as Negligible magnitude of change and Moderate/minor significance (not significant).
	Potential effects from collision	No flights recorded over the main site or within the survey area. Therefore, collision risk is of Negligible magnitude of change and Moderate/minor significance (not significant). Surveys of the main site would be undertaken once the Proposed Varied Development is operational to investigate whether increased nesting opportunities arising from conifer regeneration attracting species to breed on the site with consequential changes to collision risk. If identified, mitigation measures would include clearance of conifer regeneration.
Barn owl	Potential effects from disturbance/displacement	The site of the Proposed Varied Development is of Regional Importance (medium sensitivity). Breeding was not proven but possible. Displacement due to loss of nest sites considered unlikely (trees to be removed are unsuitable and building is to be retained). Therefore, effects from operational disturbance/displacement predicted as Negligible magnitude of change and Minor significance (not significant).
	Potential effects from collision	A single flight was recorded during VP surveys (below collision height) during 2018-19 surveys. Therefore, Negligible magnitude of change and Minor significance (not significant) predicted for collision effects during operation.

Predicted Decommissioning Effects

- 5.7.49 It is envisaged that the predicted effects from the decommissioning of the Proposed Varied Development on the VORs would be similar to those described above for the predicted construction effects (paragraphs 5.7.2 to 5.7.15 and Table 5.24).
- 5.7.50 Following 50 years of operation, the population and distribution of VORs will have changed in the vicinity of the Proposed Varied Development. Therefore, updated baseline surveys would be required to assess effects and inform mitigation strategy.
- 5.7.51 Guidance and legislation on the assessment and mitigation of effects may have changed by the time of decommissioning and therefore any assessment and mitigation should ensure it follows best practice prescribed at the time.

Predicted Cumulative Construction effects

- 5.7.52 The cumulative construction effects that could be associated with the Proposed Varied Development are restricted to developments that have the potential to negatively or positively affect the same species within the region, or, for developments in close proximity to the Proposed Varied Development, effect the same individual birds or territories.
- 5.7.53 Proposed wind farm sites in planning or scoping that fall into this category are shown in Figures 5.2 and 5.3 (EIAR Volume 3a: Figures). The scope for cumulative construction effects with the Proposed Varied Development arises from Strathy Wood wind farm for all species. Armadale wind farm and Akron wind farm are too distant to have construction effects.
- 5.7.54 The construction of Strathy Wood wind farm, if contemporaneous with construction of the Proposed Varied Development, would have potential to cause cumulative effects. E.ON. (2013)⁴⁷ and E.ON. (2019)⁴⁹, do however, include a proposed CEMP to mitigate construction disturbance to birds. Combined with the measures being put in place by the Applicant for the Proposed Varied Development, cumulative construction effects would be minimised or avoided altogether.

Predicted Cumulative Operational Effects

- 5.7.55 Consideration has been given to cumulative effects at relevant scales, namely for the Caithness and Sutherland Peatlands SPA/Ramsar site and for the wind farms being progressed within Strathy glen. Consideration has also been given at the NHZ level.
- 5.7.56 For the SPA/Ramsar site, this required an examination of in-combination effects of relevant plans and projects. SNH maintains an Excel spreadsheet of wind farm developments where there is potential connectivity. This was supplied to the Applicant's technical team (04/06/20) and reviewed for each qualifying species that has been recorded at the main site, and a resulting 'in combination' assessment undertaken.
- 5.7.57 The SNH spreadsheet also allowed scrutiny of cumulative effects at the NHZ level, supplemented by examination at the NHZ level, using <https://map.environment.gov.scot/sewebmap/> and its onshore wind farm layer.
- 5.7.58 Within Strathy glen, and in proximity to it, additional collision mortality from nearby operational wind farms have been considered, namely Strathy North wind farm, Betty Hill wind farm, and Ballie wind farm. Collision mortality has also been considered from Strathy Wood wind farm, which is in planning, and for those at the Scoping stage (Armadale wind farm and Akron wind farm).
- 5.7.59 Akron wind farm is sufficiently distant and at a location sufficiently to the east, that no cumulative effects from collision are anticipated for any VORs, including red-throated divers. The red-throated divers breeding within 1 km of the main site generally either commute north or northwest towards Armadale Bay or Bettyhill to forage, or northeast towards Strathy Bay. Cumulative collision effects for this and other species has therefore been concluded as not significant in terms of Akron.

- 5.7.60 Baillie Wind Farm and Akron wind farm are also of negligible collision risk to wintering or migratory wildfowl that cross the airspace above the Proposed Varied Development. Cumulative impacts on VORs (including whooper swans and greylag geese), have therefore been concluded as not significant from Baillie.
- 5.7.61 The proposed Armadale wind farm is in closer proximity to the Proposed Varied Development than Akron wind farm or Baillie wind farm but in the absence of survey data or a confirmed layout, it is not possible to determine the extent of any cumulative impact at this stage. Given the considerable distance between the Proposed Varied Development and Armadale wind farm, any potential cumulative effects would be limited to species with larger ranges, specifically red or black-throated divers, golden eagle, white-tailed eagle, wintering or migratory wildfowl. These species could potentially, cross airspace at the main site and Armadale wind farm.
- 5.7.62 For Strathly North wind farm, comprehensive survey work has been undertaken pre, during and post construction, over the period 2003 to 2019. Flight activity surveys over 2018 and 2019 have allowed up-to-date collision risk rates to be derived for VORs where flight activity has been recorded. Combined with the predicted collision rates for VORs derived from 2018 and 2019 flight activity monitoring at the main site, there are no species for which cumulative effects from additional mortality jointly from the Strathly North wind farm and the Proposed Varied Development would become significant.
- 5.7.63 The potential for cumulative effects on VORs between Strathly Wood wind farm, Strathly North wind farm and the Proposed Varied Development has been examined in detail. From this compilation of data, two species have been identified as potentially experiencing cumulative effects, as a result of their breeding and flight activity patterns. These species are hen harrier and red-throated diver, both of which have been examined in considerable detail in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). Reference is made to the following Sections of Technical Appendix 5.1: Section 2.2 in relation to the ornithology baseline information for red throated diver; Section 2.4 in relation to ornithology baseline information for hen harrier; and Section 4 in relation to cumulative collision risk calculations. The main considerations that have influenced the conclusions on predicted likely significance of effect are summarised below.
- 5.7.64 For hen harrier, there has been a considerable reduction in nesting numbers and flight activity at the main site, Strathly Wood and Strathly North since the 2013 baseline for the Consented Scheme. This is due to the time-line of habitat influences detailed in Technical Appendix 5.1 (EIAR Volume 5: Confidential Documents). In summary, as habitat conditions have become less suitable over time (notably due to heather beetle damage and forest maturation at the Strathly North, forestry maturation at the Strathly South main site and a decline in the extent of brash left after forestry works at Strathly Wood), the artificially elevated density of nesting harriers and flight activity that built up from 2007 to 2014 has since diminished. As well as predicted collision risk for the Proposed Varied Development consequently being less than for the Consented Scheme for hen harrier, the contemporary predicted collision rates for Strathly North and Strathly Wood are also greatly reduced when compared to previous levels. Therefore, the cumulative effects from the Proposed Varied Development combined with the wind farms in the immediate local area and at the SPA scale have diminished. The cumulative operational effect of the Proposed Varied Development on hen harriers is therefore not significant, based on the updated baseline.
- 5.7.65 For red-throated diver, the cumulative collision risk has been greatly reduced by SNH's adoption of the 99.5% avoidance rate for this species. The other notable difference compared to the Consented Scheme is that Strathly Wood has a smaller number of turbines, and these are configured in a layout specifically designed to minimise collision risk and barrier effects for the birds using the site's breeding lochan. As a result of the changes to the avoidance rate and the Strathly Wood layout, the predicted cumulative collision rates at the local and SPA scale are lower than at the time of the assessment work for the Consented Scheme. The cumulative operational effect of the

Proposed Varied Development on red-throated divers is therefore not significant, based on the updated baseline and change in avoidance rate.

- 5.7.66 Operational effects from cumulative collision risk for other species have been considered and the conclusion reached is that they are not significant, based on the 2018 and 2019 flight activity surveys at the Strathy South main site (and Strathy North wind farm).
- 5.7.67 Operational effects from cumulative barrier effects have been considered and the conclusion reached is that they are not significant. This includes evidence drawn from post-construction monitoring at Strathy North wind farm.

5.8 Mitigation

- 5.8.1 As part of the Consented Scheme, the Applicant committed to detailed mitigation proposals to minimise likely predicted significant residual effects that were identified at the time. The same measures would be applied to the Proposed Varied Development. These are summarised below and are fully integral to the Proposed Varied Development. The measures would ensure VORs and the integrity of the Caithness and Sutherland Peatlands SPA/Ramsar site and associated SSSIs are protected.

Mitigation During Construction

- 5.8.2 Mitigation measures to be employed during construction would ensure all wildlife protection legislation is complied with, specifically by avoiding disturbance to breeding Schedule I species or Annex I species and preventing damage to any wild bird nests. This would be achieved by:
- A full pre-construction survey of breeding raptors, divers and moorland breeding birds to inform the detailed measures required to ensure effective mitigation of breeding birds;
 - The production and implementation of the proposed Bird Protection and Mitigation Plan, which would include detailed species-specific protection plans. This approach would avoid all potentially significant disturbance effects during construction. This would form part of the final CEMP and would be managed by an on-site ECoW during construction, working with a suitably experienced on-site ornithologist. Based on the successful avoidance of disturbance during the construction of Strathy North wind farm it is intended that the Bird Protection and Mitigation Plan would be a combination of measures that were put in place for Strathy North plantation removal and wind farm construction. An Outline CEMP is included as Technical Appendix 2.1 (EIAR Volume 4: Technical Appendices), which includes the Bird Protection and Mitigation Plan.

Mitigation During Operation

- 5.8.3 The mitigation measures that would be implemented during operation of the Proposed Varied Development would be:
- Implementation of the extensive HMP (EIAR Volume 4: Technical Appendix 9.5), completing the progressive removal of Strathy South conifer plantation and continuing restoration of blanket bog and associated habitat.
 - Species-specific operational mitigation measures within the main site would also involve:
 - Management of conifer regeneration/rushes/brash (or other sward management) in the vicinity of turbines if bird monitoring revealed that these features were attracting key species on to site (notably hen harrier, merlin or short-eared owl), resulting in elevated collision risk.
 - To accompany the HMP, detailed post-construction bird monitoring would take place to monitor operational effects on VORs and provide information on effectiveness of operational mitigation measures, and to determine if there is a requirement for any additional measures.

- 5.8.4 For the Consented Scheme, one further measure was offered as enhancement, specifically the provision of diver rafts to benefit the SPA population of breeding red-throated and black-throated divers. This measure would still be added to the HMP activities if SNH or RSPB considered it would be beneficial.

Mitigation During Decommissioning

- 5.8.5 Mitigation during decommissioning would employ many of the same measures described for construction (paragraph 5.8.2), whereby detailed species protection plans would be designed and implemented, informed by a pre-decommissioning survey of the area potentially affected. This plan would be further refined to take account of any changes in legal requirements, guidance or policy in the intervening 50 years.

5.9 Assessment of Residual Effects

- 5.9.1 The assessment of the likely significance of residual effects during construction, operation and decommissioning of the Proposed Varied Development predicts **no significant residual effects**.

Residual Construction Effects

- 5.9.2 The Bird Protection and Mitigation Plan would be an integral part of the mitigation measures proposed for the Proposed Varied Development. Through its full implementation, significant residual effects during construction would be avoided.
- 5.9.3 Specifically, the predicted residual magnitude of change for hen harrier and merlin would be **Slight**, once the Plan had been implemented. Therefore, in combination with these species' high sensitivity, the residual effects due to construction disturbance and displacement would be of **Moderate significance** (not significant).
- 5.9.4 All other VORs are predicted to have a **Negligible magnitude** of change, or no change as result of construction activities, taking account of implementation of the Bird Protection and Mitigation Plan. The likely significance of predicted residual effects on these species due to construction disturbance and displacement would therefore be no greater than **Moderate/minor significance** (not significant).

Residual Operational Effects

- 5.9.5 Operational effects from displacement and disturbance are predicted to cause a **Slight magnitude** of change for hen harrier and merlin (both highly sensitivity species). However, there is sufficient suitable habitat beyond the potential displacement distances that the predicted likely significance of residual effect on the SPA population for these species is considered to be of **Moderate significance** (not significant).
- 5.9.6 All other SPA qualifying species and VORs are predicted to be of **Negligible or No magnitude** of change, as result of operational disturbance and displacement. Therefore, even in combination with the high sensitivity level of a number of these species, the predicted likely significance of residual effects due to operational disturbance or displacement is predicted to be of **Moderate/minor significance** (not significant) at most.
- 5.9.7 The magnitude of change for collision effects for the other Caithness and Sutherland Peatlands SPA qualifying species during operation is predicted as **Negligible magnitude of change**. Therefore, in combination with the high sensitivity of these species, the predicted likely significance of residual effects due to collision is considered to be of **Moderate/minor significance (not significant)**. During operation there is a possibility that SPA populations of hen harrier, merlin or short-eared owl could be subject to elevated collision risk as a result of habitat changes during the operational life of the Proposed Varied Development. Detailed monitoring and, if necessary, implementation of sward

management would ensure that there remains no significant residual collision risk for these species.

- 5.9.8 As previously highlighted, if the predicted collision risk model output was only considered in isolation, the appropriateness of a Substantial magnitude of the predicted effect would need to be considered for white-tailed eagle. A Substantial magnitude of change combined with regional (medium) sensitivity of the site, would result in a Major/Moderate significance (significant). However, the assessment of effects is not only based on quantitative model outputs alone, particularly where the limited number of flights makes the modelling process susceptible to large margins of error (extrapolating from a small sample size). Consideration of the key geographic and ecological (qualitative) factors is essential to derive as realistic prediction of effects as possible, and this requires assessment of the individuals present, their behaviour (including ranging distance), age, breeding activity, habitat use, quality and functionality, and the species wider population dynamics, including trends over the lifetime of the Proposed Varied Development. Having taken these factors into account (including consideration that the population using the site in 2018-19 were non-breeding, the absence of breeding within at least 6 km of the site, the lack of suitable breeding habitat on site and in the area, the proposed removal of the conifer plantation as part of the Proposed Varied Development, the fact that the large majority of birds were sub-adults, the wide ranging nature of these individuals, and the likelihood that the avoidance rate is over-precautionary in such circumstances) it is considered that the effect of collision would not result in significant effects for the regional breeding population (the regional population being taken as the Scotland/UK population, given the extensive ranging distribution of this species). The magnitude of change for white-tailed eagle collisions is therefore judged to result in a **Moderate magnitude of change** which, combined with regional (medium) sensitivity of the site, results in predicted likely significance residual effects of **Moderate significance** (not significant).
- 5.9.9 During operation a **Slight magnitude of change** is possible for whooper swan (non-breeding) and pink-footed goose (non-breeding) from predicted collisions. Combined with the regional (medium) sensitivity of the site for these species, the effect is of **Moderate/Minor significance** (not significant). For greylag goose (breeding), the **Slight magnitude of change** combined with the precautionary 'residual' international (high) sensitivity of the Ramsar site for this species, the effect is **Moderate** (not significant).

Residual Decommissioning Effects

- 5.9.10 For some species such as golden eagle or peregrine, which typically use fixed physical topographic features on which to nest, it is feasible to anticipate with a degree of certainty where future breeding activity may be located. By comparison, it is more difficult to predict with such confidence the composition, distribution and status of bird populations in the vicinity of the Proposed Varied Development at the time of decommissioning, given the extent of habitat transformation that would take place through the HMP, plus effects due to climate change. However, as there will be substantial enhancement measures to safeguard the current suite of VORs, it is anticipated that the species assemblage and distribution is likely to remain broadly comparable, albeit that higher densities of dunlin and golden plover would be expected around the main site, as a result of there no longer being the influence of the conifer plantation. The detailed ornithological monitoring throughout the operational life of the Proposed Varied Development would however, allow any potential effects from decommissioning to be anticipated and necessary mitigation implemented to avoid residual adverse effects from decommissioning.

Residual Cumulative Construction Effects

- 5.9.11 The potential for cumulative construction effects would arise if the construction of the Proposed Varied Development and Strathy Wood wind farm was contemporaneous, or if construction overlapped and therefore extended the combined period of construction activity beyond what

would be required individually. Both developments include mitigation in the form of comprehensive Bird Protection and Mitigation Plans within their respective CEMPs (notably deployment of a suitably experienced ECoW, and measures including surveys before and during construction to determine and monitor exclusion zones and screening to protect nests and avoid disturbance to Annex 1 species) (E.ON. (2019)⁴⁹. In accordance with wildlife protection legislation, these measures would reduce cumulative disturbance effects during construction, and as a result the predicted residual **magnitude of change is Negligible**. Combined with the national (high) or regional (medium) sensitivity of the site for these species, the predicted likely significant residual cumulative effects from construction are considered to be no higher than **Moderate/Minor significance** (not significant).

Residual Cumulative Operational Effects

- 5.9.12 The potential for cumulative operational impacts of the Proposed Varied Development, Strathy North wind farm, Strathy Wood wind farm and Armadale wind farm were all considered. This involved using, and updating, information from SNH's cumulative spreadsheet for the Caithness and Sutherland Peatlands SPA, and from E.ON. (2019)⁴⁹ and post-construction monitoring by the Applicant at Strathy North wind farm. The effects from Armadale wind farm cannot be fully predicted at present, so other than through reference to summary information on flight activity recorded over 2017 to 2019 (Brookfield Renewables)⁵⁰, cumulative collision effects with the Armadale wind farm have been excluded, albeit any such effects would be limited to divers, golden eagle, and white-tailed eagle as these species are most likely to range across all four sites.
- 5.9.13 For Strathy North wind farm, there are collision risk predictions from 2018 and 2019 for all key species. Golden eagle and white-tailed eagle had no 'at risk' flights over 2018 and 2019, resulting in a collision risk of zero. The 2018/2019 mean collision rate for hen harrier was 0.0192 birds a year, for red-throated diver 0.0219 birds a year, greylag geese 0.1077 for the breeding season, and greenshank 0.3337 (after applying the distance detection factor of 14.2).
- 5.9.14 For Strathy Wood, updated collision risk predictions for red-throated diver and hen harrier are provided, to reflect the reduced number of turbines and revised layout (E.ON. (2019)⁴⁹. The mean number of predicted collisions for hen harrier from 2011 to 2018 data was provided (0.056 collisions a year), but excluding the 2011 figure of 0.269 birds a year that was generated by the high nesting density due to the presence of brash, using the two most recent years (2017 and 2018) gives a mean of 0.017 hen harrier collisions a year. The predicted collision risk for red-throated divers gives a mean of 0.012 or 0.011 depending on whether E.ON. used what they term a 'four corridor model' or 'single corridor model' (reflecting different at risk corridors). Taking the predicted collision rates for the two most recent years, (2017 and 2018), the mean collision rate from both models over each year is 0.002 and 0.001 red-throated divers a year, respectively.
- 5.9.15 Taking the cumulative operational residual effects into account, the predicted residual **magnitude of change is Negligible** from cumulative collision risk. Combined with the national (high) or regional (medium) sensitivity of the site for these species, the residual cumulative effect of construction is no higher than **Moderate/Minor significance** (not significant).

Conclusions on Residual Effects

- 5.9.16 In conclusion, the assessment of residual effects and measures designed to reduce adverse effects ensure that:
- There are no predicted likely significant adverse residual effects from the construction and operation of the Proposed Varied Development on any of the valued ornithological receptors that were identified as sensitive receptors for inclusion in the environmental impact assessment work for ornithology.

- The assessment work has been carried out in accordance with up-to-date and relevant Guidance from SNH, together with other professional guidance from the CIEEM and contained in relevant published and grey literature referenced throughout this Chapter.
- There is a high level of confidence in the assessment of significance of predicted residual effects from the construction and operation of the Proposed Varied Development on the main site having regard to the uniquely comprehensive baseline data sets for the survey area and the wider area which, together with the monitoring data available for the operational Strathly North wind farm, provide important insight on breeding birds and flight activity on the main site and across the surrounding peatland habitat. The long-term consistent involvement of highly experienced surveyors at Strathly South (and Strathly North) also ensures the data sets and interpretation are founded on detailed local knowledge of the birds on and around the Proposed Varied Development.
- Suitable, effective tried and tested mitigation measures have been identified and have been taken into account when assessing the residual effects, in respect of which the Applicant is willing to commit to implementation of these measures through agreeing to appropriate planning conditions that would be attached to deemed planning permission.
- The construction and operation of the Proposed Varied Development can be carried out in full compliance with wildlife protection legislation, notably in relation to the prevention of disturbance to all breeding birds.

5.9.17 Therefore, it is considered beyond reasonable doubt that the Proposed Varied Development will cause **No Likely Significant Effects** on the VORs identified for assessment.

Conclusions in relation to Designated Sites

5.9.18 It is reported in paragraph 5.5.16-5.5.17 above that a desk study was undertaken to collate relevant information on all sites with designated ornithological features within a distance of the main site where there could be ecological connectivity between the site and protected species and bird populations. In Section 1.5 of Technical Appendix 1.5 details of all of the designated sites identified as potentially having such connectivity are provided, including details of the protected species of relevance to each of those designations.

5.9.19 This part of the Ornithology Chapter collates the assessment work reported upon above in relation to the qualifying species of the SPAs, the qualifying features of the Ramsar sites, and the key features of the SSSIs, in order to reach overall conclusions on the protected species for each of the designated sites to inform a conclusion on the integrity of those designated sites.

Caithness and Sutherland Peatlands SPA and Ramsar Site

5.9.20 At the time of the Public Inquiry for the Consented Scheme the designated site of primary importance when assessing the effects on the designated sites in the area were the Caithness and Sutherland Peatlands SPA and the Caithness and Sutherland Peatlands Ramsar site. The Scottish Ministers accepted the recommendation of their appointed Reporter who conducted the Public Inquiry that it could be concluded, beyond reasonable scientific doubt, that the integrity of the Caithness and Sutherlands SPA would not be adversely affected by the Consented Scheme. This conclusion was reached notwithstanding the objections from SNH and RSPB on the ground that they contended the integrity of the SPA would be adversely affected.

5.9.21 In relation to the Ramsar site the Scottish Ministers adopted their conclusions in respect of the qualifying species of the SPA for those bird species that the Ramsar site had in common with the SPA. This approach is in accordance with Scottish Government policy in paragraph 211 of Scottish Planning Policy (2014), which is still extant. The Scottish Ministers gave further consideration to species identified as qualifying features in the Ramsar citation that were not qualifying species listed for the SPA and therefore not assessed in the assessment for the Natura site. At that time the only bird species identified as falling into that category, and which also formed part of SNH's advice

to Scottish Ministers, was breeding greylag goose. The breeding population of greylag goose is identified as a qualifying feature in the Ramsar citation.

The Caithness and Sutherland Peatlands Ramsar Site

- 5.9.22 Before reaching conclusions on the SPA, consideration is given to those Ramsar VORs that are not qualifying species of the SPA. The three species identified in this assessment for the Proposed Varied Development that fall into that category are breeding greylag goose, curlew and the arctic skua.
- 5.9.23 The current conservation value of the Ramsar breeding greylag goose population is discussed in paragraph 5.6.59-5.6.60 above as part of the review of the site importance for VORs.
- 5.9.24 There has been a large increase in number of greylag goose breeding in northern Scotland in recent decades (numbering 10,000 pairs in 1997 and 34,500 in 2008-9)³³. The Ramsar designated population of 30 breeding pairs is a legacy of a time when the north Scotland population numbered low hundreds and represented the entire British population of 'native' greylag goose. In light of the substantial increase in numbers, the Ramsar-designated population of 30 pairs is therefore somewhat obsolete in terms of representing a population of conservation value, also because the north Scotland 'designated' population is no longer distinct from the 'feral' greylag population.
- 5.9.25 The summary of the findings from the 2018 -2019 baseline work for breeding greylag goose is reported in Section 2.14 of Technical Appendix 5.2 (EIAR Volume 5: Confidential Documents). In addition to the above information it is reported in this Chapter that:
- The Ramsar breeding greylag goose is a species with connectivity to the main site by virtue of it breeding within the survey area, but that the conservation status of the Ramsar population has changed markedly since designation (paragraph 5.6.59 and Table 5.22).
 - There are predicted effects on this qualifying feature during construction of moderate/minor significance and there are no significant effects as breeding activity is on waterbodies more than 500 m from construction (Table 5.24).
 - There are predicted collision effects on this Ramsar feature of moderate significance and therefore no significant effects (Table 5.26 of this chapter and Section 3.6.3 of Technical Appendix 5.1).
 - There are moderate/minor significance of effects predicted for this species from disturbance and displacement and therefore no significant effects (Table 5.27).
 - No predicted likely significant adverse cumulative effects have been identified for this species.
- 5.9.26 It is therefore concluded that there would be no significant adverse effects on this Ramsar qualifying feature as a result of the construction and operation of the Proposed Varied Development, either alone, or in combination with other wind farm development.
- 5.9.27 The second qualifying feature of the Ramsar site that is not a SPA qualifying species is curlew. This species has been the subject of detailed study in the ornithological EIA work carried out for this EIAR. It is noted in Table 5.1.2 of Technical Appendix 5.1 that this species is part of the Ramsar breeding assemblage and its status is favourable maintained. It has a core range of 1 km with its maximum core range being within 2 km. The potential for likely significant effects on curlew has been reported upon in this Chapter. The following conclusions can be drawn from the environmental impact assessment work for this species:
- Curlew is identified as being of International importance as a listed qualifying feature of the Ramsar assemblage. The site is assessed as having National importance for this species as the main site is marginal for the Ramsar population (Table 5.22);
 - It is also listed as a SSSI feature contributing to the breeding bird assemblage of the Lochan Buidhe Mires SSSI (Table 5.1.5 in Technical Appendix 5.1);

- The territory analysis carried out for the main site based on the 2018-2019 breeding birds survey identified 2 territories within the 1 km buffer from site in 2018 and 1 territory in 2019 (Table 5.19);
- There are no potential or predicted likely significant effects identified for this species during construction as all territories identified in the 2018 and 2019 survey work were within the wader buffer. They were more than 500 m from the site boundary and more than 1 km from proposed turbine locations. Residual disturbance effects were predicted as being of Moderate/minor effect (Table 5.24);
- Eight flights were recorded during flight activity surveys during 2018 to 2019 (Table 5.16) and none of these were “at risk” (Table 5.17). No collision modelling was therefore carried out for this species and it is considered that the likely significance of collision effect is Moderate/minor (Table 5.27); and
- No potential likely significant adverse cumulative effects have been identified for this species.

5.9.28 It can therefore be concluded that the construction and operation of the Proposed Varied Development would not have any significant effect on this qualifying feature that contributes to the Ramsar breeding bird assemblage, either alone, or in combination with other wind farm development.

5.9.29 For completeness, as noted in Table 5.1.2 of Technical Appendix 5.1 the other assemblage feature of the Ramsar site is Arctic skua. It is reported in this Chapter that:

- The main site is of Negligible importance for this qualifying feature as there were no observations of the species using the main site or survey area during the 2018 and 2019 baseline surveys (paragraph 5.6.58 above);
- It is a qualifying feature with connectivity to the main site but was not recorded on site (Table 5.22);
- There are no potential or predicted significant effects identified for this species during construction as it was not recorded in the 2018-2019 surveys and was not breeding on site or within the survey area and, therefore, no change in relation to this species has been identified (Table 5.24);
- There were no significant predicted collision effects (Table 5.26);
- There are no significant effects predicted for disturbance or displacement (Table 5.27); and,
- No potential likely significant adverse cumulative effects have been identified for this species.

5.9.30 It is therefore concluded that there would be no significant adverse effects on this Ramsar assemblage feature from the construction and operation of the Proposed Varied Development either alone, or in combination with other wind farm development.

5.9.31 The assessment work in this Chapter has demonstrated beyond reasonable scientific doubt that there would be no likely significant adverse effects on the three Ramsar qualifying features that are not also SPA qualifying species, namely breeding greylag goose, curlew and arctic skua. On that basis, and taking into account the conclusion reached in relation to the SPA qualifying species that are also Ramsar qualifying features that are summarised below, it is further concluded that the integrity of the Ramsar site would not be adversely affected by the construction and operation of the Proposed Varied Development.

The Caithness and Sutherland Peatlands SPA

5.9.32 In relation to the integrity of the SPA, as noted in paragraph 5.6.3 to 5.6.10 above, because of the connectivity of the site and SPA-qualifying bird populations, together with the international importance and high sensitivity of the qualifying species of the SPA, a Report to Inform a Habitats Regulation Appraisal (HRA Report) has been prepared; (Technical Appendix 5.2). The general

approach to preparing that HRA Report is summarised below together with the conclusion reached in relation to the integrity of the SPA.

- 5.9.33 The 2018–2019 survey data has been collated, combined with desk study results and analysed to inform the assessment of the Proposed Varied Development.
- 5.9.34 A thorough assessment using all these data has been completed to predict the likely significant effects of the Proposed Varied Development on the qualifying species of the Caithness and Sutherland Peatlands SPA. This assessment has also taken particular note of the issues highlighted by SNH and RSPB in their formal Scoping consultation responses and all other advice provided through consultation, and, advice previously provided in relation to the Consented Scheme.
- 5.9.35 SNH has provided details of potential cumulative plans and projects to take account of the ‘in combination’ assessment, and considerable attention has been paid to this analysis, given the proximity of the consented Strathy North wind farm, and the proposed Strathy Wood wind farm. The SNH spreadsheet identifies all wind farm developments with potential connectivity to the SPA, summarising predicted collision rates and territory displacement. It is of note that the Applicant has used the same ornithological specialists for surveys at Strathy North wind farm as well as at Strathy South. Therefore, data on flight activity, breeding distribution and collision risk modelling from both sites are completely compatible, and readily combined for the ‘in combination’ assessment. There has additionally been sharing of bird data between the Applicant and the developer of Strathy Wood proposed wind farm (E.ON./RWE), enabling the detailed consideration of the ‘in combination’ effects of all three schemes, as well as the sites identified in SHN’s cumulative spreadsheet.
- 5.9.36 In light of all the above, it is therefore considered that there is sufficient information available for the competent authority to carry out an appropriate assessment of the Proposed Varied Development, alone and in combination with other plans and projects.
- 5.9.37 The SPA has 12 qualifying species, all notified for their breeding populations. Of these, the 2018 and 2019 data showed for short-eared owl, common scoter or wigeon that there were no breeding locations within potential disturbance range of the main site, and there were no ‘at risk’ flights. Therefore, it is evident that the Proposed Varied Development would have no adverse effect on the integrity of the Caithness and Sutherland Peatlands SPA, alone or in combination, by compromising the conservation objectives for these qualifying species.
- 5.9.38 Details to inform the appropriate assessment for the SPA’s other qualifying species are provided in Technical Appendix 5.2 (EIAR Volume 5: Confidential Documents). The HRA Report contains an assessment against the conservation objectives of the SPA for each of the nine qualifying species that were the subject of assessment in the EIAR for the purposes of identifying likely significance of effects. The Tables set out the findings in relation to each conservation objective for each species for both the Proposed Varied Development alone, and, “in combination”. It reports on the likely significance of effects before and after taking into account proposed mitigation and separately lists the proposed mitigation measures where relevant. The degree of certainty in the final conclusion as to whether or not the individual conservation objectives will be met is recorded and these are mostly “High” with a few “Moderate”.
- 5.9.39 The overall conclusion of the HRA Report is that it is beyond reasonable scientific doubt that the integrity of the Caithness and Sutherland Peatlands SPA would not be adversely affected by the construction and operation of the Proposed Varied Development either alone or in combination with other plans or projects.

Caithness Lochs SPA and Ramsar Site

- 5.9.40 As noted in Technical Appendix 5.1 (pages 8 and 9), the relevant qualifying interests of the Caithness Lochs SPA and Ramsar site were included in the assessment of likely significant effects from the Proposed Varied Development because of SNH Guidance that SPAs up to 25 km with

qualifying populations of geese should be considered for potential connectivity. It is noted in paragraph 5.6.52 that this SPA is just beyond the screening distance for SPAs with qualifying populations of geese species; the SPA being 26 km from the Proposed Varied Development. It is noted in paragraph 5.6.69 to 5.6.72 above that both greylag geese and whooper swan were both recorded overflying the site during the non-breeding season with flight activity sufficient for collision risk estimates; (refer to Tables 5.15 and 5.16 above). It was therefore considered appropriate to consider the potential and predicted effects on these qualifying species from collision risk.

- 5.9.41 The potential for likely significant effects on whooper swan as a qualifying species of the Caithness Lochs SPA and Ramsar site have been considered in this Chapter. As noted in paragraph 5.6.69 above, the published connectivity distances for whooper swan are less than 5 km and it was concluded there is no connectivity between the site and this SPA. No further assessment work on the whooper swan that is a qualifying feature of this SPA was carried out. For clarity, references in this Chapter to whooper swan being assessed for likely significant effects relate to non-breeding species (paragraph 5.6.70 above) that are over-flying the site when migrating in spring and autumn; (paragraph 5.6.71). Whooper swans were not observed to use the main site for roosting and foraging and the observed flight activity of numbers passing over the site are considered to relate to migration. Having regard to the connectivity distance for whooper swan there is no doubt that the Proposed Varied Development will have no effect on this qualifying species of this SPA.
- 5.9.42 The potential for likely significant effects on the wintering population of Icelandic greylag goose as a qualifying species of the Caithness Lochs SPA and Ramsar site have also been reported upon in this Chapter. The following conclusions have been drawn from the environmental impact assessment work:
- It is reported in paragraph 5.6.52 above that the connectivity distances for the wintering wildfowl population of Icelandic greylag goose is 15-20 km and that it is unlikely that qualified species from this SPA will make connectivity with the site;
 - In paragraph 5.6.59 and 5.6.60 above it is explained that the migrating Icelandic geese observed in the 2018-2019 surveys in late April and early May could represent 2% of the SPA population. Although it is considered that the site has limited value for the designated population of the Caithness Lochs SPA and Ramsar site, on a precautionary basis the main site is valued as being of medium sensitivity for Icelandic non-breeding greylag goose (Table 5.22);
 - The site is not used by this qualifying species for foraging or roosting and on that basis it is concluded that the site is of low sensitivity with respect to disturbance during construction. The predicted effects on this species during construction for disturbance and displacement are assessed as being of minor significance (Table 5.24 and Table 5.26);
 - There are no predicted collision effects for this species and the predicted effect is assessed as being of minor significance (Table 5.27); and
 - No potential likely significant adverse cumulative effects have been identified for this species.

It is therefore concluded that there would be no significant adverse effects on this qualifying species of the Caithness Lochs SPA and Ramsar site. The overall conclusion is that the integrity of the Caithness Lochs SPA and Ramsar site would not be adversely affected by the construction and operation of the Proposed Varied Development, either alone, or in combination with other wind farm development.

Lochan Buidhe Mires, Skelpick Peatlands, Strathy Bogs and West Halladale SSSIs

- 5.9.43 The main site is bordered by a SSSI in all directions, which are listed in paragraph 5.6.15 above. These SSSIs underpin the Caithness and Sutherlands Peatlands SPA and are within the boundary of the SPA. It is recognised that there is ecological and ornithological connectivity between the site and key ornithological features of the SSSIs. The SSSI citations have three categories of

ornithological species that are listed as key features as discussed on pages 9 and 10 of Technical Appendix 5.1 (EIAR Volume 5) and shown in Table 5.1.5 of that Technical Appendix.

- 5.9.44 The first category comprises those notified species that are listed as key features as the site was considered to support nationally significant numbers at the time of designation. The species listed are common scoter and black-throated diver, both of which are also SPA qualifying species. The second category comprises species that are a component of a breeding bird assemblage and these are listed in Table 5.1.5 of Technical Appendix 5.1. The one listed species that is not also a SPA qualifying species or Ramsar qualifying species is peregrine. The third category comprises SPA qualifying species that are listed on the SSSI citations in recognition of the SSSI habitat that supports these qualifying species. There would be no direct impact on the habitats within the SSSIs.
- 5.9.45 As regards the SPA qualifying species, as noted above it has been concluded that there would be no likely significant residual effects on any of the SPA qualifying species. It can also be concluded that there would be no likely significant effects on any of the Ramsar species that are not also SPA qualifying species listed in Table 5.1.2 of Technical Appendix but are key features of the SSSIs; namely breeding greylag goose, and curlew.
- 5.9.46 As noted above peregrine is the only key feature of the SSSIs that is not covered by the conclusions reached on the likely significant effects on SPA qualifying species or Ramsar qualifying features. Peregrine has been the subject of detailed study in the ornithological EIA work for the Proposed Varied Development. In Section 2.17 of Technical Appendix 5.1 baseline information on peregrine is provided with a summary of findings provided from the baseline information that was collected using comprehensive desk study and new survey work from April 2018 to September 2019. The key findings are reported in Section 2.17 and underpin the assessment work for peregrine that is reported upon in this Chapter and summarised below:
- Peregrine is identified as a species of national importance because it is listed as a SSSI feature contributing to the designated breeding bird assemblage of three of the four SSSIs, and, it is listed as a Schedule 1 species; (Section 2.17 at page 71 of Technical Appendix 5.1 and Table 5.23);
 - The site is assessed as being of regional importance as peregrine have been rarely observed using the main site and survey area and the species has been categorised as being of medium sensitivity to the Proposed Varied Development; (Tables 5.15 and 5.24);
 - There has been one flight recorded in both 2018 and 2019 during the 2018-2019 VP surveys; (Table 5.15 and Section 2.17 at page 72 of Technical Appendix 5.1);
 - There was no evidence of breeding within the main site or 2 km buffer survey area in 2018 or 2019 (Table 5.19 and Section 2.17 at page 72 of Technical Appendix 5.1);
 - There are no potential or predicted significant effects identified for this species during construction as it has not been recorded breeding within 2 km of the site and is therefore of low sensitivity to disturbance; (Table 5.24);
 - Due to the negligible levels of flight activity no collision risk modelling was carried out and a minor collision effect is predicted which is not significant; (Table 5.26 and Section 2.17 at page 72 of Technical Appendix 5.1); and
 - No potential likely significant adverse cumulative effects have been identified for this species.
- 5.9.47 The overall conclusion is that there are no significant effects predicted for this species from disturbance or collision both of which have been assessed as being of minor significance; (Table 5.17). This conclusion is further supported by findings from the nearby Strathy North and Strathy Wood wind farm sites for which the same suite of surveys have been completed. These show that peregrine activity is infrequent in the wider area and no breeding peregrine have been confirmed at either wind farm site.

- 5.9.48 It can therefore be concluded that the construction and operation of the Proposed Varied Development would not have any significant effect on this SSSI feature that contributes to the breeding assemblages of the Lochan Buidhe Mires, Skelpick Peatlands and West Halladale SSSIs, either alone, or in combination with other wind farm development. On that basis, and taking into account the conclusions reached in relation to the SPA qualifying species and the additional Ramsar qualifying features that are also common to the SSSIs, it is concluded that the objectives of designation and the overall integrity of the area of these three SSSIs will not be compromised in relation to the ornithological key features.

Monitoring

- 5.9.49 As part of the Consented Scheme, the Applicant has committed to a comprehensive Ornithological Monitoring Plan and has committed to applying the same monitoring programme for the Proposed Varied Development, as summarised below (Table 5.28).
- 5.9.50 The monitoring plan is a continuation of the comprehensive monitoring already undertaken at the site (in tandem with Strathy North wind farm). It would be initiated pre-commencement and continue throughout the operational life of the Proposed Varied Development. It would monitor breeding bird populations and flight activity so that the predictions underlying this assessment can be validated and the effectiveness of mitigation measures can be assessed and modified where necessary.
- 5.9.51 A summary of the proposed monitoring is presented in Table 5.28.

Table 5.28: Bird Monitoring for the Proposed Varied Development	
Species	Scope
Moorland Breeding Birds	Moorland breeding bird surveys within 1 km buffer around site. To be undertaken pre-commencement breeding season and during forest clearance/construction (to inform Bird Protection and Mitigation Plan). Thereafter, monitoring to occur in Year 1,3,5,10,15, 20, 25, 30, 35, 40, 45 and 50 of operation.
Flight activity (all species)	VP surveys at the ten VP locations used during the 2018-19 baseline surveys. Minimum 36 hours per VP for breeding season. To be undertaken pre-commencement breeding season and during forest clearance/construction (to inform Breeding Bird Protection Plan). Thereafter, monitoring to occur in Year 1,3,5,10,15, 20, 25, 30, 35, 40, 45 and 50 of operation.
Red-throated diver and black-throated diver	Breeding diver survey within 1 km of site. To be undertaken pre-commencement breeding season and during forest clearance/construction (to inform Bird Protection and Mitigation Plan). Thereafter, monitoring to occur in Year 1,3,5,10,15, 20, 25, 30, 35, 40, 45 and 50 of operation. In addition to standard surveys, remote video cameras will also be deployed to monitor nesting activity and breeding success.
Red-throated diver and black-throated diver	Focal VP surveys at active breeding locations, as used during 2018-19 baseline and previous baselines (as appropriate). Minimum 36 hours per VP for breeding season. To be undertaken pre-commencement breeding season and during forest clearance/construction (to inform Bird Protection and Mitigation Plan). Thereafter, monitoring to occur in Year 1,3,5,10,15, 20, 25, 30, 35, 40, 45 and 50 of operation.
Red-throated diver and black-throated diver	Monitoring diver usage and breeding success on any rafts deployed for mitigation and enhancement. To be undertaken pre-commencement breeding season and during forest clearance/construction. Thereafter, undertaken annually for operational lifetime of wind farm (up to 50 years). In addition to standard surveys, remote cameras will also be deployed to monitor nesting activity and breeding success.

Table 5.28: Bird Monitoring for the Proposed Varied Development

Species	Scope
Breeding raptors	Breeding raptor surveys within 2 km buffer around site. To be undertaken in the pre-commencement breeding season and during forest clearance/construction (to inform Bird Protection and Mitigation Plan). Thereafter, monitoring to occur in Year 1,3,5,10,15, 20, 25, 30, 35, 40, 45 and 50 of operation.
Hen harrier	Targeted VPs during the breeding season within the 2 km buffer of the site, aimed at characterising hen harrier flight activity in vicinity of the site and operational wind farm. To start late March and to be undertaken in the pre-commencement breeding season and during forest clearance/construction (to inform Bird Protection and Mitigation Plan). Thereafter, monitoring to occur in Year 1,3,5,10,15, 20, 25, 30, 35, 40, 45 and 50 of operation.
Golden eagle	Monitoring of the two known breeding territories; establishing annual occupancy, breeding success and productivity. To be done in collaboration with Highland Raptor Study Group, to avoid duplication.
Golden eagle	Focal golden eagle VP surveys, using 2012 golden eagle VP locations during breeding season for a minimum of 36 hours per VP (if territory occupied). To be undertaken pre-commencement breeding season and during forest clearance/construction (to inform Bird Protection and Mitigation Plan). Thereafter, monitoring to occur in Year 1, 3, 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 of operation.

5.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

- 5.10.1 None of the residual effects predicted for the VORs for either the Consented Scheme or Proposed Varied Scheme are significant.
- 5.10.2 Table 5.29 below shows the predicted effects of the Consented Scheme and Proposed Varied Development side-by-side so that the effects during construction and operation can be compared.

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Construction				
Disturbance to breeding birds from noise and other construction activities.	No significant residual effects predicted.	N/A	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as Moderate (not significant) and as Moderate/Minor (not significant) for all other species.	No material change to the residual effect, taking account of the additional construction activity associated with the up-grading of the Yellow Bog track, and of previously un-recorded possible breeding or roosting presence of one barn owl pair on site.
Disturbance to non-breeding birds from noise and other construction activities.	No significant residual effects predicted.	N/A	Residual effect of the Proposed Varied Development assessed Minor (not significant) .	No material change to the residual effect, taking account of the additional migratory wildfowl recorded and non-breeding season presence of white-tailed eagle.
Displacement of birds from habitat on-site and adjacent to the site.	No significant residual effects predicted.	N/A	Residual effect of the Proposed Varied Development to protected birds are assessed as Moderate/Minor (not significant) for all species.	No material change to the residual effect.
Operation				
Displacement of birds from habitat on-site and adjacent to the site.	No significant residual effects predicted.	N/A	Long-term effect of the Proposed Varied Development to protected birds are assessed as Minor Beneficial (not Significant) .	The HMP (EIAR Volume 4: Technical Appendix 9.5) seeks to implement landscape scale peatland restoration within the Strathy South conifer plantation for the 50-year lifespan of the Proposed Varied Development. This commitment will see improvements to habitats present through substantial increases in their quality and

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
				quantity, becoming suitable over time for colonisation by SPA qualifying species, notably waders. Consequently, the residual effects of the Proposed Varied Development to habitats during the Operational Phase are assessed conservatively as Minor Beneficial (not Significant). No material change to the residual effect.
Collision risk to red-throated and black-throated divers during the breeding season.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not Significant) .	No material change to the residual effect.
Collision risk to hen harrier during the breeding season.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed Moderate/Minor (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.
Collision risk to short-eared owl during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as None (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Collision risk to merlin during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as None (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.
Collision risk to golden eagle during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not Significant) .	Flight activity diminished compared to previous baseline. Reduced residual effect.
Collision risk to other qualifying species during the breeding season, including greenshank and other waders.	No significant residual effects predicted.	No significant residual effects predicted.	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not Significant) .	No material change to the residual effect.
Collision risk to breeding greylag goose.	The 2013 ES Addendum predicted no significant residual effects on breeding greylag goose. SNH's advice post-submission was that the Consented Scheme would have a significant effect on the breeding greylag goose qualifying feature of the	Impact of the Consented Scheme on this species assessed as Negligible Adverse (not Significant) .	Residual effect of the Proposed Varied Development on this species assessed as Moderate (not Significant) . This residual effect applies to the species and to the breeding population as a qualifying feature of the Caithness and	No material change to the residual effect.

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
	Caithness and Sutherland Peatlands Ramsar site. However, SNH also advised that this significant effect would not adversely affect the integrity of the Ramsar site based on the factors/ considerations in the decision letter from the Scottish Ministers.		Sutherland Peatlands Ramsar site.	
Collision risk to breeding season and non-breeding season white-tailed eagle.	Negligible baseline flight activity. No significant residual effects predicted.	Impact of the Consented Scheme on this species assessed as of Moderate magnitude and moderate significance (not significant) .	Residual effect of the Proposed Varied Development on this species assessed as of Moderate magnitude and moderate significance (not significant) .	Flight activity has increased compared to previous baseline as the white-tailed eagle population has expanded in numbers and distribution. The number of flights recorded during all surveys is still very low however, and ‘at risk flights’ are even more infrequent. In 2019 there were too few breeding season flights to justify collision risk modelling (only two VP flights during the whole breeding season). From the four breeding season ‘at risk’ flights in 2018, the modelled breeding season collision risk is very low, the Consented Scheme and Proposed Varied Development being 0.0076 birds a breeding season compared to 0.0140, based on 2018 flight activity. Non-breeding flights generated a higher predicted collision rate for both the Consented Scheme and the Proposed Varied Development (0.5792 birds compared to the Proposed Varied Development 0.8653 birds a non-breeding season). Again, however, the relatively

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
				small number of flights mean that CRM outputs are susceptible to relatively large margins of error, being based on a small sample size and the particular characteristics of the flights that did occur. They are not statistically robust, given the small sample or indicative of the actual likelihood of collision. The difference in predicted collision risk values arises because fewer flights are ‘at risk’ with the Consented Scheme’s smaller turbine dimensions than with the Proposed Varied Development, as would be expected. The residual effect of the Consented Scheme and Proposed Varied Development on this species is assessed as Moderate (not significant).
Collision risk to whooper swans over the non-breeding season.	Negligible baseline flight activity. No significant residual effects predicted.	Impact of the Consented Scheme on this species assessed as Moderate/Minor (not significant) .	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not significant) .	No material change to the residual effect.
Collision risk to pink-footed geese over the non-breeding season.	Negligible baseline flight activity. No significant residual effects predicted.	Impact of the Consented Scheme on this species assessed as Moderate/Minor (not significant) .	Residual effect of the Proposed Varied Development on this species assessed as Moderate/Minor (not significant) .	No material change to the residual effect.

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Displacement to SPA qualifying species.	Impact of the Consented Scheme assessed as Moderate/Minor (not Significant) .	N/A	Residual effect of the Proposed Varied Development on SPA species assessed as Moderate (not significant) for hen harrier and merlin, and as Moderate/Minor (not significant) for all other species.	No material change to the residual effect.
Decommissioning				
Disturbance and displacement of SPA qualifying species.	Decommissioning impacts were assessed as likely to be similar in nature to those of the Construction Phase. No significant residual effects predicted.	N/A	Decommissioning residual effects were assessed as likely to be similar in nature to those of the Construction Phase.	No material change to the residual effect.
Cumulative Construction				
Cumulative construction effects on disturbance and displacement SPA qualifying species.	Cumulative effects of consented and in planning developments going into construction with the Consented Scheme assessed as Moderate/Minor (not significant) for all species.	N/A	Cumulative effects from construction would realistically only arise if Strathy Wood wind farm's construction overlapped with the construction of Consented Scheme. In such an event, the effect has been assessed as	No material change to the residual effect.

Table 5.29: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Ornithology Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
			Moderate/Minor (not significant) for all species.	
Cumulative Operation				
Cumulative disturbance and displacement of SPA qualifying species.	No significant residual effects predicted.	N/A	Residual cumulative effect assessed as Moderate (not Significant) .	No material change to residual effects. The 50-year HMP for the Proposed Varied Development will, however, provide substantial benefits through longer term delivery of peatland habitat restoration (EIAR Volume 4: Technical Appendix 9.5).
Cumulative collision risk to SPA qualifying species during the breeding and non-breeding seasons.	No significant residual effects predicted.	No significant residual effects predicted.	Residual cumulative effects from operation on have been assessed as Moderate/Minor (not significant) or lower for all SPA qualifying species.	No material change to the residual effect.

5.11 Summary and Conclusions

- 5.11.1 An assessment has been completed in relation to the ornithological effects of the Proposed Varied Development.
- 5.11.2 In order that this assessment could be based on an up-to-date ornithology baseline, surveys were carried out over 2018 and 2019 of flight activity, moorland breeding birds, divers and raptors, using standard survey methods advocated in current SNH Guidance.
- 5.11.3 The results added to the already comprehensive body of survey information on the birds on the main site and Strathy glen, gathered from 2003 onwards, for the Consented Scheme, Strathy Wood wind farm, Strathy North wind farm. Combined with desk study data from RSPB Scotland, the Highland Raptor Study Group and other sources, this data set provides a unique level of knowledge from which to assess the effects on birds from the construction, operation and decommissioning of the Proposed Varied Development.
- 5.11.4 Informed by the Consented Scheme decision-making process, it is known that the species of concern for SNH at that time in 2014/2015, were red-throated diver and greenshank, and for RSPB it was these species plus hen harrier and wood sandpiper (as qualifying species of the adjacent Caithness and Sutherland Peatlands SPA). More recently, Scoping responses repeated these concerns and RSPB also requested that the occurrence of common scoter be re-considered (as it is also a SPA qualifying species). For the sake of completeness, all qualifying species of the Caithness and Sutherland Peatlands SPA and Ramsar site have therefore been considered in the assessment for the Proposed Varied Development unless scoped out from detailed assessment because it was concluded that there would be no likelihood of impacts. Consideration has also been given to the qualifying species of the Caithness Lochs SPA and Ramsar site, even though it is located beyond the distance at which connectivity would be expected. In addition, other species recorded on-site, that are of conservation importance, as key features of the four SSSIs that surround the site or Schedule 1 birds, have also been assessed. It is therefore considered that the assessment has taken account of all VORs.
- 5.11.5 Wind farm effects on birds can arise during construction (primarily as a result of disturbance, displacement or damage to nesting birds), and from operation (as a result of disturbance, displacement or collision). The assessment has therefore considered each of these predicted effects, for each VOR.
- 5.11.6 Having updated the baseline data, with two exceptions findings show bird distribution and flight activity remain broadly comparable with the previous baseline for the qualifying species of the Caithness and Sutherland Peatlands SPA. Hen harrier nesting and flight activity was lower than in the years forming the baseline for the Consented Scheme. In comparison, merlin have nested in closer proximity to the Proposed Varied Development than previously, but this is linked to use of the forestry plantation that will be removed. The number and distribution of breeding waders and divers otherwise remains broadly comparable. There was more flight activity of whooper swan, greylag and pink-footed geese over the 2018/2019 non-breeding season than previously recorded, and over the breeding season for greylag geese as well.
- 5.11.7 The main change that has taken place is in relation to a non-SPA qualifying species. There has been an increase in white-tailed eagle activity, as would be expected as the population increases over time. Whilst the collision risk modelling generated relatively high predicted collision rates based on a limited number of flights (and is therefore less likely to be robust), the lack of breeding activity on site or in the wider area, the ranging characteristics of the birds (almost entirely sub-adults) and the low suitability of the site for this species in terms of habitat function, particularly once the conifer plantation is removed, mean that the predicted residual effects of the Proposed Varied Development are not significant.

- 5.11.8 The assessment of effects of the Proposed Varied Development has taken into account the modification to a 50 year proposed operational lifetime, and cumulative effects from other developments have also been taken into account, for the whole Caithness and Sutherland Peatlands SPA/Ramsar site. Within the local context of the Proposed Varied Development in Strathy Glen, the cumulative construction and operational effects of Strathy North wind farm and Strathy Wood wind farm have also been considered, drawing on recent flight and breeding distribution data collected for those projects.
- 5.11.9 The mitigation and environmental enhancement agreed for the Consented Scheme is being fully adopted for the Proposed Varied Development. Integral to the mitigation is the implementation of the proposed Bird Protection and Mitigation Plan, part of the CEMP and designed to prevent disturbance to breeding birds and therefore ensure compliance with wildlife legislation.
- 5.11.10 The assessment of effects on birds from the Proposed Varied Development has concluded there would be no significant adverse residual effects on any species from the Proposed Varied Development. This conclusion accords with the conclusions from the 2013 ES Addendum and 2014 FIR for the Consented Scheme.
- 5.11.11 Information has also been provided to inform an appropriate assessment of the Proposed Varied Development on the Caithness and Sutherland Peatlands SPA and Ramsar site. Based on the review of the likely significant residual adverse effects that are predicted for relevant qualifying species of the Caithness and Sutherland Peatlands SPA and Ramsar site, the Caithness Lochs SPA and Ramsar site, and, the Lochan Buidhe Mires, Skelpick Peatlands, Strathy Bogs and West Halladale SSSIs, it has been concluded that the integrity of these designated sites would not be adversely affected.
- 5.11.12 The predicted significance of effects is summarised in Table 5.30 below.
- 5.11.13 In conclusion, there would be no residual significant effects on VORs from the Proposed Varied Development itself, or cumulatively. It is also the case, beyond reasonable scientific doubt, that there would be no adverse effect on the integrity of any of the designated sites, either from the Proposed Varied Development alone, or in combination with other plans or projects.

Table 5.30: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Construction				
Disturbance to nesting Schedule 1/Annex 1 birds or damage to nests of other birds.	N/A (as avoided through embedded integral measures).	Implementation of Bird Protection and Mitigation Plan which is embedded mitigation and integral to the implementation of the Proposed Varied Development.	Deployment of suitably experienced Ecological Clerk of Works and an ornithology specialist to undertake the bird protection and monitoring. To be secured through a condition of consent.	No significant residual effect for all other species. None (not significant) for all other species.
Direct (including temporary or permanent) displacement from habitat on non-designated protected habitats through installation of wind farm infrastructure for the Proposed Varied Development.	Moderate adverse (not significant).	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) which seeks to sequentially remove the Strathy South conifer plantation and restore peatland habitats across the area. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in Technical Appendix 9.6 (EIAR Volume 4). To be secured through a condition of consent.	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as Moderate (not significant) and as Moderate/Minor (not significant) for all other species.
Operation				
Displacement to SPA qualifying species.	Moderate adverse (not significant).	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) which seeks to sequentially remove the Strathy South conifer plantation and restore peatland habitats across the area. Both of these plans are embedded mitigation and integral to the	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in Technical Appendix 9.6 (EIAR Volume 4).	Residual effect of the Proposed Varied Development on SPA species assessed as Moderate (not significant) for hen harrier and merlin, and as Moderate/Minor (not significant) for all other species.

Table 5.30: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
		implementation of the Proposed Varied Development.	To be secured through a condition of consent.	
Collision risk of SPA qualifying species during the operation of the Proposed Varied Development.	Moderate/Minor Adverse (not Significant) or lower.	Implementation of the Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) to ensure forest removal does not provide suitable nesting habitat (brash) for hen harrier. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to remove the conifer plantation and restore peatland, avoiding conditions that may attract hen harrier, short-eared owl or merlin to nest. Removing the forest also further reduces the habitat suitability for white-tailed eagle, by eliminating potential nesting or roosting habitat on site. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	The Strathy South Forestry Management Plan would be implemented during the first three years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) EIAR Volume 4: Technical Appendix 9.4) and Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year lifespan of the Proposed Varied Development. To be secured through a condition of consent.	The residual effect from potential impacts to bird at species is assessed as Minor Adverse (not Significant) following implementation of the appropriate mitigation.
Collision risk of non-SPA VOR species during the operation of the Proposed Varied Development.	Moderate Adverse (not Significant) or lower.	Implementation of the Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) to ensure forest removal does not provide suitable nesting habitat (brash) for hen harrier. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to remove the conifer plantation and restore peatland, avoiding conditions that may attract hen harrier,	The Strathy South Forestry Management Plan would be implemented during the first three years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Forestry Management Plan EIAR Volume 4: Technical Appendix 9.6) and Strathy	Residual effect of the Proposed Varied Development on non-SPA VOR species assessed as Moderate (not significant) .

Table 5.30: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
		short-eared owl or merlin to nest. Removing the forest also further reduces the habitat suitability for white-tailed eagle, by eliminating potential nesting or roosting habitat on site. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year lifespan of the Proposed Varied Development. To be secured through a condition of consent.	
Decommissioning				
The predicted effects are the same as for construction.				
Cumulative Construction				
Disturbance to nesting Schedule 1/Annex 1 birds or damage to nests of other birds.	N/A (as avoided through embedded integral measures).	Implementation of the Bird Protection and Mitigation Plan which is embedded mitigation and integral to the implementation of the Proposed Varied Development.	Cumulative effects from construction would realistically only arise if Strathy Wood wind farm's construction overlapped with the construction of the Proposed Varied Development. To be secured through a condition of consent.	The residual effect has been assessed as Moderate (not significant) for hen harrier and merlin, and Moderate/Minor (not significant) for all species.
Direct (including temporary or permanent) displacement from habitat on non-designated protected habitats through installation of wind farm infrastructure for the Proposed Varied Development.	Moderate adverse (not significant)	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) which seeks to sequentially remove the Strathy South conifer plantation and restore peatland habitats across the area. Both of these plans are embedded mitigation and integral to the	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in Technical Appendix 9.6 (EIAR Volume 4).	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as Moderate (not significant) and as Moderate/Minor (not significant) for all other species.

Table 5.30: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
		implementation of the Proposed Varied Development. The Strathy Wood wind farm application includes a proposed HMP which includes a 20 ha area at the southern end of the Strathy Wood former plantation to set aside as a Hen Harrier Enhancement Area.	To be secured through a condition of consent. Strathy Wood wind farm's proposed HMP includes an area for hen harrier habitat enhancement.	
Cumulative Operation				
Collision risk of SPA qualifying species during the operation of the Proposed Varied Development.	Moderate/Minor Adverse (not Significant) or lower.	Implementation of the Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) to ensure forest removal does not provide suitable nesting habitat (brash) for hen harrier. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to remove the conifer plantation and restore peatland, avoiding conditions that may attract hen harrier, short-eared owl or merlin to nest. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	The Strathy South Forestry Management Plan would be implemented during the first three years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Forestry Management Plan EIAR Volume 4: Technical Appendix 9.6) and Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year lifespan of the Proposed Varied Development. To be secured through a condition of consent. The HMP implementation at Strathy North wind farm and Strathy Wood wind farm have both been taken into account in this cumulative assessment.	Residual cumulative effects from operation have been assessed as Moderate/Minor (not significant) or lower for all SPA qualifying species. The residual cumulative effect for operation for white-tailed eagle has been assessed against the UK population and categorised as Moderate (not significant) and lower for all SPA qualifying species.

Table 5.30: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Collision risk of non-SPA VOR species during the operation of the Proposed Varied Development.	Moderate Adverse (not Significant) or lower.	Implementation of the Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) to ensure forest removal does not provide suitable nesting habitat (brash) for hen harrier. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to remove the conifer plantation will further reduce the habitat suitability for white-tailed eagle, by eliminating potential nesting or tree roosting habitat on site. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	The Strathy South Forestry Management Plan would be implemented during the first three years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Forestry Management Plan EIAR Volume 4: Technical Appendix 9.6) and Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year lifespan of the Proposed Varied Development. To be secured through a condition of consent.	Residual effect of the Proposed Varied Development on non-SPA VOR species assessed as Moderate (not significant).

5.12 Glossary and Abbreviations

Abbreviation (in alphabetical order)	Expanded Term
Abbreviation	Description
AA	Appropriate assessment
BBS	Breeding Bird Survey
BoCC	Birds of Conservation Concern
BTO	British Trust for Ornithology
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modeling
CRZ	Collision Risk Zone
EIAR	Ecological Impact Assessment Report
ECOW	Ecological Clerk of Works
HRSG	Highland Raptor Study Group
IOF	Important Ornithological Feature
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LSE	Likely Significant Effect
Main site	The part of the Proposed Varied Development comprising the Strathy South conifer plantation and the open habitats (including waterbodies) therein, and also including the Yellow Bog track.
PAN	Planning Advice Note
PCH	Potential Collision Height
PLI	Public Local Inquiry
RSG	Raptor Study Group
RSPB	Royal Society for the Protection of Birds
SAC	Special Area for Conservation
SBL	Scottish Biodiversity List
SBBS	Scarce Breeding Bird Survey
SNH	Scottish Biodiversity List
SPA	Special Protection Area
SPEC	Species of European Conservation Concern
SSSI	Site of Special Scientific Interest
Strathy glen	The term used to refer to the wider area, along the Strathy River, north from the main site, through Strathy Wood wind farm, Strathy North wind farm and through to the northern end of Strathy Forest, together with the open moorland to the east of Strathy River.
SWBSG	Scottish Windfarm Bird Steering Group
VP	Vantage Point
VOR	Valued Ornithological Receptor
WCA	Wildlife and Countryside Act 1981 (as amended)
WWO	Winter Walkover Survey
WWT	Wildfowl and Wetlands Trust
Zol	Zone of Influence

6. NOISE

6.1 Executive Summary

- 6.1.1 A noise assessment has been undertaken to determine the likely significant noise effects from the operational phase of the Proposed Varied Development.
- 6.1.2 The assessment has been undertaken in accordance with ETSU-R-97¹ and current good practice. ETSU-R-97 provides a robust basis for determining acceptable noise limits for wind farm developments. Consequently, the test applied to operational noise is whether or not the calculated wind farm noise levels at nearby noise sensitive properties would be below the noise limits derived in accordance with ETSU-R-97.
- 6.1.3 In addition to ETSU-R-97, the recommendations included in the IOA GPG² have been considered in the noise assessment.
- 6.1.4 ETSU-R-97 states that where there are very large separation distances between turbines and the closest receptors then a simplified noise condition may be suitable. ETSU-R-97 states *"If the noise is limited to an LA90,10min of 35 dB(A) up to wind speeds of 10 m/s at 10 m height, then this condition alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary."* Due to the large separation distances between the Proposed Varied Development and the nearest receptors the simplified assessment methodology has been adopted for this assessment.
- 6.1.5 The noise assessment has been undertaken in three stages, which involved setting the Total ETSU-R-97 Noise Limits (which are limits for noise from all wind turbine developments in the area) at the nearest noise sensitive receptors, predicting the likely effects of the Proposed Varied Development (undertaking a cumulative noise assessment where required) and setting Site Specific Noise Limits for the Proposed Varied Development.
- 6.1.6 Predicted cumulative operational noise levels indicate that for noise sensitive receptors neighbouring the Proposed Varied Development, cumulative wind turbine noise would meet the Total ETSU-R-97 Noise Limits.
- 6.1.7 Predictions of wind turbine noise from the Proposed Varied Development have been made in accordance with good practice using a candidate wind turbine, the Siemens Gamesa-SG 5.0-145, 5.0 MW. Predicted operational noise levels indicate that for the nearest noise sensitive receptors, wind turbine noise would meet the Site-Specific Noise Limits at all locations.
- 6.1.8 At some locations, under some wind conditions and for a certain proportion of the time operational wind farm noise from the Proposed Varied Development may be audible; however, it would be at an acceptable level in relation to the ETSU-R-97 guidelines.
- 6.1.9 There are a range of wind turbine models that may be appropriate for the Proposed Varied Development. If the proposal receives consent, further data would be obtained from the supplier for the final choice of wind turbine model to demonstrate compliance with the operational noise limits derived in this assessment.
- 6.1.10 Vibration, low frequency noise and amplitude modulation were scoped out of the assessment with the agreement of ECU and THC.

¹ The Working Group on Noise from Wind Turbines ETSU for the DTI (Department of Trade and Industry) (1996) *ETSU-R-97 The Assessment and Rating of Noise from Wind Farms*.

² Institute of Acoustics (IOA) (2013) *Good Practice Guidance on the application of ETSU-R-97 for wind turbine noise assessment*.

6.2 Introduction

- 6.2.1 This chapter considers the likely significant effects with respect to the noise associated with the operation of the Proposed Varied Development. The specific objectives of the chapter are to:
- describe the noise baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects (if required);
 - assess the residual effects remaining following the implementation of mitigation (if required); and,
 - provide a comparison of effects between the Consented Scheme and the Proposed Varied Development.
- 6.2.2 This chapter reports on the likely significant effects with respect to operational noise only. Noise associated with the construction and decommissioning of the Proposed Varied Development has been scoped out of assessment (though previous assessments of construction noise for the Consented Scheme have been considered).
- 6.2.3 The noise assessment has been undertaken in a number of stages, firstly to consider the cumulative noise limits ('Total ETSU-R-97 Noise Limits') applicable for all wind farm schemes in the area and secondly to derive the 'Site Specific Noise Limits' through the apportionment of the Total ETSU-R-97 Noise Limits.
- 6.2.4 An assessment has been undertaken against both sets of limits to assess whether the cumulative noise predictions can meet the Total ETSU-R-97 Noise Limits and also to show whether the noise immission levels from the Proposed Varied Development can meet the Site-Specific Noise Limits.
- 6.2.5 This chapter is supported by the figures and technical appendices presented in Table 6.1.

Table 6.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Volume 3a: Figure 6.1: Noise Assessment Locations	New information generated for the 2020 EIA. Plan showing the noise assessment locations.	Due to the increase in turbine size an updated operational noise assessment has been undertaken based on a suitable candidate turbine.
Volume 3a: Figure 6.2: Cumulative Turbine Locations	New information generated for the 2020 EIA. Plan showing the cumulative turbine locations.	Due to the increase in turbine size an updated operational noise assessment has been undertaken based on a suitable candidate turbine. The cumulative noise assessment has also been updated to take account of changes in relevant cumulative schemes.
Volume 4: Technical Appendix 6.1: Operational Noise Report	New information generated for the 2020 EIA. Presentation of the operational noise assessment.	Due to the increase in turbine size an updated operational noise assessment has been undertaken based on a suitable candidate turbine.

Competent Expert Summary

- 6.2.6 This chapter was prepared by TNEI Services Ltd. TNEI is a specialist energy consultancy that has undertaken noise assessments for over 4GW of onshore wind farm developments. All of the staff involved in the assessment are affiliated with the Institute of Acoustics.
- 6.2.7 The lead author of this chapter and the report included as Technical Appendix 6.1 is Jim Singleton. Jim is a Principal Technical Consultant whose experience within acoustics consultancy covers a range of sectors but with particular expertise in the assessment of environmental noise associated with energy generation and infrastructure projects.
- 6.2.8 Jim is the Team Manager of the TNEI Site Services Team, with a specific focus on Quality Assurance. Jim has worked on a range of wind farm projects from single turbine applications through to large scale Section 36 developments.
- 6.2.9 He has 13 years' experience working on noise projects across the UK and abroad and previously lectured in acoustics for 6 years. He is a full Member of the Institute of Acoustics (IOA), holds a first-class BSc (Hons) and the IOA Diploma in Acoustics and Noise Control.
- 6.2.10 A table presenting the relevant qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).

6.3 Summary of Effects of Consented Scheme

- 6.3.1 No significant operational noise effects and no significant cumulative operational noise effects were predicted in the 2013 ES Addendum and 2014 Further Information Report.
- 6.3.2 No significant construction and decommissioning noise effects were predicted in the 2013 ES Addendum.
- 6.3.3 The 2014 Further Information Report provided an assessment for the Consented T39 Layout, which remains appropriate to identify likely significant effects for the Consented Scheme.
- 6.3.4 No further cumulative schemes have been consented since the 2014 Further Information Report (FIR) noise assessment. However, the cumulative noise assessment for the Proposed Varied Development presented here takes into account changes to layouts of those cumulative schemes in planning and scoping. The cumulative noise impacts assessed for the Consented Scheme and those for the Proposed Varied Development are considered to be comparable. This includes a reduction in the number of turbines for the Strathy Wood Wind Farm layout and the additional cumulative schemes which are Armadale and Ackron Wind Farms, which are currently in scoping (which were added at the specific request from THC).

6.4 Methodology

Scope of the Assessment

- 6.4.1 An initial desktop assessment was undertaken in order to identify the nearest noise sensitive receptors (NSRs) surrounding the site and to determine potential Noise Assessment Locations (NALs). A detailed review of all existing consented or operational wind turbine developments in the area was also undertaken to identify potential cumulative noise effects. In total, three NALs (Bowside Cottage and Bowside cottage to the north and Rhifail to the west) of the Proposed Varied Development were identified and considered in the assessment. These are detailed in Figure 6.1.
- 6.4.2 It should be noted that two previously considered NALs (Braerathy Lodge and Dallangwell) that were included in the 2014 FIR are financially involved with the Proposed Varied Development and will be vacant for the lifetime of the wind farm. Therefore, these properties have been scoped out of this noise assessment as agreed with The Highland Council (THC).

- 6.4.3 There are a number of wind energy developments located in the vicinity of the Proposed Varied Development (as shown on Figure 6.2). Further information on these can be found in Annex 4 of Technical Appendix 6.1: Operational Noise Report and these developments have all been considered as part of the cumulative noise assessment. Further information on the cumulative noise assessment can be found in Section 6.5 of Technical Appendix 6.1: Operational Noise Report.
- 6.4.4 Noise associated with construction and decommissioning was considered in detail as part of the Environmental Statement for the Consented Scheme. The changes that are proposed to the construction or decommissioning of the Proposed Varied Development are considered minimal in terms of noise effects, with the Consented Scheme construction and decommissioning assessment is still applicable. Therefore, construction and decommissioning has been scoped out as confirmed in the Scoping Opinion issued by THC.
- 6.4.5 The assessment has been carried out in accordance with the following combination of guidance and assessment methodologies:
- Planning Advice Note PAN 1/2011: 'Planning and Noise'³;
 - Web Based Renewables Advice: 'Onshore Wind Turbines' (updated May 2014)⁴;
 - ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms';
 - ISO9613: 1996 'Acoustics - Attenuation of sound during propagation outdoors Part 2: General method of calculation'⁵; and
 - Institute of Acoustics 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (2013) (IOA GPG).
- 6.4.6 The above documents are discussed in detail within Section 2 of Technical Appendix 6.1: Operational Noise Assessment, where relevant. Information on low frequency noise, vibration and amplitude modulation has been included within Section 3 of Technical Appendix 6.1: Operational Noise Report.

Consultation

- 6.4.7 A summary of the consultation undertaken is presented in Table 6.2.

Table 6.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
ECU 18/07/19	Scoping Opinion	Construction Noise Assessment to be scoped out as previously assessed for Consented Scheme. Noise limits to be met through Construction Noise Mitigation Plan as part of Construction and Environmental Management Document.	Construction noise assessment scoped out in agreement with ECU (meeting with Stephen McFadden on 24/09/2019)/THC (meeting with Simon Hindson (21/01/2020).
		Vibration, low frequency	Scoped out in agreement

³ The Scottish Government (2011) *Planning Advice Note PAN 1/2011: Planning and Noise*
<http://www.scotland.gov.uk/Resource/Doc/343210/0114180.pdf>

⁴ The Scottish Government (2014) *Web Based Renewables Advice: 'Onshore wind Turbines'*
<http://www.scotland.gov.uk/Resource/0045/00451413.pdf>

⁵ International Standards Organisation (1996) *ISO9613:1996 'Acoustics – attenuation of sound during propagation outdoors' – Part 2: General method of calculation.*

Table 6.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		and amplitude modulation to be scoped out.	with ECU/THC.
		Operational noise assessment to be updated for Proposed Varied Development. To be undertaken in line with ETSU-R-97 and IOA GPG.	Updated operational noise assessment undertaken.
THC 28/11/19	EHO Consultation	Confirmed approach to operational noise assessment including the use of ETSU-R-97 simplified limits (so no background noise monitoring required) and scoped out vacant properties of Braerathy and Dallangwell. Cumulative assessment approach to include application of site-specific limits to Strathy South. Due to the distances to the nearest receptors the use of proxy noise monitoring locations was agreed, should compliance monitoring be required.	Agreed approach to operational noise assessment and the use of proxy noise monitoring locations, if required, for compliance noise monitoring.
THC 21/01/20	SSE meeting with THC	THC requested that Ackron Wind Farm and Armadale Wind Farm which are 'in Scoping' at the time of submission be included in the cumulative assessments.	The cumulative noise assessment has considered both Ackron Wind Farm and Armadale Wind Farm as they are presented.

Baseline Conditions

- 6.4.8 The assessment has been undertaken in accordance with ETSU-R-97 and current good practice. ETSU-R-97 provides a robust basis for determining acceptable noise limits for wind farm developments.
- 6.4.9 ETSU-R-97 states that where there are very large separation distances between turbines and the closest receptors, and so predicted turbine noise is low enough, then a simplified noise condition may be suitable. ETSU-R-97 states *"If the noise is limited to an LA90,10min of 35 dB(A) up to wind speeds of 10 m/s at 10 m height, then this condition alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary."* Due to the separation distances between the Proposed Varied Development and the nearest receptors (>4 km), and therefore subsequent predicted turbine noise being low enough, this simplified assessment methodology has

been adopted. Accordingly, a survey to establish the existing baseline conditions has not been required.

Cumulative Baseline

- 6.4.10 There are a number of proposed, consented and operational wind farms located in the vicinity of the Proposed Varied Development, these are:
- Strathy North Wind Farm (operational);
 - Strathy Wood Wind Farm (in planning);
 - Bettyhill Wind Farm (operational);
 - Ackron Wind Farm (in scoping); and
 - Armadale Wind Farm (in scoping).
- 6.4.11 The wind farms detailed above have been considered as part of a cumulative noise assessment and further information on this can be found in Section 6.5 of Technical Appendix 6.1.

Assessment of Residual Effects

- 6.4.12 Planning Advice Note PAN 1/2011 'Planning and Noise' and the associated Technical Advice Note (TAN) – 'Assessment of Noise' provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise.

Criteria for Assessing Sensitivity of Receptors

- 6.4.13 Table 2.1 of the TAN presents the levels of sensitivity associated with a variety of receptors. All of the NSRs identified for this assessment are residential receptors, which the TAN details as having a high sensitivity.

Criteria for Assessing Magnitude of Change

- 6.4.14 PAN 1/2011 refers to the web-based planning advice on renewable technologies for Onshore Wind Turbines, which states that ETSU-R-97 should be used to assess and rate noise from wind energy developments.
- 6.4.15 The assessment of operational noise against the ETSU-R-97 noise level limits is simply a case of above or below the noise limits and as such cannot be used to determine the magnitude of impact.

Criteria for Assessing Significance

- 6.4.16 ETSU-R-97 does not define significance criteria, but, describes a framework for the measurement of wind farm noise and gives indicative noise levels considered to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development. Achievement of ETSU-R-97 derived noise limits ensures that wind turbine noise will comply with current Government guidance.
- 6.4.17 In terms of the EIA Regulations, the use of the term "significance" in this chapter refers to compliance/non-compliance with the ETSU-R-97 derived noise limits. For situations where predicted wind turbine noise meets or is less than the noise limits defined in ETSU-R-97, then the noise effects are deemed not significant. Any exceedance of the ETSU-R-97 derived noise limits due to the Proposed Varied Development is deemed to result in a significant effect.

Assumptions and Limitations

- 6.4.18 A candidate wind turbine has been used for predictions of operational noise from the Proposed Varied Development. Whilst the final model of wind turbine to be used may differ from that presented here, the operational noise levels would have to comply with the noise limits imposed by the Scottish Government, as informed by this noise assessment.

- 6.4.19 The candidate turbines used for cumulative wind farm predictions have been taken from the most recent planning documentation available for each scheme online. The candidate turbines used in the assessment are detailed in Annex 3 of Technical Appendix 6.1.
- 6.4.20 No other assumptions or data gaps have been identified.

6.5 Baseline Conditions

Current Baseline

- 6.5.1 The Proposed Varied Development is located within a rural location where existing background noise levels at the NSRs are generally considered to be low. The predominant noise sources in the area are expected to be wind induced noise (wind passing through vegetation and around buildings), local watercourses and birdsong. At some receptors the soundscape at times may be affected by local road traffic noise and noise from existing operational turbines.

Future Baseline

- 6.5.2 It is possible that noise propagation and resulting noise immission levels could change over the life of the project due to climate change (as noise attenuation is influenced by air temperature, relative humidity and ground conditions). However, noise limits would be set for the lifetime of the project and the operator would be required to meet them for the duration of the consent. If climate change resulted in the exceedance of limits, turbine noise could be reduced through mode management measures. There are no other known current or predicted future processes that are likely to change the baseline conditions.

Identified Sensitive Receptors

- 6.5.3 A total of three NSRs were chosen as representative NALs. The NALs chosen are the closest receptors to the Proposed Varied Development and other wind farm developments.
- 6.5.4 It should be noted that Dallangwell is owned by the Applicant and Braerathy Lodge is financially involved with the Proposed Varied Development. Both properties will be vacant for the lifetime of the wind farm and therefore these properties have been scoped out of the noise assessment.
- 6.5.5 The NALs refer to the closest position on the curtilage of a property. Predictions of wind turbine noise have been made at each of the NALs as detailed in Table 6.3 and as shown on Figure 6.1. This approach ensures that the assessment considers the worst case (loudest) noise immission level expected at the noise sensitive receptor.

Table 6.3: Operational Noise Assessment Locations				
Receptor	Easting	Northing	Elevation (m AOD)	Approximate Distance to nearest Strathy South Turbine (m)
NAL1 – Bowside Cottage	283050	960898	53	8237
NAL2 – Bowside Lodge	282917	960980	44	8278
NAL3 - Rhifail	273021	949390	54	4386

6.6 Potential Significant Effects

6.6.1 To undertake the noise assessment in accordance with the guidance contained within the IOA GPG the following assessment stages are required;

- Stage 1 - establish the Total ETSU-R-97 Noise Limits for each Noise Assessment Location (NAL)s.
- Stage 2 - undertake a likely cumulative noise assessment.
- Stage 3 - establish the Site-Specific Noise Limits for the Proposed Varied Development (through apportioning the Total ETSU-R-97 Noise Limits, where required) and compare the noise predictions from the Proposed Varied Development on its own against the Site-Specific Noise Limits.

6.6.2 The aim of the operational noise assessment therefore is to establish the Total ETSU-R-97 Noise Limits, determine the likely impacts of the Proposed Varied Development at the nearest NSRs, derive Site Specific Noise Limits and to demonstrate whether the Proposed Varied Development can operate within the limits.

Setting the Total ETSU-R-97 Noise Limits (Stage 1)

6.6.3 The Total ETSU-R-97 Noise Limits have been established for each of the NALs and are based on the simplified 35 dB criteria detailed in ETSU-R-97. Accordingly, the Total ETSU-R-97 Noise Limits at all receptors and for all time periods and wind speeds will be 35 dB LA90(10 minutes) as detailed in Table 6.4.

Table 6.4: Total ETSU-R-97 Noise Limit – Applicable to all times of the day												
Receptor	Wind Speed (ms-1) as Standardised to 10 m Height											
	1	2	3	4	5	6	7	8	9	10	11	12
NAL1 – Bowside Cottage	35	35	35	35	35	35	35	35	35	35	35	35
NAL2 – Bowside Lodge	35	35	35	35	35	35	35	35	35	35	35	35
NAL3 - Rhifail	35	35	35	35	35	35	35	35	35	35	35	35

Predicting the Likely Effects and the Requirement for a Cumulative Noise Assessment (Stage 2)

- 6.6.4 Predictions of wind turbine noise for the Proposed Varied Development were made, based upon the sound power level data for a candidate wind turbine, the SIEMENS Gamesa-SG 5.0-145, 5.0 MW as it is considered representative of the type of wind turbine likely to be installed at the site.
- 6.6.5 The candidate turbines used for cumulative wind farm predictions have been taken from the most recent planning documentation available for each scheme online. The candidate turbines used in the assessment are detailed in Annex 3 of Technical Appendix 6.1.
- 6.6.6 Noise predictions have been undertaken using the propagation model contained within Part 2 of International Standard ISO 9613-2, 'Acoustics – Attenuation of sound during propagation outdoors'. The model calculates, on an octave band basis, attenuation due to geometric spreading, atmospheric absorption and ground effects. The noise model was set up to provide realistic noise predictions, including mixed ground attenuation ($G=0.5$) and atmospheric attenuation relating to 70 % Relative Humidity and 10 °C.
- 6.6.7 The ISO model assumes all properties are downwind of all wind turbines at all times (as this would result in the highest wind turbine noise levels). However, where properties are located in between groups of wind turbines, or when turbines are spread over a wide area, it is not possible to be downwind of all wind turbines simultaneously. Therefore, it is appropriate to consider the effect of wind direction on predicted noise levels and this has been considered using the guidance in the IOA GPG.
- 6.6.8 Also, in line with the IOA GPG, an assessment has been undertaken to determine whether concave ground profile corrections (+3 dB) or barrier corrections (-2 dB), are required considering the topography between the wind turbines and the NSRs. Propagation across a valley (concave ground) increases the number of reflection paths, and in turn, has the potential to increase sound levels at a given receptor. Topographical screening effects from terrain surrounding a wind farm can result in reductions in the observed sound level between the source and receiver where no line of sight is present. Concave ground and barrier corrections were found to be required for a number of wind turbines at a number of receptors (Annex 4, Technical Appendix 6.1).
- 6.6.9 Detailed information regarding the noise modelling procedure is provided in Technical Appendix 6.1.
- 6.6.10 The modelling was undertaken to consider the cumulative developments nearby compared to the Total ETSU-R-97 Noise Limit. The results are shown in Table 6.5 and are summarised on Figures A1.2a-c included within Annex 1 of Technical Appendix 6.1.
- 6.6.11 Figures A1.2a-c show the predicted noise levels from each individual scheme as well as their combined cumulative predicted levels. Table 6.5 shows the comparison between the Total ETSU-R-97 noise limits and the predicted cumulative wind turbine noise levels. The result of the cumulative noise assessment show that the Proposed Varied Development can operate concurrently with the operational, consented or proposed wind farm developments near to the NALs, whilst still meeting the Total ETSU-R-97 Noise limits established in accordance with ETSU-R-97 at the three NALs.

Table 6.5: Compliance Table – Comparison of predicted cumulative noise levels (all schemes) against the Total ETSU-R-97 Noise Limits at each receptor													
Receptor		Wind Speed (ms⁻¹) as Standardised to 10 m Height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL1 – Bowside Cottage	Total ETSU-R-97 Noise Limit	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	30.7	34.3	34.7	34.7	34.7	34.7	34.7	34.7
	Exceedance Level LA90	-	-	-	-	-4.3	-0.7	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
NAL2 – Bowside Lodge	Total ETSU-R-97 Noise Limit	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	30.5	34	34.4	34.4	34.4	34.4	34.4	34.4
	Exceedance Level LA90	-	-	-	-	-4.5	-1	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
NAL3 - Rhifail	Total ETSU-R-97 Noise Limit	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	23	27.2	28.3	28.3	28.3	28.3	28.3	28.3
	Exceedance Level LA90	-	-	-	-	-12	-7.8	-6.7	-6.7	-6.7	-6.7	-6.7	-6.7

Operational Phase - Derivation of Site-Specific Noise Limits for the Proposed Varied Development (Stage 3)

- 6.6.12 The difference between the predicted levels for the operational Strathy North Wind Farm and the simplified 35 dB noise limit was less than 5 dB at NAL1 and 2. Therefore there was not significant headroom. On that basis it was determined that at NAL1 and 2 Strathy North could potentially use the entire Total ETSU-R-97 Noise Limit. Therefore, the Site-Specific Noise Limit for the Proposed Varied Development was set 10 dB below the Total ETSU-R-97 Noise Limit at NAL1 and NAL2.
- 6.6.13 At NAL3 Rhifail all cumulative developments modelled were predicted to be greater than 10 dB below the predicted levels of the Proposed Varied Development. Therefore, the Site-Specific Noise Limit for the Proposed Varied Development was set at the Total ETSU-R-97 Noise Limit of 35 dB at NAL3.
- 6.6.14 The Site-Specific Noise Limits were compared to the predictions from the Proposed Varied Development and the results are summarised in Table 6.6. The Table shows the exceedance level, which is the difference between the predicted wind turbine noise level and the Site-Specific Noise Limit at a given wind speed. A negative exceedance level indicates satisfaction of the noise limit. The Site-Specific Noise Limits and predictions are also shown on Figures A1.3a - 3c in Annex 1 of Technical Appendix 6.1: Operational Noise Report.

Table 6.6: Compliance Table – Comparison of predicted noise levels from the Proposed Varied Development against the Site-Specific Noise Limits at each receptor													
Receptor		Wind Speed (ms-1) as Standardised to 10 m Height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL1 – Bowside Cottage	Site Specific Noise Limit	25	25	25	25	25	25	25	25	25	25	25	25
	Predicted Wind Turbine Noise LA90	-	-	-	-	18.2	22.5	23.6	23.6	23.6	23.6	23.6	23.6
	Exceedance Level LA90	-	-	-	-	-6.8	-2.5	-1.4	-1.4	-1.4	-1.4	-1.4	-1.4
NAL2 – Bowside Lodge	Site Specific Noise Limit	25	25	25	25	25	25	25	25	25	25	25	25
	Predicted Wind Turbine Noise LA90	-	-	-	-	18	22.3	23.4	23.4	23.4	23.4	23.4	23.4
	Exceedance Level LA90	-	-	-	-	-7	-2.7	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
NAL3 – Rhiffail	Site Specific Noise Limit	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Wind Turbine Noise LA90	-	-	-	-	22.3	26.6	27.7	27.7	27.7	27.7	27.7	27.7
	Exceedance Level LA90	-	-	-	-	-12.7	-8.4	-7.3	-7.3	-7.3	-7.3	-7.3	-7.3

6.6.15 The assessment shows that the predicted wind turbine noise immission levels meet the Site-Specific Noise Limits under all conditions and at all locations for both daytime and night-time periods at all receptors.

6.6.16 There would be no likely significant noise effects resulting from the Proposed Varied Development after the Site-Specific Noise Limits are adopted.

6.7 Mitigation

6.7.1 No specific mitigation is proposed, however, turbine noise from the Proposed Varied Development turbines would have to meet the Site-Specific Noise Limits as imposed by condition. The exact model of wind turbine to be used at the Proposed Varied Development would be the result of a future tendering process and achievement of the noise limits determined by this assessment would be a key determining factor in the final choice of wind turbines for the site.

6.8 Assessment of Residual Effects

6.8.1 At all NALs the operational noise levels from the Proposed Varied Development and all other operational, consented and proposed wind farms are below the Total ETSU-R-97 Noise Limits. In addition, the predicted wind farm operational noise levels from the Proposed Varied Development will be below the Site-Specific Noise Limits at all the NALs.

6.8.2 There would be no likely significant residual effects resulting from the Proposed Varied Development after the Site-Specific Noise Limits are adopted.

- 6.8.3 At some locations, under some wind conditions and for a certain proportion of the time wind farm noise from the Proposed Varied Development could be audible; however, with wind farm noise being below the noise limits, it would be at an acceptable level in relation to the ETSU-R-97 guidelines.

Residual Cumulative Operational Effects

- 6.8.4 Predicted cumulative wind turbine noise is less than the Total ETSU-R-97 Noise Limits at all NALs, accordingly the Proposed Varied Development would result in no likely significant cumulative effects.

6.9 Monitoring

- 6.9.1 No monitoring is required.

6.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

- 6.10.1 A Comparison of the significant effects between the consented scheme and the Proposed Varied Development is presented in Table 6.7.
- 6.10.2 Based on the candidate turbine used in this assessment the predicted operational noise levels at the NALs are higher than presented in the ES for the Consented Development, however, this does not change the outcome of the assessment that the Proposed Varied Development would result in no significant effects.
- 6.10.3 For both the Consented Scheme and the Proposed Varied Development, predicted cumulative wind turbine noise is less than the Total ETSU-R-97 Noise Limits at all NALs, and accordingly would result in no significant effects.
- 6.10.4 For both the Consented Scheme and Proposed Varied Development, operational noise levels lie below the Site-Specific Noise Limits at all the NALs, and accordingly would result in no significant effects.

Table 6.7: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Noise Chapter Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Operation				
Operational noise effects on noise sensitive receptors	No significant residual effects.	N/A	No significant residual effects.	Predicted noise remains below site specific limits. No significant residual effects. Based on the candidate turbine used in this assessment the predicted operational noise levels at the NALs are higher than presented in the 2014 Further Information Report for the Consented Scheme, however, this does not change the outcome of the assessment that the Proposed Varied Development would result in no significant effects.
Cumulative Operation				
Cumulative operational noise effects on noise sensitive receptors	No significant residual effects.	N/A	No significant residual effects.	Predicted cumulative noise remains below total ETSU-R-97 limits. No significant residual effects.

6.11 Summary and Conclusions

- 6.11.1 The guidance contained within ETSU-R-97 and the IOA GPG was used to assess the likely operational noise impact of the Proposed Varied Development. Predicted levels indicate that for dwellings neighbouring the Site the operational noise impact is not significant after the Site-Specific Noise Limits are adopted.
- 6.11.2 There are a range of wind turbine models that may be appropriate for the Proposed Varied Development. If the proposal receives consent, further data would be obtained from the supplier for the final choice of wind turbine model to demonstrate compliance with the operational noise limits derived in this report.
- 6.11.3 Should the Scottish Ministers be minded to grant consent for the Proposed Varied Development it would be appropriate to include a set of the noise conditions for the Proposed Varied Development. A set of suggested noise conditions are included within Annex 5 of Technical Appendix 6.1: Operational Noise Report.
- 6.11.4 The residual effects are presented in Table 6.8.

Table 6.8: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development				
Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Operation				
Operational noise effects on noise sensitive receptors	Not significant	N/A	N/A	No significant residual effects.
Cumulative Operation				
Cumulative operational noise effects on noise sensitive receptors	Not significant	N/A	N/A	No significant residual effects.

6.12 Glossary and Abbreviations

- 6.12.1 A glossary of the technical terms used within this Chapter is included as Section 8 of Technical Appendix 6.1 (EIAR Volume 4).

Abbreviation (in alphabetical order)	Expanded Term
dB	Decibel
ECU	Energy Consents Unit, Scottish Government
EHO	Environmental Health Officer
IOA GPG	Institute of Acoustics Good Practice Guidance
NAL	Noise Assessment Location
NSR	Noise Sensitive Receptor
THC	The Highland Council

7. CULTURAL HERITAGE

7.1 Executive Summary

- 7.1.1 This Chapter considers the likely significant effects on cultural heritage and archaeology associated with the construction, operation and decommissioning of the Proposed Varied Development.
- 7.1.2 No direct impacts on known heritage assets have been identified and as such there would be no effects on known heritage assets during the construction phase.
- 7.1.3 There is a Low potential for hitherto unknown archaeological remains to survive on the site. It is advised that an agreed archaeological process is confirmed with The Highland Council (THC) through a Written Scheme of Investigation which would detail actions to be taken in the event of discovery of archaeological remains during construction. This process would be disseminated to the construction team via a toolbox talk.
- 7.1.4 The assessment has identified 17 Scheduled Monuments and five Listed Buildings within the ZTV of the Proposed Varied Development. An assessment of the impact on the setting of the Scheduled remains of Ben Griam Beg (Site 15) and five Scheduled Monuments within 15 km of the site, not previously located within the ZTV of the Consented Scheme, are reported within this Chapter. A settings assessment of the remaining 11 Scheduled Monuments and five Listed Buildings are detailed within EIAR Volume 4: Technical Appendix 7.2 Settings Assessment.
- 7.1.5 The Scheduled remains of Ben Griam Beg (Site 15) are judged to be of High relative sensitivity to change. The Proposed Varied Development would constitute a Low magnitude of change to the setting of the fort and the predicted level of effect is Minor-moderate. This is not considered significant in EIA terms. Effects on the settings of the five Scheduled Monuments, not previously located within the ZTV, have been assessed as Negligible or Neutral and not significant in each case.
- 7.1.6 Assessment of the cumulative impact on the Scheduled Ben Griam Beg (Site 15) identified seven cumulative developments, largely located to the north and northwest of the fort. The addition of the Proposed Varied Development would increase the proportion of the view occupied by wind farm development and would also be located in closer proximity than the other cumulative developments. It would also constitute a notable alteration to the wide and long, currently uninterrupted, northern view from Ben Griam Beg (Site 15) across the peatland to the north coast and North Sea. A moderate and significant adverse cumulative effect on the setting of the fort is anticipated. No other significant cumulative effects have been identified.

7.2 Introduction

- 7.2.1 This Chapter considers the potential for significant effects on cultural heritage and archaeology associated with the construction, operation and decommissioning of the Proposed Varied Development and identifies likely significant residual effects. The specific objectives of the Chapter are to:
- describe the cultural heritage baseline;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - assess the potential for direct impacts on archaeology and heritage assets resulting from the construction of the Proposed Varied Development;
 - assess the setting and cumulative effects upon the setting of designated heritage assets within the site and 15 km cultural heritage study area during the operational phase;
 - identify measures that would mitigate or offset any predicted significant adverse effects; and

- assess the significance of residual effects following the implementation of mitigation.

7.2.2 This Chapter is supported by the figures and technical appendices presented in Table 7.1. All site numbers referred to in the Chapter relate to the current gazetteer (EIAR Volume 4, Technical Appendix 7.3) and current figures for the Proposed Varied Development. Previously utilised site numbers or site references have been cross referenced within the gazetteer (EIAR Volume 4, Technical Appendix 7.3).

Table 7.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 7.1: Heritage Assets within the Site and Site Access	New information generated for the 2020 EIAR.	Figure produced to accompany Chapter 7, Cultural Heritage of the EIAR of the Proposed Varied Development and show the location of heritage assets.
EIAR Volume 3a: Figure 7.2: Designated Heritage Assets within 15 km with the ZTV	New information generated for the 2020 EIAR.	As above.
EIAR Volume 3a: Figure 7.3: Inventory Garden and Designed Landscapes within 30 km with the ZTV	New information generated for the 2020 EIAR.	As above.
EIAR Volume 3b: Figure 7.4 a-d: View from Ben Griam Beg (Site 15)	New information generated for the 2020 EIAR. New 360° panorama from the Scheduled Ben Griam Beg.	Provides a 360° view from the Scheduled Ben Griam Beg, showing the location of the Proposed Varied Development and cumulative developments.
EIAR Volume 3b: Figure 7.5: View from Armadale Burn, broch (Site 61)	New information generated for the 2020 EIAR.	Visualisations produced from agreed Scheduled Monuments showing the Proposed Varied Development and included within this Chapter. Visualisations were agreed with HES (EIAR Volume 4: Technical Appendix 7.1).
EIAR Volume 3b: Figure 7.6: View from Halladale Bridge (Site 32)	New information generated for the 2020 EIAR.	As above
EIAR Volume 3b: Figure 7.7: View from Rosdal, deserted township (Site 56)	New information generated for the 2020 EIAR.	As above
EIAR Volume 3b: Figure 7.8: View from Skelpick, long cairn (Site 50)	New information generated for the 2020 EIAR.	As above
EIAR Volume 3b: Figure 7.9a-b: View from Ben Griam Beg (Photomontage)	New information generated for the 2020 EIAR.	As above
EIAR Volume 4: Technical Appendix 7.1: Proposed Visualisations for Assessing Potential Impacts on the	New information generated for the 2020 EIAR. Proposed list of visualisations as agreed with Historic Environment Scotland	Provides the list of new and agreed upon visualisations which evidence the conclusions of this chapter.

Table 7.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Setting of Cultural Heritage Features	(HES) and THC Historic Environment Team.	Designated heritages assets not previously assessed in the cultural heritage assessment work for the Consented Scheme, have been highlighted.
EIAR Volume 4: Technical Appendix 7.2: Settings Assessment	New information generated for the 2020 EIAR. Presentation of the assessment of the impact of the Proposed Varied Development.	The ZTV for the Proposed Varied Development differs from the 2013 ES Addendum and more designated assets were included within the new ZTV.
EIAR Volume 4: Technical Appendix 7.3: Heritage Assets Gazetteer	Updated information generated for the 2020 EIAR.	Where possible the same reference numbers from the 2007 ES, 2013 ES Addendum and 2014 Further Information Report have been reused or referenced in the "Site Name". Updated and new heritage assets recorded by the Highland Historic Environment Record (HER) and HES since 2014 have also been included.
EIAR Volume 4: Technical Appendix 7.4: Cultural Heritage Plates	New information generated for the 2020 EIAR.	Photographs taken in August 2019 during site visits to designated assets within the ZTV and within the 15 km cultural heritage study area.

Competent Expert Summary

- 7.2.3 The assessment has been carried out by AOC Archaeology Group and in accordance with the standards of professional conduct outlined in the Chartered Institute for Archaeologists' (CIfA) Code of Conduct and Professional Conduct¹, as well as the CIfA Standard and guidance for commissioning work on, or providing consultancy advice on, archaeology and the historic environment²; desk- based assessment³; field evaluations⁴; and other relevant guidance.
- 7.2.4 The assessment has been led by Lynne Roy of AOC Archaeology Group. Lynne Roy is a Consultancy Project Manager with 15 years of experience working on a range of archaeology and cultural heritage impact assessments as well as numerous geoarchaeological projects. Lynne specialises in EIA's and has prepared over 30 ES/EIAR chapters for windfarms throughout the UK. Lynne also has experience at Public Inquiry and has prepared Statements of Appeal and associated Rebuttals. Lisa Bird is a Project Officer with four years of experience working on a range of desk-based assessments and large walkover survey projects. A table presenting their relevant qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).

¹ Chartered Institute for Archaeologists (CIfA). (2014a) *Code of Conduct*. <https://www.archaeologists.net/codes/cifa> (06/01/2020)

² Chartered Institute for Archaeologists (CIfA). (2014b) *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*. <https://www.archaeologists.net/codes/cifa> (06/01/2020)

³ Chartered Institute for Archaeologists (CIfA). (2017) *Standard and guidance for historic environment desk-based assessment*. <https://www.archaeologists.net/codes/cifa> (06/01/2020)

⁴ Chartered Institute for Archaeologists (CIfA). (2014c) *Standard and guidance for archaeological field evaluation*. <https://www.archaeologists.net/codes/cifa> (06/01/2020)

7.3 Summary of Effects of Consented Scheme

- 7.3.1 The 2007 Environmental Statement (ES) concluded that the Original 2007 Scheme would directly impact 15 heritage assets. A mitigation strategy was proposed and following mitigation it was judged that a single heritage asset, Bowside Bridge, would have a direct residual impact of moderate effect. This level of effect was considered to be significant.
- 7.3.2 In addition, the 2007 ES concluded that there would be a moderate and significant effect on the setting of the Scheduled Ben Griam Beg (Site 15). However, the 2007 ES stated that due to the limited arc of visibility of the Original 2007 Scheme, it would “*not significantly diminish the appreciation of the setting of Ben Griam Beg*”. The 2007 ES went on to conclude that there would be no significant indirect impact from the Original 2007 Scheme on designated assets within the 15 km cultural heritage study area and the ZTV.
- 7.3.3 The 2013 ES Addendum concluded that there would be no direct impacts upon known heritage assets. Mitigation, in the form of fencing, to protect an upstanding post medieval sheiling (Site 1) in the northwestern corner of the Modified 2013 Scheme was deemed sufficient and it was concluded that a watching brief would be undertaken on archaeological sensitive areas as set out by the Historic Environment Team (HET) at THC.
- 7.3.4 The 2013 ES Addendum included an updated assessment of indirect impact on the setting of the Scheduled Ben Griam Beg (Site 15). Assessment of all other designated assets was scoped out of the 2013 ES Addendum. The 2013 ES Addendum judged that the Modified 2013 Scheme would have a minor impact on the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is not considered to be significant. A cumulative assessment predicted a minor to major impact on the setting of Ben Griam Beg (Site 15). The 2013 ES Addendum does not define whether this level of effect is significant or not.
- 7.3.5 The 2014 Further Information Report (FIR) concluded that there was no change to the magnitude or significance of the effects outlined in the 2013 ES Addendum.
- 7.3.6 The cultural heritage assessment as presented in the 2007 ES remains appropriate to identify likely significant effects for that scheme. The methodology and assessment requirements for both the assessment of direct and indirect impacts have evolved since the 2007 ES and have been updated in line with current policy and guidance (paragraph 7.4.5). The criteria for determining the threshold of a significance of effect remains unchanged.

7.4 Methodology

Scope of the Assessment

- 7.4.1 The scope of this Chapter follows that advised in the Scoping Opinion. It considers the potential effects on hitherto unknown archaeological remains during the construction phase of the Proposed Varied Development and effects on the setting of heritage assets (e.g. changes as a result of visual intrusion) arising from the operational phase of the Proposed Varied Development. The Chapter also includes assessment of operational cumulative effects on the setting of heritage assets.
- 7.4.2 This EIAR Chapter has been prepared using baseline information and survey data collected for the 2007 ES, which has been reviewed, reused and updated where appropriate. Where necessary, additional surveys including the additional survey reported in the 2013 ES Addendum have been reused and/or undertaken. This Chapter provides an assessment of potentially significant effects on cultural heritage and archaeological assets, including archaeological sites and monuments, historic buildings and historic landscapes that may be affected by the Proposed Varied Development. Where relevant, mitigation measures are proposed to address likely significant effects. Residual effects remaining, following the implementation of mitigation, are identified and assessed.

- 7.4.3 Three cultural heritage study areas were identified for this assessment:
- All heritage assets were identified within the site (EIAR Volume 3a, Figure 7.1);
 - A 15 km cultural heritage study area for the assessment of potential effects on the setting of all designated assets, including Scheduled Monuments; Listed Buildings; Inventoried Gardens and Designed Landscapes; Inventoried Battlefields and Conservation Areas. This cultural heritage study area is covered by the Zone of Theoretical Visibility (ZTV) (EIAR Volume 3a, Figure 7.2); and
 - A 30 km cultural heritage study area for the assessment of potential effects on the setting of Inventoried Garden and Designed Landscapes. This cultural heritage study area is covered by the ZTV (EIAR Volume 3a, Figure 7.3).
- 7.4.4 The assessment is based on walkover surveys and data gathering for the Original 2007 ES, and the Modified 2013 Scheme, as well as data received from HES and the Highlands Historic Environment Record (HER) in July 2019. Site visits to designated assets within 15 km were undertaken in August 2019.
- 7.4.5 Assessment of effects on cultural heritage assets was undertaken, taking cognisance of the following guidance:
- Scottish Planning Policy;⁵
 - Historic Environment Policy for Scotland⁶, including Designation Policy and Selection Guidance⁷ and Scheduled Monument Consents Policy⁸;
 - Planning Advice Notes (PAN) for Scotland in particular PAN 2/2011 'Archaeology and Planning';⁹
 - Managing Change in the Historic Environment: Setting;¹⁰
 - The Highland-wide Local Development Plan, Policy 57;¹¹ and
 - THC Supplementary Guidance: Historic Environment Strategy.¹²

Consultation

- 7.4.6 Table 7.2. summarises the responses from statutory and non-statutory consultation bodies in regard to cultural heritage and the Proposed Varied Development.

⁵ Scottish Government. (2014). *Scottish Planning Policy (SPP)*. [https://www.gov.scot/publications/scottish-planning-policy/\(06/01/2020\)](https://www.gov.scot/publications/scottish-planning-policy/(06/01/2020))

⁶ Historic Environment Scotland (HES). (2019a). *Historic Environment Policy for Scotland (HESP)*. [https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/\(06/01/2020\)](https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/(06/01/2020))

⁷ Historic Environment Scotland (HES). (2019b) *Designation Policy and Selection Guidance*. [https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b\(06/01/2020\)](https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b(06/01/2020))

⁸ Historic Environment Scotland (HES). (2019c) *Scheduled Monument Consents Policy*. [https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=46d8502d-7059-416b-940e-aa250102112d\(06/01/2020\)](https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=46d8502d-7059-416b-940e-aa250102112d(06/01/2020))

⁹ Scottish Government. (2011). *Planning Advice Note 1/2011: Archaeology and Planning*. [https://www.gov.scot/publications/pan-2-2011-planning-archaeology/\(06/01/2020\)](https://www.gov.scot/publications/pan-2-2011-planning-archaeology/(06/01/2020))

¹⁰ Historic Environment Scotland (HES). (2016) *Managing Change in the Historic Environment*. [https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549\(06/01/2020\)](https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549(06/01/2020))

¹¹ The Historic Council (THC). (2012). *Highland-wide Local Development Plan*. [https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan\(06/01/2020\)](https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan(06/01/2020))

¹² ¹² The Historic Council (THC). (2013). *Highland Historic Environment Strategy*. [https://www.highland.gov.uk/downloads/file/11047/highland_historic_environment_strategy\(06/01/2020\)](https://www.highland.gov.uk/downloads/file/11047/highland_historic_environment_strategy(06/01/2020))

Table 7.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
20 th May 2019	Historic Environment Scotland (HES)	HES welcomed the intent to re-assess setting effects on heritage assets. HES stated that where significant effects are expected, appropriate visualisation or wirelines would be required. The required visualisations could be agreed with HES prior to submission of the EIA.	- All designated heritage assets within 15 km of the site were identified. Designated assets within 15km and within the Zone of Theoretical Visibility (ZTV) were subject to site visits for a reassessment of the potential impact of the Proposed Varied Development on their settings. - A list of proposed visualisations from designated assets within the ZTV was forwarded to HES on the 27th July 2019. The list has been reproduced in Technical Appendix 7.1, EIAR Volume 4. The list included the proposal for a photomontage from the Scheduled Ben Griam Beg (Site 15) (EIAR Volume 3b: Figure 7.4). - HES agreed the list of visualisations on the 29th July 2019, noting the appropriate inclusion of a photomontage from Ben Griam Beg (Site 15). - Cultural heritage visualisations have been reproduced in EIAR Volume 3b: Visualisations.
7 th June 2019	THC	THC noted that the Highland-wide Local Development Plan (HwLDP) Policy 57: Natural, Built and Cultural Heritage should be adhered to.	This assessment has been undertaken with cognisance of Policy 57.
		THC indicated that an assessment of the impact on cultural heritage designations and features that will be impacted by the Proposed Varied Development should be undertaken.	- All designated assets within 15 km have been identified and all designated assets within 15 km and the ZTV were subject to site visits. - A new search of the Highland HER has also been undertaken to compare the direct impact baseline between the Consented Scheme and the Proposed Varied Development (paragraph 7.6.4-9).

Table 7.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
18 th July 2019	The Scottish Government – Energy Consents Unit	Ministers did not agree to scoping out an assessment of direct impacts to cultural heritage assets.	- A search of the Highland HER and the National Record of Historic Environment (NRHE) has been undertaken for this assessment to compare the direct impacts baseline of the Consented Scheme and the Proposed Varied Development. - Due to the proximity of known heritage assets to the Proposed Varied Development infrastructure, potential direct impacts on known and unknown cultural heritage assets are assessed as part of this assessment.
31 st July 2019	THC	HES advised that the list of proposed visualisations would need to be agreed with THC.	THC agreed the proposed list of visualisations with no additional comments.

Baseline Conditions

Desk Study

7.4.7 For the purpose of this assessment, information was gathered from the following sources:

- HES: For NRHE data, World Heritage Sites data, Scheduled Monument data, Listed Buildings data, Inventory Garden and Designed Landscape data, and Inventory Battlefield data downloaded in July 2019;
- THC: For non-designated heritage assets as recorded on the Highland HER received July 2019;
- National Map Library of Scotland: For old Ordnance Survey maps (1st and 2nd Edition, small- and large-scale) and pre-Ordnance Survey maps;
- 2007 Environmental Statement (ES); for the original cultural heritage assessment, figures and visualisations;
- 2013 ES Addendum; for the modified cultural heritage assessment, figures and visualisations; and
- 2014 Further Information Report; for the latest produced cultural heritage assessment, figures and visualisations in respect of the Consented Scheme.

7.4.8 Each heritage asset referred to in the text is listed in the Technical Appendix 7.3: Heritage Assets Gazetteer (EIAR Volume 4: Technical Appendices) and shown on Figures 7.1 and 7.2 (EIAR Volume 3a: Figures). Each heritage asset has been assigned a 'Site No.' unique to this assessment. To avoid confusion Sites 1-9 are consistent with those used in the 2007 ES and Sites 10-26, 86 and 87 include cross-reference to their site reference in the 2007 ES (E1-17 and A33). The gazetteer includes information regarding the type, period, grid reference, NRHE number, HER number, statutory protective designation, and other descriptive information, as derived from the consulted sources.

Field Study

- 7.4.9 All designated assets within the ZTV were visited between the 27th and 29th August 2019. Weather conditions were sunny to overcast which provided good visibility.
- 7.4.10 No walkover of the site was undertaken for this assessment.

Cumulative Baseline

- 7.4.11 The cumulative baseline is based on seven cumulative developments: existing or consented wind farm developments at; Baillie; Strathly North; Bettyhill and Limekiln; in planning development at Strathly Wood; and, in scoping development at Armadale and Ackron.

Identification of Potential Effects

- 7.4.12 Potential direct effects have been identified by plotting the known heritage assets within the site, including those identified during works to inform the 2007 ES and 2013 ES Addendum, against the Proposed Varied Development infrastructure plan. Thirteen heritage assets have been identified within the site.
- 7.4.13 All designated heritage assets within 15 km, and Inventoried Garden and Designed Landscapes within 30 km of the site were identified and mapped. The ZTV suggests that 23 of the 73 designated assets within 15 km have theoretical visibility of the Proposed Varied Development (EIAR Volume 3a: Figure 7.2). One Inventoried Garden and Designed Landscape was identified within 30 km (EIAR Volume 3a: Figure 7.3). The ZTV indicates that there would be no theoretical visibility with the Proposed Varied Development.
- 7.4.14 Each designated asset within the ZTV was visited between the 27th and 29th August 2019.

Assessment of Residual Effects

Criteria for Assessing Sensitivity of Receptors

- 7.4.15 HEPS notes that to have cultural significance an asset must have a particular “*aesthetic, historic, scientific or social value for past, present and future generations*”¹³. Heritage assets also have value in the sense that they “*...create a sense of place, identity and physical and social wellbeing, and benefits the economy, civic participation, tourism and lifelong learning*”¹⁴.
- 7.4.16 For clarity, and to avoid confusion with ‘significance’ in EIA terms, the term ‘cultural value’ will be applied throughout this assessment though, as outlined above, it is acknowledged this is the same as cultural significance as defined in HEPS.
- 7.4.17 All heritage assets have some intrinsic value; however, some heritage assets are judged to be more important than others. The level of that importance is, from a cultural resource management perspective, determined by establishing the asset’s capacity to contribute to our understanding or appreciation of the past¹⁵. In the case of many heritage assets their importance has already been established through the designation (i.e. Scheduling, Listing and Inventory) processes applied by HES.

¹³ Historic Environment Scotland (HES). (2019a). *Historic Environment Policy for Scotland (HESP)*. <https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/> (06/01/2020)

¹⁴ Scottish Government. (2014). *Scottish Planning Policy (SPP)*. <https://www.gov.scot/publications/scottish-planning-policy/> (06/01/2020)

¹⁵ Historic Environment Scotland (HES). (2019b) *Designation Policy and Selection Guidance*. <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b> (06/01/2020)

- 7.4.18 The criteria used to rate importance of heritage assets are presented in Table 7.3 below and relate to the criteria for designations as set out in Designation Policy and Selection Guidance¹⁶, Scotland's Listed Buildings¹⁷ and professional judgement.

Table 7.3: Criteria for Establishing Relative Importance of Heritage Assets	
Importance	Receptors
International and National	- World Heritage Sites; - Scheduled Monuments (actual and potential); - Category A Listed Buildings; - Inventory Gardens and Designed Landscapes; - Inventory Battlefields; and/or - Fine, little-altered, and therefore outstanding, examples of some particular period, style or type.
Regional	- Category B Listed Buildings; - Conservation Areas; - Major examples of some period, style or type, which may have been altered; or - Assets of a type which would normally be considered of national importance that have been partially damaged (such that 'their inherent capability or potential to make a significant addition to the understanding or appreciation of the past' has been diminished).
Local	- Category C Listed Buildings; - Representative examples of any period, style or type, as originally constructed or altered, and simple, traditional sites, which group well with other significant remains, or are part of a planned group such as an estate or an industrial complex; and/or - Assets of a type which would normally be considered of regional importance that have been partially damaged or assets of a type which would normally be considered of national importance that have been largely damaged (such that their inherent capability or potential to make a contribution to the understanding or appreciation of the past has been diminished).
Negligible	- Relatively numerous types of remains; and/or findspots of artefacts that have no definite archaeological remains known in their context; and/or - Assets of a type which would normally be considered of local importance that have been largely damaged (such that their inherent capability or potential to make a contribution to the understanding or appreciation of the past has been diminished).

- 7.4.19 Determining cultural heritage value can be made with reference to the intrinsic, contextual and associative characteristics of an asset as set out in HEPS¹⁸ and its accompanying Designation Policy and Selection Guidance¹⁹. HEPS Designation Policy and Selection Guidance²⁰ indicates that the relationship of an asset to its setting or the landscape makes up part of its contextual characteristics. The Xi'an Declaration²¹ set out the first internationally accepted definition of setting with regard to cultural heritage assets, indicating that setting is important where it forms

¹⁶ ibid

¹⁷ Historic Environment Scotland (HES). (2019). *Scotland's Listed Buildings*. <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=34c90cb9-5ff3-45c3-8bc3-a58400fcbc44> (06/01/2020)

¹⁸ Historic Environment Scotland (HES). (2019a). *Historic Environment Policy for Scotland (HEPS)*. <https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/> (06/01/2020)

¹⁹ Historic Environment Scotland (HES). (2019b) *Designation Policy and Selection Guidance*. <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b> (06/01/2020)

²⁰ ibid

²¹ ICOMOS (2005). *Xi'an Declaration*. <https://www.icomos.org/xian2005/xian-declaration.htm> (06/01/2020)

part of or contributes to the significance of a heritage asset. SPP does not differentiate between the importance of the asset itself and the importance of the asset's setting. Indeed, under the section on Scheduled Monuments it states that '*where there is potential for a proposed development to have an adverse effect on a scheduled monument or on the integrity of its setting, permission should only be granted where there are exceptional circumstances*'.²² However, it is widely recognised²³ that the importance of an asset is not the same as its sensitivity to changes to its setting. Elements of setting may make a positive, neutral or negative contribution to the value of an asset.²⁴ Thus, in determining the nature and significance of impacts upon assets and their settings by the development, the contribution that the setting makes to an asset's value and importance, and thus its sensitivity to changes to setting, need to be considered.

- 7.4.20 This approach recognises the importance of preserving the integrity of the setting of an asset in the context of the contribution that setting makes to the experience, understanding and appreciation of a given asset. It recognises that setting is a key characteristic in understanding and appreciating of some, but by no means all, assets. Indeed, a nationally important asset does not necessarily have high sensitivity to changes to its setting (e.g. does not necessarily have a high relative sensitivity). An asset's relative sensitivity to alterations to its setting refers to its capacity to retain its ability to contribute to our understanding and appreciation of the past in the face of changes to its setting. The ability of an asset's setting to contribute to an understanding, appreciation and experience of the asset, and its value, also has a bearing on the sensitivity of that asset to changes to its setting. While all nationally important heritage assets are likely to be sensitive to direct impacts, not all will have a similar sensitivity to impacts on their setting; this would be true where setting does not appreciably contribute to their value or importance. Assets with high sensitivity to settings impacts may be vulnerable to any changes that affect their settings, and even slight changes may reduce their information content or the ability of their settings to contribute to the understanding, appreciation and experience of them. Less sensitive assets will be able to accommodate greater changes to their settings without material reduction in their ability to contribute to our understanding of the past and in spite of such changes the relationship between the asset and its setting will still be legible.
- 7.4.21 The criteria for establishing an asset's relative sensitivity to changes to its setting is detailed in Table 7.4. This table has been developed based on AOC's professional judgement and experience in assessing setting impacts. It has been developed with reference to the policy and guidance noted above including SPP²⁵, HEPS²⁶ and its Designation Policy and Selection Guidance²⁷, the Xi'an Declaration²⁸ and HES's guidance on the setting of heritage assets.²⁹

²² Scottish Government. (2014). *Scottish Planning Policy (SPP)*. [https://www.gov.scot/publications/scottish-planning-policy/\(06/01/2020\)](https://www.gov.scot/publications/scottish-planning-policy/(06/01/2020))

²³ Lambrick, G. *Setting Standards: A Review*

²⁴ Historic England (HE). (2017). *The Setting of Heritage Assets*. [https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/\(06/01/2020\)](https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/(06/01/2020))

²⁵ Scottish Government. (2014). *Scottish Planning Policy (SPP)*. [https://www.gov.scot/publications/scottish-planning-policy/\(06/01/2020\)](https://www.gov.scot/publications/scottish-planning-policy/(06/01/2020))

²⁶ Historic Environment Scotland (HES). (2019a). *Historic Environment Policy for Scotland (HESP)*. [https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/\(06/01/2020\)](https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/(06/01/2020))

²⁷ Historic Environment Scotland (HES). (2019b) *Designation Policy and Selection Guidance*. [\(06/01/2020\)](https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b)

²⁸ ICOMOS (2005). *Xi'an Declaration*. [\(06/01/2020\)](https://www.icomos.org/xian2005/xian-declaration.htm)

²⁹ Historic Environment Scotland (HES). (2016) *Managing Change in the Historic Environment*. [\(06/01/2020\)](https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549)

Table 7.4 – Criteria for Establishing Relative Sensitivity of a Heritage Asset to Changes to its Setting

Relative Sensitivity	Criteria
High	An asset in respect of which its setting contributes significantly to an observer's understanding, appreciation and experience of it should be thought of as having High Sensitivity to changes to its setting. This is particularly relevant for assets in respect of which their settings, or elements thereof, contribute directly to their cultural value (e.g. form part of their Contextual Characteristics (HES, 2019b, Annex 1). For example, an asset which retains an overtly intended relationship with its setting and the surrounding landscape. These may in particular be assets such as ritual monuments which have constructed sightlines to and/or from them or structures intended to be visually dominant within a wide landscape area e.g. castles, tower houses, prominent forts etc.; and/or An asset, the current understanding, appreciation and experience of which, relies heavily on its modern setting. In particular an asset for which its setting is an important factor in its protection and in retention of its cultural value (as per SPP 2014 definition of setting).
Medium	An asset in respect of which its setting contributes moderately to an observer's understanding, appreciation and experience of it should be thought of as having Medium Sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to value but whereby its value is derived mainly from its other characteristics.³⁰ This could for example include assets which had an overtly intended relationship with their setting and the surrounding landscape but where that relationship (and therefore the extent to which the assets' surroundings contribute to an understanding, appreciation and experience of them) has been moderately compromised either by previous modern intrusion in their setting or the landscape, or, where the asset itself is in such a state of disrepair that the relationship cannot be fully determined; An asset for which the current understanding, appreciation and experience of it relies partially on its modern setting regardless of whether or not this was intended by the original constructors or users of the asset; and/or An asset in respect of which its setting is a contributing factor to its protection and the retention of its cultural value.
Low	An asset in respect of which its setting makes some contribution to an observer's understanding, appreciation and experience of it should generally be thought of as having Low Sensitivity to changes to its setting. This may be an asset in respect of which its value is mainly derived from its other characteristics and whereby changes to its setting will not materially diminish our understanding, appreciation and experience of it. This could for example include assets which had an overtly intended relationship with their setting and the surrounding landscape but where that relationship (and therefore the ability of the assets' surroundings to contribute to an understanding, appreciation and experience of them) has been significantly compromised either by previous modern intrusion to its setting or the landscape or where the asset itself is in such a state of disrepair that the relationship cannot be determined.
Marginal	An asset in respect of which its setting makes minimal contribution to an observer's understanding, appreciation and experience of it should generally be thought of as having Marginal Sensitivity to changes to its setting. This may include assets for which the original relationship with their surrounding has been lost, possibly having been compromised by previous modern intrusion, but for which they still retain cultural value in their intrinsic and possibly wider contextual characteristics.

³⁰ Historic Environment Scotland (HES). (2019b) *Designation Policy and Selection Guidance*.

<https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b> (06/01/2020)

- 7.4.22 The evaluation of the sensitivity of a heritage asset to changes to its setting is first and foremost reliant upon the assessment of its setting and the elements of setting which contribute to its cultural value, and, an understanding and appreciation of that cultural value. The criteria set out in Table 7.4 are intended as a guide. Assessment of individual heritage assets is informed by knowledge of the asset itself; of the asset type if applicable and by site visits to establish the current setting of the assets. This allows for the use of professional judgement and each asset is assessed on an individual basis. It should be noted that individual heritage assets may fall into a number of the sensitivity categories presented above, e.g. a country house may have a high sensitivity to alterations within its own landscaped park or garden, but its level of sensitivity to changes may be less when considered within the wider landscape context. It is also the case that the wider landscape may not contribute to the understanding or appreciation of the asset at all.

Criteria for Assessing Magnitude of Impact

- 7.4.23 Potential direct impacts, that is the physical change to known heritage assets, and unknown buried archaeological remains, in the case of the Proposed Varied Development relate to the possibility of disturbing, removing or destroying in situ remains and artefacts during construction works.
- 7.4.24 The magnitude of the direct impact upon heritage assets caused by the Proposed Varied Development is rated using the classifications and criteria outlined in Table 7.5 below.

Table 7.5: Criteria for Classifying Magnitude of Direct Impact	
Physical Impact	Criteria
Substantial	Major loss of information content resulting from total or large-scale removal of deposits from an asset. Major alteration of an asset's baseline condition.
Moderate	Moderate loss of information content resulting from material alteration of the baseline conditions by removal of part of an asset. Moderate alteration of an asset's baseline condition.
Slight	Minor detectable impacts leading to the loss of information content. Minor alterations to the baseline condition of an asset.
Negligible	Barely measurable loss of information content. Loss of a small percentage of the area of an asset's peripheral deposits. Very slight and reversible alterations to an asset.
None	No physical impact anticipated.

- 7.4.25 The magnitude of impact upon the setting of heritage assets by the Proposed Varied Development is an assessment of the magnitude of change to the setting of any given heritage asset, in particular those elements of the setting that inform its cultural value. Assessments of impacts upon the setting of heritage assets have been informed by site visits, ZTV mapping, visualisations, where appropriate, and GIS analysis.
- 7.4.26 Table 7.6 outlines the main factors requiring consideration when assessing magnitude of impact.

Table: 7.6 Importance of Detail of Assessing Magnitude of Setting Impact	
Site Details	Importance of Detail for Assessing Magnitude of Setting Impact
Proximity to the site (for this assessment this is measured to the nearest proposed turbine)	Increasing distance of an asset from the site will, in most cases, diminish the effects on its setting.
Visibility of Proposed Varied Development	The proportion of the view from each asset which will feature the Proposed Varied Development will also affect the magnitude of impact. The existence of features (e.g. tree belts, forestry, landscaping or built features) that could partially or wholly obscure the development from view will also affect the magnitude of impact.
Complexity of landscape	The more visually complex a landscape is then the less prominent the Proposed Varied Development may appear within it. This is because where a landscape is visually complex the eye can be distracted by other features and will not focus exclusively on the new development. Visual complexity describes the presence, extent, character and scale of the existing built environment ³¹ and the extent to which there are various land types, land uses, and built features producing variety in the landscape and how the proposal compares to and fits in with this.
Design of Development	This refers to the perceived scale of the proposed change relative to the scale of the historic asset or place and its setting. Depending on the individual asset, the design of the Proposed Varied Development could affect the perception of dominance or foci of a particular asset and its relationship with other cultural and natural features within the landscape (SNH 2012). For example, whether the development would be seen against the skyline or against a backdrop of hills may affect the perception of the prominence of an asset and/or the Proposed Varied Development.

7.4.27 It is acknowledged that Table 7.6 primarily deals with visual factors affecting setting. While the importance of visual elements of settings, e.g. views, inter-visibility, prominence etc., are clear, it is also acknowledged that there are other, non-visual factors which could potentially result in setting impacts. Such factors could be other sensory factors, e.g. noise or smell, or could be associative. Where applicable these are considered in coming to a conclusion about magnitude of impact upon setting. Once the above has been considered, the prediction of the level of magnitude of impact upon setting is based upon the criteria set out in Table 7.7 below. In applying these criteria, particular consideration is given to the relationship of the Proposed Varied Development to those elements of setting which have been defined as the most important in contributing to the ability to understand, appreciate and experience the heritage asset and its cultural value.

Table: 7.7: Criteria for Assessing Magnitude of Settings Impact	
Magnitude of setting impact	Criteria
Substantial	• Direct and substantial visual impact on a key sightline to or from an asset; • Direct and substantial visual impact on a key 'designed-in' view or vista from an asset; • Direct severance of the relationship between an asset and its setting; and • An impact that changes the setting of an asset such that it affects the

³¹ Historic Environment Scotland (HES). (2016) *Managing Change in the Historic Environment*.
<https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549> (06/01/2020)

Table: 7.7: Criteria for Assessing Magnitude of Settings Impact	
Magnitude of setting impact	Criteria
	integrity of its setting (SPP 2014) and materially affects an observer's ability to understand, appreciate and experience the asset'.
Moderate	- Oblique visual impact on an axis adjacent to a key sightline to or from an asset, but where the key sightline of the asset is not obscured; - Oblique visual impact on a key 'designed-in' view or vista from a Designed Landscape or building; - Partial severance of the relationship between an asset and its setting; - Notable alteration to the setting of an asset beyond those elements of the setting which directly contribute to the understanding of the cultural value of the asset; and - An impact that changes the setting of an asset such that the understanding of the asset and its cultural value is marginally diminished.
Slight	- Peripheral visual impact on a key sightline to or from an asset; - Slight alteration to the setting of an asset beyond those elements of the setting which directly contribute to the understanding of the cultural value of the asset; and - An impact that changes the setting of an asset, but where those changes do not materially affect an observer's ability to understand, appreciate and experience the asset.
Negligible	All other setting impacts.
None	No setting impacts anticipated.

Criteria for Assessing Significance

7.4.28 The predicted significance of direct effect on each heritage asset is determined by considering the asset's importance in conjunction with the predicted magnitude of the impact. The method of deriving the level of effect significance resulting from a direct effect is provided below in Table 7.8.

Table 7.8: Significance of Direct Effects based on Inter-Relationship between the Importance of a Heritage Asset and the Magnitude of Impact (shaded boxes are levels of significance which are Significant in EIA terms)				
Magnitude of Impact	Importance of Asset			
	Negligible	Local (Low Sensitivity)	Regional (Medium Sensitivity)	National/International (High Sensitivity)
Substantial	Minor-Moderate	Moderate	Moderate-Major	Major
Moderate	Minor	Minor-Moderate	Moderate	Moderate-Major
Slight	Negligible	Minor	Minor-Moderate	Moderate
Negligible	Negligible	Negligible	Minor	Minor-Moderate
None	None	None	None	None

7.4.29 Using professional judgment and with reference to the Guidelines for Environmental Impact Assessment (as updated)³², this assessment considers moderate and greater effects to be significant (shaded grey in Table 7.8 above), while minor-moderate and lesser effects are considered not significant.

³² IEMA (2017) *Environmental Impact Assessment Guide*. <https://www.iema.net/assets/newbuild/documents> (06/01/2020)

- 7.4.30 The significance of effects on the setting of heritage assets is judged to be the interaction of the asset's relative sensitivity (Table 7.4) and the magnitude of the impact (Table 7.7), and also takes into consideration the importance of the asset (Table 7.9). In order to provide a measure of consistency, the assessment of sensitivity, the prediction of magnitude of impact and the assessment of significance of effect have been guided by pre-defined criteria³³. However, a qualitative descriptive narrative is also provided for each asset to summarise and explain each of the professional value judgements that have been made in establishing sensitivity and magnitude of impact for each individual asset.
- 7.4.31 The interactions determining significance of effect on the setting of the heritage assets in question are shown in Table 7.9.

Table 7.9: Significance Setting Effect based on Inter-Relationship between the Relative Sensitivity of the Heritage Asset and the Magnitude of Impact (shaded boxes are levels of significance which are Significant in EIA terms)

Impact Magnitude	Relative Sensitivity			
	Marginal	Low	Medium	High
Substantial	Minor	Minor-Moderate	Moderate	Major
Moderate	Negligible	Minor	Minor-Moderate	Moderate
Slight	Neutral	Negligible	Minor	Minor-Moderate
Negligible	Neutral	Neutral	Negligible	Minor
None	None	None	None	None

- 7.4.32 Using professional judgment, and with reference to the Guidelines for Environmental Impact Assessment (as updated)³⁴, effects established as moderate and greater are defined as significant in EIA terms (those shaded grey in Table 7.9), while those determined to be minor-moderate and less, are considered not significant.

Assumptions and Limitations

- 7.4.33 This assessment is based upon data obtained from publicly accessible archives as described in the Data Sources in Section 7.4.7 and site visits. Site visits were undertaken in August 2019. HER data was received in July 2019 and NRHE data was downloaded from HES in July 2019. This assessment does not include any records added after this date.

7.5 Baseline Conditions

Current Baseline

Context

- 7.5.1 The site is located within the Strathy South conifer plantation, an area described by the Historic Landuse Assessment as "Plantation" containing "densely packed, coniferous species" of tree.³⁵ The site is currently used for commercial forestry activities. The 2007 ES and 2013 ES Addendum concluded that there was a scarcity of evidence for prehistoric and historic settlement on the site.

³³ Scottish Natural Heritage (SNH). (2013). A Handbook on environmental impact assessment. <https://www.nature.scot/sites/default/files/Publication%202014%20-%20A%20handbook%20on%20environmental%20impact%20assessment.pdf> (11/08/2020)

³⁴ ibid

³⁵ Historic Environment Scotland (2019). Historic Landscape Assessment. <https://hmap.org.uk/>. (19/01/2020)

The Scottish Palaeoecological Database (SPAD)³⁶ records Strathly Bog in the area of the link corridor, however, as noted in the 2013 ES Addendum, forestry activities may have diminished the value of any palaeoenvironmental remains on the site.

Designated Assets

- 7.5.2 There are no designated assets, as registered by HES (World Heritage Sites; Scheduled Monuments; Listed Buildings; Inventoried Garden and Designed Landscapes; Inventoried Battlefields; and Conservation Areas) located on the site.
- 7.5.3 Within 15 km of the site there are:
- Forty-seven Scheduled Monuments;
 - One Category A Listed Building;
 - Ten Category B Listed Buildings; and
 - Fifteen Category C Listed Buildings (EIAR Volume 3a: Figure 7.2).
- 7.5.4 One Inventoried Garden and Designed Landscape has been identified within 30 km of the site. Tongue House (GDL00375) is located c. 17.58 km to the northwest of the site (EIAR Volume 3a: Figure 7.3).
- 7.5.5 Designated assets within 15 km, and Inventoried Garden and Designed Landscapes within 30 km of the site that were judged to be potentially subject to changes to their setting and/or occurred with the ZTV, were subject to further assessment and sites visits. Designated heritage assets identified as falling within the blade tip ZTV and shown in EIAR Volume 3a: Figure 7.2 include:
- Seventeen Scheduled Monuments;
 - One Category B Listed Building; and
 - Four Category C Listed Buildings.

Non-designated Assets

- 7.5.6 There are 13 non-designated heritage assets within the site, 11 of which were reported in the 2007 ES (Site 1-9, 86 & 87). These assets include a post-medieval hunting lodge at Lochstrathly (Site 9); two post-medieval buildings (Sites 1 & 3); two sheepfolds (Sites 4 & 7); and three mileposts (Sites 2, 6 & 8) which appear to have been moved potentially during activities relating to the widening of forestry access tracks. Within the Site Access are Dallangwell Farm (Site 87) and a cairn (Site 86) recorded during the cultural heritage survey for the 2007 ES. The 20th century bothy at Lochstrathly (Site 83) which stands on the location of a former farmstead and a sheepfold (Site 84) were noted within the site in the 2013 ES Addendum. All non-designated assets are shown on Figure 7.1 (EIAR Volume 3a).

Future Baseline

- 7.5.7 Future baselines (without the Proposed Varied Development) would largely be expected to mirror the current baseline. Any alteration to the baseline condition of the heritage assets within the site would likely relate to the ongoing forestry operations. The assets on the site would be at risk from potential further disturbance from tree and root growth, or by the eventual disturbance that may be caused by future felling and replanting activities.
- 7.5.8 The setting of assets in and round the site will be altered throughout proposed felling of all trees within the site in the next five years and then again by any future restocking. The setting of the assets within and around the site may also be altered in the future through the construction and operation of cumulative developments. The potential effects of the turbines associated with the

³⁶ Historic Environment Scotland (n.d.). Scottish Palaeoecological Database. <https://www.geos.ed.ac.uk/~ajn/spad/> (19/01/2020)

cumulative development is discussed in detail in the Section below on Potential Cumulative Operational Effects (paragraph 7.6.27-32).

Identified Sensitive Receptors

7.5.9 A summary of the receptors identified as being sensitive to the Proposed Varied Development and which have been 'scoped-in' to the assessment are as follows:

- Six non-designated assets (Sites 2, 4, 6, 7, 8 & 86) located within 50 m of proposed infrastructure;
- Seventeen Scheduled Monuments (Sites 10-21, 27, 32, 50, 53 & 56); and
- Five Listed Buildings; one Category B Listed Building (Site 26) and four Category C Listed Buildings (Sites 22-25).

7.5.10 Table 7.10 below provides a summary of issues scoped out of this assessment:

Table 7.10: Issues Scoped Out of the EIA	
Potential Effect	Basis for scoping out
Effects on the settings of designated heritage assets outside the ZTV	Assessment of the potential for effects upon the settings of designated heritage assets was only undertaken in those cases where the assets fell within the Proposed Varied Development's finalised ZTV. The majority of designated assets where no visibility is predicted have been scoped out. However, consideration was given to those assets that fall outwith the ZTV but where key views towards them might be impacted by the Proposed Varied Development. A total of 51 heritage assets within the identified cultural heritage study areas were found to be outwith the ZTV and thus excluded from further assessment.
Effects on the settings of Conservation Areas, Inventory Battlefields, and World Heritage	There are no Conservation Areas, Inventory Battlefields, or World Heritage Sites located within 15 km of the Proposed Varied Development.
Effects arising from decommissioning	Effects arising from the process of decommissioning have been scoped out since they are of a similar nature to construction issues, but of a smaller scale and shorter duration. However, the results of decommissioning (i.e. the removal of the wind farm) are taken into account in assessing ongoing and operational effects, where appropriate.
Effects on the settings of non-designated heritage assets	Assessment of the potential for effects upon the settings of non-designated heritage assets was only undertaken where these assets both fell within the ZTV and their assessment was specifically requested by the local planning authority or other consultees at scoping.
Direct effects on known heritage assets within the site located greater than 50 m from proposed infrastructure	Assets located more than 50 m from proposed infrastructure would not be impacted by the Proposed Varied Development.

7.6 Potential Significant Effects

- 7.6.1 Potential significant effects with regards to the Proposed Varied Development relate to the potential for adverse direct effects on known and unknown heritage assets and adverse effects on the setting of designated heritage assets.
- 7.6.2 There would be no direct effects on known heritage assets resulting from the Proposed Varied Development. The potential for direct effects on unknown heritage assets is considered to be Low and not significant as explained in paragraph 7.6.9 below.
- 7.6.3 There is judged to be a Minor-Moderate significance of effect on the setting of Ben Griam Beg (Site 15). The significance of effect is not considered to be significant in EIA terms. A detailed assessment of all other designated assets is provided within Technical Appendix 7.2 (EIAR Volume 4). No significant effects have been identified.

Potential Construction Effects

- 7.6.4 There are six heritage assets (Sites 2, 4, 6, 7, 8 & 86) located within the site and common access and within 50 m of the infrastructure of the Proposed Varied Development. The Cultural Heritage Importance of these non-designated assets has been rated in line with the methodology detailed in Table 7.3, 7.5 & 7.8 and are detailed in Table 7.11 below.

Table 7.11: Cultural Heritage Importance of Non-designated Assets within the Site				
Site Number	Site Name	Site Type	Designation	Importance
2	Milepost	Milepost	Non-designated	Negligible
4	Sheepfold	Sheepfold	Non-designated	Negligible
6	Milepost	Milepost	Non-designated	Negligible
7	Sheepfold	Sheepfold	Non-designated	Negligible
8	Milepost	Milepost	Non-designated	Negligible
86	A' Chailleach	Cairn	Non-designated	Local

- 7.6.5 A cairn (Site 86) was recorded in 2012, c.30 m west of the indicative cable route along the common access. The cairn is of unknown date, however prehistoric cairns and remains have been found in the wider area around Strathy and it is possible that the cairn is of prehistoric origin. The cairn, as an example of a potential prehistoric structure, is judged to be of Local importance.
- 7.6.6 Two post-medieval sheepfolds (Site 4 & 7) have been identified along the Allt Badain within 20 m north of the proposed cable route and within 50 m north of the on-site access tracks. The archaeological survey for the 2007 ES stated that no standing remains survived at the location of the sheepfold at Site 4, however a circular, grassy area was observed and it was concluded that this area may mark the location of the sheepfold (Site 4) and potentially buried remains of the asset. The sheepfold recorded as Site 7 was recorded in deep forestry during the archaeological works for the 2007 ES. A desktop survey in 2012 also noted the location of Site 7. Sheepfolds are common features in the Highlands and largely reflect the intensive use of the land from the mid 18th century onwards for sheep farming. These assets (Site 4 & 7) are judged to be of Negligible importance.
- 7.6.7 The former locations, according to historic maps, of three post-medieval mileposts (Sites 2, 6 & 8), are found within 50 m of the infrastructure of the Proposed Varied Development. Site 2 and Site 6 are recorded as being located between the proposed upgraded track to the west and the proposed cable layout in the north-eastern area of the site. Site 8 is noted immediately east of the proposed upgrade track in the southeastern area of the track. Archaeological works for the 2007 ES found no upstanding evidence of the mileposts (Site 2, 6 & 8) and it was hypothesised that they may have been disturbed or moved during a prior upgrade to the tracks within the site. This assessment judges the mileposts (Sites 2, 6, & 8) to be of Negligible importance as the assets are common

features of the post-medieval road network and since they appear to have been moved have no definite archaeological remains known in their context.

- 7.6.8 Construction effects on cultural heritage assets are largely limited to direct impacts. Construction impacts associated with the Proposed Varied Development include felling works, construction of hardstanding, excavations for borrow pits, underground cables and turbine bases and construction works for buildings and turbines. The Proposed Varied Development has been designed to avoid direct impacts on known heritage assets. There would be no direct impacts upon known heritage assets within the site.
- 7.6.9 The site is currently occupied by Strathy South conifer plantation. Activities associated with forestry operations have been found to detrimentally affect buried archaeological and palaeoenvironmental remains. However, the potential for hitherto unknown archaeological remains cannot be wholly discounted and there is judged to be a Low potential for hitherto unknown archaeological remains to survive on the site. The Proposed Varied Development has the potential to have a Low level of impact on any hitherto unknown archaeological remains. The level of impact is unlikely to reach the significance threshold.

Potential Operational Effects

- 7.6.10 Operational effects include potential impacts upon the settings of designated assets such as Listed Buildings, Scheduled Monuments, and Inventory Gardens and Designed (note no Conservation Areas, Inventory Battlefields, or World Heritage Sites are located within the cultural heritage study areas). No direct effects upon designated or non-designated assets are anticipated during the operational phase.
- 7.6.11 A Zone of Theoretical Visibility (ZTV) provided for this assessment indicated areas of theoretical visibility. The maximum height of the proposed turbines is 200 m. Twenty-nine Scheduled Monuments, an Inventoried Garden and Designed Landscape and 21 Listed Buildings within the cultural heritage study areas have been found to be located outwith the ZTV and as such have been excluded from further assessment. The wireline from Armadale broch (Site 61) shows no intervisibility with the Proposed Varied Development (EIAR Volume 3b: Figure 7.5). Settings Assessments for 11 Scheduled Monuments and five Listed Buildings within the ZTV, which are unlikely to have significant setting effects, are reported in Technical Appendix 7.2 (EIAR Volume 4). The 2007 ES judged there to be a potential likely significant effect on the setting of the Scheduled remains at Ben Griam Beg (Site 15). As such the setting of Ben Griam Ben has been reassessed for the Proposed Varied Development. Five Scheduled Monuments (Sites 27, 32, 50, 53 & 56) not previously identified by the 2007 ES and the 2013 ES Addendum as having likely setting impacts have been identified within the ZTV for the Proposed Varied Development and are also assessed. Table 7.12 details the predicted level of effect on the setting of these Scheduled Monuments from the Proposed Varied Development in line with Tables 7.4, 7.6, 7.7 and 7.9.

Table 7.12: Significance of Effect on the Settings of Scheduled Monuments

Site Name	Site Number	Distance from nearest turbine	Number of theoretically visible turbines	Other factors Effecting Visibility	Relative Sensitivity	Magnitude of Setting Impact	Significance of Effect
Ben Griam Beg	15	8.64 km north northeast T28	39	-	High	Low	Minor-moderate
Dun Chealamy, broch	27	5.73 km east T41	1-5	The site is located in Strathnaver and its	Low	Low	Negligible

Table 7.12: Significance of Effect on the Settings of Scheduled Monuments							
Site Name	Site Number	Distance from nearest turbine	Number of theoretically visible turbines	Other factors Effecting Visibility	Relative Sensitivity	Magnitude of Setting Impact	Significance of Effect
				setting is related to that valley setting.			
Halladale Bridge	32	14.08 km north east T1	1-5	-	Low	None	None
Skelpick, long cairn	50	6.93 km WNW T69	1-5	-	Low	Negligible	Neutral
Carnachy, hut circles, Stratnaver	53	5.66 km east of T41	1-5	The site is located in Stratnaver and its setting is related to that valley setting.	Low	Low	Negligible
Rosdal, deserted township	56	11.4 km southwest T35	1-10	Surrounded by modern forestry.	Low	Negligible	Neutral

- 7.6.12 All plates referenced in the text below are contained within EIAR Volume 4: Technical Appendix 7.4: Cultural Heritage Plates.
- 7.6.13 The Scheduled remains of the highest hill fort in Scotland (580 m OD) are located on the summit of Ben Griam Beg (Site 15). The remains include a roughly oval, drystone wall enclosure with a potential inner walled area. A possible hut circle has been identified within the enclosure and a gully has been recorded crossing beneath the southwestern wall. There appear to be two annexes to the main enclosed area, one on the northern side and one on the western side. Another wall has been recorded on the southern flank of the hill between 90 m and 120 m OD. At the walls eastern-end a cluster or small enclosure has been identified. The hillfort was built on the west saddle of Ben Griam Beg summit which would have provided good natural defences for the fort as well as excellent views of the surrounding landscape, including uninterrupted views across the moorland to the north, to the north coast. The Scheduled hillfort (Site 15) was clearly built with its vertical and visual planes in mind and is considered to be of High relative sensitivity to changes in its setting.
- 7.6.14 The closest turbine, T28, of the Proposed Varied Development is located 8.64 km north northeast of the Scheduled Monument (Site 15). Due to the low lying, largely blanket peat occupied land between Ben Griam Beg (Site 15) and the Proposed Varied Development, all 39 turbines would be visible from the Scheduled Monument (EIAR Volume 3b: Figure 7.4 a-d & 7.4 a). The Proposed Varied Development would appear as an overtly modern addition in the wider landscape, to the north of the Scheduled Monument (Site 15-Figure 7.9 a), in one of the three directions of visibility from the hill fort (Site 15- EIAR Volume 3b: Figure 7.4 a-d). The Proposed Varied Development would thus impact on a key previously uninterrupted view from the hillfort (Site 15) to the north, the northern coastline and the sea (EIAR Volume 3b: Figure 7.4 a). However, an observer would still be able to appreciate and understand the northern views and coastal views from Ben Griam Beg (Site 15). Furthermore, visibility of the Proposed Varied Development would not diminish the ability to understand and appreciate the vertical location of the hill fort (Site 15) in the landscape,

nor would it impede the ability of the viewer to understand the defensive advantages of Ben Grian Beg (Site 15). Near views from the hillfort to the north, west and south would remain largely unchanged (EIAR Volume 3b: Figures 7.4 b-d). As such there is judged to be a Low magnitude of setting impact from the Proposed Varied Development. The predicted significance of effect would be Minor-moderate level of effect, which is not considered to be significant in EIA terms.

- 7.6.15 Dun Chealamy broch (Site 27) is a Scheduled Monument located on the western slopes of Strathnaver, on a spur of the Carnachy Burn. The broch is naturally defenced on all sides except the southwest, and a double rampart and traces of a ditch have been recorded around the broch (Site 27). Potentially the broch (Site 27) forms part of a chain of brochs along Strathnaver. The broch would have had good views within the immediate area, which occupied by river floodplains may have provided good agricultural ground. In addition, the location of the broch (Site 27) on a spur of higher ground would have afforded longer views north and south along Strathnaver. The broch's (Site 27) naturally defensive location makes it highly sensitive to changes within its immediate setting. However, the broch is judged to have a Low relative sensitivity to changes beyond Strathnaver.
- 7.6.16 The Proposed Varied Development would be located c. 5.73 km east of the broch (Site 27) beyond Strathnaver. The ZTV indicates that there would be intervisibility of 1-5 turbines. Due to topography it is likely that these turbines would only be visible as tips of blades and be appreciably outwith the setting of the broch (Site 27). As such the magnitude of impact by the Proposed Varied Development would be Low. The significance of effect would be Negligible and not significant in EIA terms.
- 7.6.17 A number of hut circles have been collectively Scheduled at Site 53, to the north of Dun Chealamy broch (Site 27) on the floodplain of the Carnachy Burn and to the west of the River Naver in agricultural pastureland. The land to the west, north and south rises and envelopes the area around Site 53. The hut circles are open to the east and would have had views across the River Naver and its associated fertile land. Hut circles as domestic features may be designed with the wider setting in mind, and it appears as though the valley setting of the hut circles was an important choice for the builders. It is also possible due to the density of prehistoric and historic settlement remains along Strathnaver that the position of the settlement (Site 53) within the strath was important when the hut circles (Site 53) were occupied. In terms of the wider landscape, the hut circles are judged to be of Low relative sensitivity to changes outwith Strathnaver.
- 7.6.18 The closest turbine of the Proposed Varied Development would be located c. 5.66 km east of the hut circles, beyond the eastern brough of Strathnaver. The ZTV indicates that 1-5 turbines would be visible from Site 53, and any intervisibility would likely be limited to turbine blades. As the Proposed Varied Development is located beyond the setting of the Scheduled Monument (Site 53), there is judged to be a Low magnitude of impact and an overall Negligible significance of effect. This significance of effect is not deemed significant in EIA terms.
- 7.6.19 Halladale Bridge Scheduled Monument (Site 32) is composed of two roughly square in plan areas on the eastern and western sides of the A836, where it is oriented north, south. The monument includes hut circles, a roundhouse and clearance cairns of uncertain date, but is most likely of prehistoric date. Both areas of the monument (Site 32) are currently inaccessible due to the presence of locked gates and high fences (over 2 m). When viewed from the A836 no features were overtly visible within the monument (Site 32) and the land was occupied by long grass (EIAR Volume 4: Technical Appendix 7.3 - Plates 7.21 & 7.22). The monument is located on northwest sloping land on the upper slopes of the Halladale strath, which overlooks the North Sea and the beach at Melvich. The monument has also been bisected by the A836, although the polygon extent of the monument (Site 32) depicted on the Highlands HER website does indicate that part of the monument (Site 32) may survive beneath the extant road. The land to the south rises along Strath Halladale and views to the east also rise due to the topography of the coats and strath. The monument, a domestic and most likely agricultural settlement appears to have been sited for its

relationship to the Halladale valley and coast, and as such would have a higher relative sensitivity to change in that direction. The relative sensitivity of the monument, in a southern direction is judged to be Low.

- 7.6.20 The Proposed Varied Development at c.14 km to the southwest would potentially be visible in the far distance, in a sightline which does not appear integral to the understanding of the monument. Views along Strath Halladale and to the North Sea, as well as the monuments (Site 32) immediate surroundings would not be affected by the Proposed Varied Development. As such the Proposed Varied Development would not impede the ability to understand the monument in its setting. A wireline created from the western side of Halladale Bridge Scheduled Monument (Site 32) indicates that the Proposed Varied Development would not be visible from the Scheduled Monument (EIAR Volume 3b: Figure 7.6). However, there may be partial intervisibility from the eastern portion of the Scheduled area due to it being position further upslope. Therefore, there is a Negligible magnitude of change and the significance of effect would be Neutral. The significance of effect is not considered significant in EIA terms.
- 7.6.21 Skelpick Long cairn (Site 50) is a Scheduled chambered cairn located on the east side of Skelpick Burn, a small stream to the east of the River Naver (Plate 7.20). The cairn (Site 50) is located on the lower terrace of the Skelpick Burn, with the land rising steeply upwards to the east, up to the ridgeline of Strathnaver. The topography to the south of the cairn (Site 50) is variable, most likely a result of river action and as such clear views south from the cairn (Site 50) are curtailed down the Skelpick Burn valley. The northward views from the cairn (Site 50) include a long view along Strathnaver, and the North Sea is visible in the far distance. Land to the west falls to the Skelpick Burn and then rises to the relatively flat plateau, to the River Naver, further west. As such the cairn (Site 50) has views to the west, across what is now semi-improved pastureland. Also, to the west are a number of agricultural and domestic structures which relate to the post medieval and modern use of Strathnaver.
- 7.6.22 It is argued that water and stone (in the form of chambered cairns) were two substances associated with transformation and the realms of the living and the dead during the Neolithic.³⁷ The choice of location of the erection of the funerary cairn (Site 50) by a small burn may be of some importance. It is likely that the cairn (Site 50) had intervisibility with Skelpick Lodge Chambered Cairn (Site 14) to the southeast, which was located on slightly higher ground between the Skelpick Burn and River Naver. Therefore, it appears that the cairn (Site 50) was positioned on relatively low-lying ground to be near water and to have intervisibility with other funerary monuments within Strathnaver. The cairn is judged to have a High relative sensitivity to changes within the strath, and Low relatively to changes beyond the valley setting. The Proposed Varied Development located 6.89 km west northwest would be peripherally visible, as a limited number of turbines blades beyond the eastern ridgeline of Strathnaver (EIAR Volume 3b: Figure 7.12), beyond the setting the intended setting of the cairn (Site 50). The magnitude of change would be Negligible and the significance of effect Neutral. The significance of effect is not considered significant in EIA terms.
- 7.6.23 Rosdal (Site 56) is a Scheduled deserted settlement located on a relatively flat area of ground on the west facing slope of Strathnaver. The monument (Site 56) consists of the remains of a pre-clearance township (Plate 23), that was cleared in the 19th century by the Countess of Sutherland during the Highland Clearances. During this period crofting communities were often forced off their land, for the landowners to use the land for sheep farming which was considered a more profitable use of the land. The remains of several buildings and earthworks associated with small scale agriculture are visible within the monument (Site 56). Rosdal is currently surrounded by

³⁷ McClean, S. (2016). "Seaweeds and Limpets will Grow on our Grave Stones: On Islands, Time, Death and Inhuman Materialities" In *Taming time, Taming Death: Social Technologies and Ritual* (eds) R. Willerselv & D. Refslund; Routledge, London; Cummings, V. & Fowler, C. (2015). *The Neolithic of the Irish Sea*. Oxbow Books, Oxford

modern forestry plantations and the Forestry Commission Scotland have created a car park to the west of the monument (Site 56) to provide access and interpretation material including interpretation boards, a listening post and walking trail around Rosdal (Site 56) to facilitate visitors to the monument and also explain its history and importance. The monument (Site 56) would have had views in all directions when in use, but as an agricultural community the local landscape including access to the River Naver and usable agricultural land would have been the key relationships for the township (Site 56). In the modern era the township (Site 56) has been encircled by trees, and further modern forestry plantations which were partially being felled during the site visit extend to the north and south. The plantations make it difficult to discern any inter-relationships with other pre-clearance townships of dispersed settlements in the wider area. As such whilst the monument (Site 56) may have relatively high sensitivity to change within the Scheduled area, the monument (Site 56) is considered to have a Low relative sensitivity to changes outwith the surrounding forestry.

- 7.6.24 The Proposed Varied Development located c.11.38 km northeast of the monument (Site 56) would constitute a Negligible magnitude of change clearly being located outwith the immediate setting of the monument (Site 56). A wireline from Rosdal (Site 56- EIAR Volume 3b: Figure 7.7) indicates that three tips of the Proposed Varied Development would be visible in the far distance from the centre of the monument (Site 56) and that the tips of Armadale Windfarm would be visible also in the far distance from the monument. As such the Proposed Varied Development would not impede the ability of an observer to understand the township remains (Site 56) nor its present and historical setting at the southern end of Strathnaver. The significance of effect would be Neutral and not significant in EIA terms.

Potential Decommissioning Effects

- 7.6.25 Effects arising from the process of decommissioning have been scoped out since they are of a similar nature to construction issues, but of a smaller scale and shorter duration (Table 7.10).

Potential Cumulative Construction Effects

- 7.6.26 There are anticipated to be no potential cumulative construction effects.

Potential Cumulative Operational Effects

- 7.6.27 Cumulative effects relating to cultural heritage are for the most part limited to effects upon the settings of heritage assets. This assessment considers the significance of cumulative effects arising from the addition of the Proposed Varied Development to other cumulative developments upon the setting of heritage assets. These are the effects which are predicted to occur during the operational phase.
- 7.6.28 The assessment considers operational, consented and within-planning and scoping developments which were agreed during the consultation process with THC. Seven cumulative developments have been identified for an assessment of cumulative impacts; three operational Bettyhill; Strathy North; and Baillie; two consented; Strathy South and Limekiln; one in planning; Strathy Wood and two at scoping Ackron and Armadale. These cumulative developments are shown on cultural heritage wirelines as appropriate. While all have been considered, only those which contribute to, or have the possibility to contribute to, cumulative effects on specific heritage assets are discussed in detail in the text. Additionally, given the emphasis SNH place on significant effects, cumulative effects have only been considered for those assets where the effects upon the setting from the Proposed Varied Development, alone, have been judged to be an effect of Minor-moderate level or greater. The setting of assets which would have an effect of less than Minor-moderate level are unlikely to reach the threshold of significance as defined in Table 7.9 and paragraph 7.4.32 above.
- 7.6.29 A potential Minor-moderate significance of effect on the setting of the Scheduled remains on Ben Griam Beg (Site 15) has been identified. There are no cumulative developments to the east, south

or west of Ben Griam Beg (Site 15) and as such the southern view provides a view from the monument without turbines (EIAR Volume 3b: Figure 7.4.c-d). The northern view from the hillfort (Site 15) will include the turbines of Strathly South, Bettyhill, Armadale, Strathly North and Strathly Wood, however these turbines are all located over 10km to the north of the hillfort and would be visible in one arc. Given the distances involved, and as shown on Figure 7.4 a (EIAR Volume 3b) these wind farms will appear as one large, dispersed wind farm. As such the arc to the north will appear to be one large turbine field. The addition of the Proposed Varied Development within the same arc of view but closer to the monument would bring this large turbine field closer to the monument and contribute to a sense of a larger and more proximate turbine field.

- 7.6.30 Approximately 22 km north west of Ben Griam Beg, the 'in scoping' Ackron development would most likely not be readily discernible in the wider landscape and would only be visible on clear days. These turbines do not challenge the present skyline nor the uninterrupted view of the landscape between Ben Griam Beg and the 'in scoping' Ackron development.
- 7.6.31 The cumulative developments consisting of two additional wind farms, Baillie Wind Farm (operational) and Limekiln Wind Farm (consented), located over 20 km northeast of Ben Griam Beg (Site 15), may be visible from the higher point to the east of Scheduled area (Site 15- LVIA VP1), although from the centre of the hillfort (Site 15) due to the rising ground to the summit of Ben Griam Beg the views eastward are limited. At such a distance there would be limited impact on the setting of Ben Griam Beg (Site 15). An observer at the hillfort would still be able to understand the monuments defensive position and appreciate the long and wider northern views from the monument (Site 15).
- 7.6.32 The addition of the Proposed Varied Development in the same view as cumulative developments to the north of the hillfort (EIAR Volume 3b: Figure 7.4 b) would constitute a notable alteration to the wider setting of the fort and would increase the proportion of view occupied by wind farm development and the perception of proximity of the turbines. The turbines would be visible as modern intrusions in the landscape to the north and as such partially sever the uninterrupted views of the landform to the north, towards the north coast and North Sea from the hillfort (Site 15). However, the overall integrity of the setting of the hillfort and the ability to understand it as a defensive monument placed to command panoramic views across the landscape and towards the coast would not be affected. As such a Medium magnitude cumulative impact is predicted. This would result in a Moderate cumulative significance of effect. The significance of effect is considered to be significant in EIA terms.

7.7 Mitigation

- 7.7.1 There would be no significant direct impacts resulting from the Proposed Varied Development and as such no mitigation is required.
- 7.7.2 In terms of indirect effects there is judged to be a likely significant cumulative impact on the setting of Ben Griam Beg hillfort (Site 15). The cumulative magnitude of impact would be Medium, and the level of effect would be Moderate. There would be a partial severance of the long, northern views from the hillfort (Site 15) as the Proposed Varied Development constitutes a modern intrusion in a relatively flat landscape which continues to the north coast of Scotland and the sea and would appear as a large turbine field set to the north of the hillfort. However, the ability to understand the defensive nature of the hillfort (Site 15) would be maintained. The integrity of the setting of the Ben Griam Beg would not be adversely affected (as per para 145 of SPP). No direct mitigation is possible for cumulative setting effects beyond that inherent in the current design.

Mitigation during Construction

- 7.7.3 There would be no direct impacts on known heritage assets during the Construction phase. Known heritage assets would be fenced prior to works commencing, to prevent accidental damage (outlined in Table 7.14).
- 7.7.4 As advised in the 2013 ES Addendum, a toolbox talk should be undertaken prior to construction works to appraise the on-site construction team of what to do should hitherto unknown archaeological remains be uncovered. A Written Scheme of Investigation (WSI) would be submitted to THC for the provision of a toolbox talk and the due process to be followed in the scenario that archaeological remains are uncovered. This would provide clear steps of reporting, communication and actions to be undertaken in the event of hitherto unknown archaeological remains being uncovered that can be disseminated across the construction team. Further details are outline in Table 7.14 and in the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1).
- 7.7.5 No further mitigation is advised.

Mitigation during Operation

- 7.7.6 No likely significant effects on designated assets within 15km of the site have been identified and as such no mitigation is required.

Mitigation during Decommissioning

- 7.7.7 No direct impacts are anticipated during the Construction phase. It is advised that during Decommissioning works the same routeways are used throughout the site and Site Access to continue to avoid known heritage assets.

7.8 Assessment of Residual Effects

- 7.8.1 The residual effect is the significance of effect following the application of mitigation and management measures, and after construction has been completed. In terms of the methodology reaching conclusions on residual effects forms the final stage of assessing the significance of the effects on cultural heritage assets that would be associated with the Proposed Varied Development. As no predicted significant construction or operational effects have been identified, the assessed predicted effect would remain not significant in each case. No direct mitigation is possible for cumulative (setting) effects, the only significant predicted effect identified, and therefore residual effects on the setting of heritage assets would be the same as predicted for the operational phase.

Residual Construction Effects

- 7.8.2 There would be no residual construction effects.

Residual Operational Effects

- 7.8.3 The predicted residual impacts on the settings of designated heritage assets will be the same as assessed for the predicted operational effects. No significant residual operational effects are predicted to result from the operation of the Proposed Varied Development. There would be a Minor-moderate and not significant residual effect on the setting of Ben Griam Beg (Site 15) and Fiscary cairns and chambered cairn (Site 13). All other residual effects would be at most Minor and not significant.

Residual Decommissioning Effects

- 7.8.4 All operational effects upon the settings of designated assets would be as predicted for operational effects for the life of the Proposed Varied Development, however, those effects would be reversed with the removal of the turbines following decommissioning.

Residual Cumulative Construction Effects

- 7.8.5 The would be no cumulative construction effects.

Residual Cumulative Operational Effects

- 7.8.6 There would be a residual cumulative Moderate significance of effect on the setting of the Scheduled Ben Griam Beg (Site 15). This significance of effect is judged to be Significant in EIA terms.

7.9 Monitoring

- 7.9.1 No monitoring is required.

7.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

- 7.10.1 This assessment has found no difference between the likely significant effects found in the Consented Scheme compared to the Proposed Varied Development. Due to changes to the infrastructure, between the Consented Scheme and Proposed Varied Development, direct impacts were reassessed, however no direct impacts are anticipated from the Construction phase of the Proposed Varied Development.
- 7.10.2 There is judged to be a cumulative Moderate level of effect on the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is considered to be Significant and was reported as part of the Consented Scheme.

Table 7.13: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Cultural Heritage Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Construction				
Direct effects on known heritage assets on-site.	The 2013 ES Addendum concluded that direct effects on known heritage assets would be Negligible. This level of effect is not judged to be Significant in EIA terms.	N/A.	This assessment judged there to be no direct impacts on known heritage assets. This level of effect is not judged to be Significant in EIA terms.	The Proposed Varied Development infrastructure has been designed to avoid all known heritage assets. No material change.
Direct effects on hitherto unknown buried archaeological remains on-site.	The 2013 ES Addendum concluded direct effects on unknown heritage assets would be Negligible. This level of effect is not judged to be Significant in EIA terms.	N/A	This assessment judged there to be Low potential for hitherto unknown remains to survive on-site. The level of effect is not judged be Significant in EIA terms.	No material change.
Operation				
Setting effects on designated cultural heritage assets.	The 2013 ES Addendum judged there to be a Minor significance of effect on the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is not considered to be Significant in EIA terms.	N/A	This assessment considers there to be a Minor-moderate significance of effect in the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is not considered to be Significant in EIA terms.	No material change. The difference reported is due to terminology and methodology.

Table 7.13: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Cultural Heritage Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Decommissioning				
Decommissioning effects were scoped out.	N/A	N/A	N/A	N/A
Cumulative Construction				
Cumulative construction effects were scoped out.	N/A	N/A	N/A	N/A
Cumulative Operation				
Cumulative operational setting effects.	The 2013 ES Addendum considered there to be a cumulative Minor-Major significance of effect on the setting of the Scheduled Ben Griam Beg (Site 15). The 2013 ES Addendum does not conclude whether this level of effect is Significant or not. A Minor level of effect would not be considered Significant, whereas a Major level of effect would be considered Significant.	N/A	This assessment considers there to be a cumulative Moderate significance of effect on the setting of Ben Griam Beg (Site 15). This level of effect is judged to be Significant in EIA terms.	No material change. The difference reported is due to terminology and methodology; however, there is no change to the overall significant effect.

7.11 Summary and Conclusions

- 7.11.1 This assessment has reassessed the potential for construction effects on heritage assets within the site due to changes in infrastructure between the Consented Scheme and the Proposed Varied Scheme.
- 7.11.2 No direct impacts on known heritage assets have been identified and as such there would be no effects on known heritage assets during the construction phase. There is a Low potential for hitherto unknown archaeological remains to survive on the site. It is advised that an agreed archaeological process is confirmed with THC through a Written Scheme of Investigation which would detail actions to be taken in the event of discovery of archaeological remains during construction. This process would be disseminated to the construction team via a toolbox talk.
- 7.11.3 The assessment has identified 18 Scheduled Monuments and five Listed Buildings within the ZTV of the Proposed Varied Development. An assessment of the impact on the setting of the Scheduled remains of Ben Griam Beg (Site 15) and five Scheduled Monuments within 15 km of the site, not previously located within the ZTV of the Consented Scheme, are reported within this Chapter. A settings assessment of the remaining 12 Scheduled Monuments and five Listed Buildings are detailed within Technical Appendix 7.2: Settings Assessment (EIAR Volume 4).
- 7.11.4 The Scheduled remains of Ben Griam Beg (Site 15) are judged to be of High relative sensitivity to change. The Proposed Varied Development would constitute a Low magnitude of change to the setting of the fort and the predicted level of setting effect is Minor-moderate and not significant. Effects on the settings of the five Scheduled Monuments, not previously located within the ZTV, have been assessed as Negligible or Neutral and not significant in each case.
- 7.11.5 Assessment of the cumulative impact on the Scheduled Ben Griam Beg (Site 15) identified seven cumulative developments, largely located to the north and northeast of the fort. The addition of the Proposed Varied Development would increase the proportion of the view from this Scheduled Monument that would be occupied by wind farm development. It would also be located in closer proximity to the monument than the other cumulative developments. This would constitute a notable alteration to the wide and long, currently uninterrupted, northern view from Ben Griam Beg (Site 15) across the peatland to the north coast and North Sea. A moderate and significant cumulative effect is predicted.

Table 7.14: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Construction				
Direct effects on known heritage assets	Not significant	Heritage assets to be fenced prior to works commencing as presented in the outline CEMP (EIAR Volume 4: Technical Appendix 2.1).	Final CEMP to be submitted for the written approval of THC, SNH and SEPA prior to construction commencing and delivered as condition of consent.	Not significant
Direct effects on hitherto unknown buried heritage assets	Not significant. (The level of impact is unlikely to reach the	An archaeological contractor will undertake a walkover survey of the precise location of ground impact,	Final CEMP to be submitted for the written approval of THC, SNH and SEPA prior to construction commencing and	Not significant

Table 7.14: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development				
Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
	significance threshold).	will provide toolbox talks to enable the identification of archaeological remains and will remain on call in the case that archaeological remains are identified; as presented in the outline CEMP (EIAR Volume 4: Technical Appendix 2.1).	delivered as condition of consent.	
Operation				
Effect on setting of assets from the Proposed Varied Development.	Not significant	None	N/A	Not significant
Decommissioning				
N/A	N/A	N/A	N/A	N/A
Cumulative Construction				
N/A	N/A	N/A	N/A	N/A
Cumulative Operation				
Cumulative operational setting effects	The significance of effect on the setting of Ben Griam Beg (Site 15) is judged to be Moderate. The significance of effect is considered Significant in EIA terms.	None	N/A	The significance of effect on the setting of Ben Griam Beg (Site 15) is judged to be Moderate. The significance of effect is considered Significant in EIA terms.

7.12 Glossary and Abbreviations

Abbreviation (in alphabetical order)	Expanded Term
CIfA	Chartered Institute for Archaeologists
EIA	Environmental Impact Assessment
ES	Environmental Statement
HEPS	Historic Environment Policy for Scotland (2019)

Abbreviation (in alphabetical order)	Expanded Term
HER	Historic Environment Record
HES	Historic Environment Scotland
HLA	Historic Landscape Assessment
ICOMOS	International Council on Monuments and Sites
IGDL	Inventory Garden and Designed Landscape
NRHE	National Record of the Historic Environment
SPAD	The Scottish Palaeocological Database
SPP	Scottish Planning Policy (2014 Edition)
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

8. ROADS AND TRAFFIC

8.1 Executive Summary

- 8.1.1 It is recognised that traffic activity associated with the operational and maintenance phase of the Proposed Varied Development would be very low, and such traffic generated during the operational phase would not be expected to produce any significant effects. For the decommissioning phase, the future baseline situation would not be reliably predictable given the long duration between the present day and decommissioning. Relevant authorities would therefore be consulted with respect to decommissioning and an appropriate level of assessment undertaken at that time, if deemed appropriate.
- 8.1.2 Consequently, this assessment focuses solely upon the potential significant traffic and transport effects associated with the construction phase of the Proposed Varied Development.
- 8.1.3 The Study Area, agreed with The Highland Council (THC), has been defined as the public road network in the vicinity of the site which would be most commonly used for access by traffic generated by the Proposed Varied Development. The Study Area incorporates the following public road Route Sections; illustrated contextually in Figure 8.1a (EIAR Volume 3a):
- Route Section (RS) 1 – A9(T) between the A99(T) and the A836;
 - RS2 – A9(T) between the A836 (east) and the A836 (west);
 - RS3 – A9(T) between Scrabster and the A836;
 - RS4 – A836 between the A9(T) and the A897; and
 - RS5 – A836 between the A897 and the site access.
- 8.1.4 The following categories of potential effects have been considered for route sections within the Study Area during the main construction phase¹ for the Proposed Varied Development in isolation and cumulatively with cumulative developments² which are likely to utilise local roads at the same time as traffic generated by the Proposed Varied Development:
- driver delay;
 - road safety;
 - community effects (severance, pedestrian amenity / fear and intimidation and pedestrian delay); and
 - the physical effects (wear and tear) of Heavy Goods Vehicle (HGV) traffic (including abnormal load) on the public road infrastructure.
- 8.1.5 Using the indicative construction programme and the anticipated vehicle movements provided by the Applicant for each activity, the number of vehicle movements that are anticipated for each month of the construction programme has been calculated. The vehicle movements calculated have then been distributed over each route section as per the assumptions indicated in the Assessment Assumptions section and predicted traffic increase calculated for each route section within the Study Area.
- 8.1.6 During the 24 months construction period, it is predicted that 24,570 HGVs would access the site equating to 88 daily HGV movements during the 'peak period' (May 2023 to August 2023 inclusive).

¹ As part of the Proposed Varied Development, enabling works would be required prior to the main construction phase. The enabling work phase would generate low levels of traffic and professional judgement suggests that effects arising from such low level of traffic would be negligible and therefore not significant. As such, the assessment of the likely significant traffic and transport effects with the construction of the Proposed Varied Development has focused on the main construction phase from January 2023 to December 2024.

² Those developments which have permission/consent or are under construction or are the subject of an application for planning permission/consent.

- 8.1.7 It is predicted that there will be an increase in traffic flows during the 'peak period' of:
- RS1 – Increase in total traffic by 8.5% and an increase in HGVs of 44%;
 - RS2 – Increase in total traffic by 2% and an increase in HGVs of 40%;
 - RS3 – Increase in total traffic by 0.1% and an increase in HGVs of 4%;
 - RS4 – Increase in total traffic by 7% and an increase in HGVs of 126%; and
 - RS5 – Increase in total traffic by 28% and an increase in HGVs of 463%.
- 8.1.8 During construction, effects are temporary, and the residual traffic and transport effects have been assessed as being not significant in terms of the EIA Regulations 2017³.
- 8.1.9 Whilst not necessary to address the environmental effects associated with the increase in traffic within the Study Area (in terms of EIA Regulations 2017), it is proposed that construction traffic would be managed through adoption of a regulated and approved CTMP. A framework CTMP is provided in Technical Appendix 8.1 (EIAR Volume 4).
- 8.1.10 In addition to the CTMP, if the construction phase of any notably sized development(s), e.g. wind farm development(s) appears likely to overlap with the Proposed Varied Development, as a matter of best practice, the Applicant would seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effects of combined construction.

³ Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

8.2 Introduction

- 8.2.1 This chapter presents an assessment of the potential traffic and transport effects associated with the construction of the Proposed Varied Development. Cumulative effects associated with cumulative developments which are likely to generate traffic that would utilise local public roads within the Study Area at the same time as traffic generated by the Proposed Varied Development have also been assessed. The specific objectives of the chapter are to:
- describe the current baseline traffic and route conditions;
 - describe the assessment methodology and significance criteria used in completing the impact assessment;
 - describe the potential effects, including direct, indirect and cumulative effects;
 - describe the mitigation measures proposed to address likely significant effects;
 - assess the residual effects remaining following the implementation of mitigation; and
 - provide a comparison of effects between the Consented Scheme and the Proposed Varied Development.
- 8.2.2 This chapter reports on the likely significant effects with respect to traffic and transport associated with the construction of the Proposed Varied Development.
- 8.2.3 This chapter is supported by the figures and technical appendices presented in Table 8.1.

Table 8.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 8.1a: Construction Access Routes Plan	New information generated for the 2020 EIA. Plan showing the proposed construction access routes.	New information necessary to illustrate proposed construction access routes.
EIAR Volume 3a: Figure 8.1b: Traffic Counts Location Plan	New information generated for the 2020 EIA. Plan showing traffic count locations.	New information necessary to illustrate latest traffic count locations.
EIAR Volume 3a: Figure 8.2: Abnormal Load Route Plan	New information generated for the 2020 EIA. Plan showing the proposed route for the abnormal loads.	New information necessary to illustrate proposed abnormal load access route.
EIAR Volume 4: Technical Appendix 8.1: Framework Construction Traffic Management Plan (CTMP)	New information generated for the 2020 EIA. Presentation of the proposed Framework CTMP for the Proposed Varied Development.	New information necessary as quantities and related traffic movements vary from original submission due to the larger turbines which would require an increase in the number of vehicle movements to site.
EIAR Volume 4: Technical Appendix 8.2: Abnormal Load Access Study	New information generated for the 2020 EIA. Presentation of the abnormal load access study from port of entry at Scrabster to the site.	Due to the increase in turbine size the Swept Path Assessment (SPA) has been rerun to ensure the turbine deliveries for the abnormal loads can be accommodated on the road network.
EIAR Volume 4: Technical Appendix 8.3:	New information generated for the 2020 EIA.	New information necessary to allow a comparison between the

Table 8.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
Assessment of the Consented Scheme based on 2023 Baseline	Presentation of the assessment of the potential traffic and transport effects associated with the construction of the Consented Scheme based on the 2023 Baseline	Consented Scheme and the Proposed Varied Development.

Competent Expert Summary

- 8.2.4 The assessment has been carried out by Fabien Jahnke, of Mott MacDonald who is a Transportation Engineer with more than 20 years' experience covering aspects of civil engineering and transport planning. He is experienced in delivering a range of studies including transport access studies, traffic management plans, inputs to environmental impact assessments and developing highway design schemes. He is qualified with a BSc Hons Environmental Civil Engineering and is a member of CIHT. The assessment methodology and outputs have been reviewed and approved by transport expert John Dooley, BA, FCILT, IEng MICE, MCIHT, who has more than 30 years relevant global industry experience and specifically experience leading the development of transport elements of EIA and ESIA studies pertaining to energy developments. Furthermore, John has established expert witness credentials. A table presenting Fabien Jahnke's relevant qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).

8.3 Summary of Effects of Consented Scheme

- 8.3.1 Chapter A15: Roads and Traffic of the 2013 ES Addendum provided an updated assessment of the potential roads and traffic effects of the Modified 2013 Scheme to those presented for the Original 2007 Scheme in the 2007 ES. It was concluded in the 2013 ES Addendum that no mitigation measures would be required for the operational traffic effects because the amount of associated operational traffic would be minimal.
- 8.3.2 Resultant from a reduction in the number of turbines, from the 47 proposed in the Modified 2013 Scheme to the 39 turbines proposed for the Consented Scheme, it was concluded in the 2014 Further Information Report (FIR) that the Consented Scheme would not generate any significant residual effects in relation to roads and traffic.
- 8.3.3 The methodology adopted for the assessment presented in the EIAR differs from the one previously used to assess the Consented Scheme; key changes include:
- the Study Area has been extended to include the A9 (T) from its junction with the A99 and the A836 to the west of Thurso (EIAR Volume 3a: Figure 8.1a);
 - the scope of the assessment has been expanded to include potential cumulative effects with cumulative developments and include the following categories of potential effects:
 - road safety; and
 - community effects (severance, pedestrian amenity / fear and intimidation and pedestrian delay).
- 8.3.4 Consequently, an updated assessment of the Consented Scheme has been carried out against the 2023 baseline taking into consideration the wider Study Area and an expanded scope including potential cumulative effects. The assessment is presented in Technical Appendix 8.3 (EIAR Volume 4) and it concludes that the Consented Scheme would not generate any significant residual effects.

8.4 Assessment Methodology

Scope of the Assessment

Study Area

- 8.4.1 The Study Area, which was agreed with THC, has been defined as the public road network in the vicinity of the site which would be most commonly used for access by traffic generated by the Proposed Varied Development. It is anticipated that construction traffic bound for the site, would access from the east, via the A9 and the A836 (EIAR Volume 3a: Figure 8.1a). Abnormal loads have been assumed to originate from Scrabster and accordingly the A9 (north of the A836) has been included within the proposed Study Area (EIAR Volume 3a: Figure 8.2).
- 8.4.2 The Study Area incorporates the following public road Route Sections; illustrated contextually in Figure 8.1a (EIAR Volume 3a):
- Route Section (RS) 1 – A9(T) between the A99(T) and the A836;
 - RS2 – A9(T) between the A836 (east) and the A836 (west);
 - RS3 – A9(T) between Scrabster and the A836;
 - RS4 – A836 between the A9(T) and the A897; and
 - RS5 – A836 between the A897 and the site access.

- 8.4.3 This report section outlines the effects which have been considered as potentially significant in this assessment and the associated reasoning for scoping out assessment of other effects from the study.

Effects Assessed in Full

- 8.4.4 The following categories of potential effects have been considered for Route Sections within the Study Area during the main construction phase for the Proposed Varied Development in isolation and cumulatively with cumulative developments which are likely to utilise local roads at the same time as traffic generated by the Proposed Varied Development:
- driver delay;
 - road safety;
 - community effects (severance, pedestrian amenity / fear and intimidation and pedestrian delay); and
 - the physical effects (wear and tear) of HGV (including abnormal load) traffic on the public road infrastructure.

Effects Scoped Out

- 8.4.5 The effects scoped out of this assessment remain the same as those outlined in Chapter A15: Roads and Traffic of the 2013 ES Addendum, i.e. operational and maintenance phase traffic generation effects and decommissioning phase traffic generation effects.
- 8.4.6 Once operational, wind farms typically generate very low levels of traffic, as such traffic generated during the operational phase is not expected to produce any significant effects.
- 8.4.7 Decommissioning of the Proposed Varied Development would be undertaken at the end of its 50 year operational lifespan, and, based upon professional judgement, can reasonably be expected to generate traffic at a level less than, or similar to the construction phase. Given the long duration between the present day and decommissioning it is difficult to determine an accurate baseline for this assessment. For the purposes of a meaningful assessment, it is therefore proposed that the study of decommissioning phase effects is undertaken closer to the time of decommissioning.

Consultation

- 8.4.8 Consultation was undertaken with Transport Scotland (TS) and The Highland Council (THC) to ascertain their views on the assessment methodology, environmental effects relating to access, traffic and transport, any particular concerns they may have and any proposed road works on their network. A summary of the consultation undertaken is presented in Table 8.2 (and presented in further detail in EIAR Volume 4: Technical Appendix 1.1: Consultation Register).

Table 8.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
THC 07/06/2019	Scoping opinion	A Transport Assessment (TA), or section on traffic and transportation, within the Environmental Impact Assessment Report (EIAR) for the project will be required. The TA should identify all Council maintained roads likely to be affected by the various stages of the development and consider in detail the impact of development traffic, including abnormal load movements, on these roads.	Requirement acknowledged, scope and assessment methodology has been discussed and agreed with THC – See other consultation. Technical Appendix 8.2 (EIAR Volume 4), highlights the impacts on the local road network (i.e. A836) and identifies proposed public road infrastructure works to accommodate the proposed abnormal loads.
		Prior to preparation of the TA the developer should first carry out a detailed scoping exercise in consultation with the Council, as local roads authority, and TS, as trunk roads authority. In considering the transport impacts of the development, in addition to the requirements of the Institute of Environmental Assessment (IEA) guidelines, account must also be taken of the guidance contained in the TS document, Transport Assessment Guidance, and the Council's own document, Guidance on the Preparation of Transport Assessments.	Requirement acknowledged. Scope and assessment methodology have been discussed and agreed with THC and all TS requirements have been acknowledged – See other consultation.
		It is agreed that the impact of operational traffic associated with the development should be minimal and can therefore be scoped out of the assessment.	Noted.
		Details of any other committed developments to be considered in the TA should be obtained from the planning service.	Requirement acknowledged. Details of other cumulative developments (in addition to the wind farms already being considered in this EIAR) were requested from THC Planning; no response has been provided to date. For the purposes of the assessment details of other cumulative developments have

Table 8.2: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
			been sourced from THC's online planning portal.
		Any timber extraction required in connection with the development proposals should also be considered in the TA.	Requirement acknowledged. Timber extraction has been considered in this assessment.
		Early contact should be made with the Council's Structures Section regarding any affected Council maintained structures.	Requirement acknowledged. Consultation with THC structures has been undertaken as part of the abnormal load route access study to verify the structural adequacy of any bridges and culvert along the proposed abnormal load access route to the site. A total of 11 structures were identified on the proposed route of which 6 will need to be assessed for the proposed abnormal loads.
		The TA should include a framework TMP aimed at minimising the impact of the construction traffic. It shall include measures to ensure development traffic adheres to the approved routes and establish protocols for the movement of HGV's on minor public roads. Consultation with the local community and the local Area Roads Office will be required regarding the detailed content and implementation of the CTMP.	Requirement acknowledged. A framework CTMP is provided as Technical Appendix 8.1 (EIAR Volume 4). The framework CTMP provides preliminary details of proposed traffic management measures and associated interventions to be implemented during the construction phase of the Proposed Varied Development to minimise disruption and improve safety. The CTMP would be enhanced and expanded as appropriate by the Applicant's appointed contractor(s), prior to commencement of construction activities and updated as necessary during the construction phase.
		In order to protect the interests of the Council, as roads authority, a suitable agreement relating to Section 96 of the Roads (Scotland) Act and appropriate planning legislation may be necessary. An appropriate Road Bond or similar security may also be required.	Requirement acknowledged. The Applicant would enter into a legal agreement under Section 96 of the Roads (Scotland) Act 1984 to formalise an inspection and maintenance regime with THC for agreed sections of road.
TS 15/05/2019	Scoping opinion	TS asked that the previous percentage impacts should be reassessed to see if there is a requirement to undertake a detailed assessment of the potential environmental impacts associated with increased traffic.	Requirement acknowledged. As required, a detailed assessment of the potential traffic and transport effects associated with the construction of the Proposed Varied Development has been carried out and findings are presented in this Chapter.

Table 8.2: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		A full Abnormal Loads Assessment report should be provided with the EIAR that identifies key pinch points on the trunk road network and details provided with regard to any required changes to street furniture or structures along the route.	Requirement acknowledged. An Abnormal Load Route Survey Report is provided as Technical Appendix 8.2 (EIAR Volume 4). The report highlights the impacts on the trunk road network and identifies proposed public road infrastructure accommodation works to accommodate the proposed abnormal loads.
		TS confirmed that it has no issue with the operational and decommissioning traffic impacts being scoped out of the assessment.	No further action required.
BEAR Scotland 14/08/2019	Other consultation	BEAR Scotland has confirmed that none of the trunk road structures located on the proposed route would require to be assessed for the proposed movements.	No further action required.
THC 30/07/2019	Other consultation	THC identified 11 structures on the proposed route of which six will need to be assessed for the proposed movements.	Further consultation with THC would be required post planning consent once a transporter has been appointed and detailed transport configurations are identified to agree scope of the structure assessments.
THC 22/11/2019	Other consultation	EIA scope and methodology.	Further consultation with THC was undertaken to agree scope and methodology for the assessment and Study Area. Furthermore, it was agreed with THC that a TA would not be required.
THC 04/12/2019	Other consultation	Transport Assessment requirement.	Further consultation was undertaken with THC and it was agreed that a formal Transport Assessment was not necessary.

Baseline Conditions

Desk Study and Data Sources

- 8.4.9 Preliminary desktop study was undertaken to review site access routes. Constraints and sensitive road sections were identified (i.e. locations which are likely to be more vulnerable to change in traffic flow or profile, e.g. crash cluster sites ('accident blackspot'), high footfall areas, or areas in close proximity to a school).
- 8.4.10 Recorded Personal Injury Collision (PIC) data was obtained from publicly available PIC information from the Crashmap website⁴ which utilises information sourced from the Department for Transport (DfT) database.

⁴ <https://www.crashmap.co.uk/> [Accessed in 2019]

- 8.4.11 The Applicant provided information in relation to construction traffic generation, based on its knowledge and experience of the construction and operational traffic requirements of similar projects. Information in relation to traffic movements required for forestry felling was provided by RDS Forestry.
- 8.4.12 In addition, the following data sources have been referenced in this assessment:
- Traffic flow information for roads within the defined Study Area were sourced from the Department for Transport (DfT) website⁵ (where available); and
 - Automatic traffic counts (ATC) undertaken by Streetwise on behalf of Mott MacDonald (to supplement traffic flow information obtained from the DfT) in December 2019.
- 8.4.13 Traffic count locations are illustrated in Figure 8.1b (EIAR Volume 3a).

Field Surveys

- 8.4.14 Field surveys were undertaken on 4th and 5th June 2019 by experienced Mott MacDonald staff. These surveys included a drive through of the public road sections within the Study Area to identify potential constraints and upgrades necessary to accommodate the safe movements of development generated construction traffic (including proposed abnormal loads) and review sensitive route sections.
- 8.4.15 Mott MacDonald met with Scrabster Harbour Authority to ascertain recent experience and capability for handling large wind turbine components.

Method of Assessment

Guidance

- 8.4.16 This assessment has been carried out in accordance with principles and guidance set-out within the following documents:
- Institution of Highways and Transportation (IHT) (1994), Guidelines for Traffic Impact Assessment;
 - Institute of Environmental Assessment (now the Institute of Environmental Management and Assessment (IEMA) (1993), Guidelines for the Environmental Assessment of Road Traffic, Guidance Notes No. 1 (referred to as 'the IEMA Guidelines'));
 - The Highland Council (2014), Guidance on the Preparation of Transport Assessment;
 - Transport Scotland (2012), Transport Assessment Guidance;
 - Scottish Government (2005), NES Manual, DMRB, Volume 15, Economic Assessment of Road Schemes in Scotland; and
 - ROSPA (2007) Road Safety Engineering Manual.
- 8.4.17 The methodology used in this assessment adheres to that set out in the IEMA Guidelines. The guidelines suggest that to determine the scale and extent of the assessment and the level of effect the development will have on the surrounding road network, the following two 'rules' should be followed:
- Rule 1 - Include road links where flows are predicted to increase by more than 30% or where the number of HGVs is predicted to increase by more than 30%; and
 - Rule 2 - Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.
- 8.4.18 Rules 1 and 2 are used to determine whether or not a full assessment of effects on routes within the Study Area is required as a result of intensification of road traffic activity.

⁵ <https://roadtraffic.dft.gov.uk/> [Accessed in 2019]

- 8.4.19 The assessment presents the potential effects of construction traffic and identifies those which could result in significant effects.

Cumulative Baseline

- 8.4.20 Cumulative effects associated with cumulative developments, which are likely to generate traffic that will utilise local public roads within the Study Area at the same time as traffic generated by the Proposed Varied Development, have also been assessed.
- 8.4.21 THC listed seven developments it wished to be considered in the cumulative assessment:
- Strathy Wood Wind Farm (in planning);
 - Limekiln Wind Farm (consented);
 - Baillie Wind Farm (existing in operation);
 - Strathy North Wind Farm (existing in operation);
 - Bettyhill Wind Farm (existing in operation);
 - Ackron Wind Farm (in scoping); and
 - Armadale Wind Farm (in scoping).
- 8.4.22 The three existing wind farms listed above are in operation and therefore associated traffic with these wind farms is included in the existing baseline traffic flow, as such there is no requirement to include these developments in the cumulative assessment.
- 8.4.23 Ackron and Armadale wind farms are in scoping at the time of writing and the likelihood of construction programmes for these two wind farms overlapping with the Proposed Varied Development construction period is considered highly improbable, as such these developments have not been considered in the cumulative assessment.
- 8.4.24 Therefore, for the purpose of the cumulative assessment, the following developments were considered:
- Strathy Wood Wind Farm (in planning); and
 - Limekiln Wind Farm (consented).

Identification of Potential Effects

- 8.4.25 The assessment appraised the potential traffic and transport effects associated with the construction of the Proposed Varied Development and identified those which could result in significant effects.
- 8.4.26 The potential traffic and transport effects considered in this assessment have been identified from the list included in the 'IEMA Guidelines' and agreed with both THC and TS.

Assessment of Residual Effects

Criteria for Assessing Sensitivity of Receptors

- 8.4.27 The receptors that may be subject to any traffic effects arising from the construction of the Proposed Varied Development include settlements along the turbine delivery route and construction traffic routes. These settlements are classified by size, function, presence of school and community facilities, traffic calming or traffic management measures, vehicles speed limits and position on the road's hierarchy, using the criteria identified Table 8.3. This classification is based upon subjective, professional judgement and relative sensitivity to the potential traffic effects of the Proposed Varied Development.
- 8.4.28 Table 8.3 provides description of receptor sensitivity based on DMRB LA 104 'Environmental Assessment and Monitoring'.

Table 8.3: Receptor Sensitivity	
Sensitivity	Description
High	Typically, receptors with high importance and rarity on an international and national scale and with limited potential for substitution. To include large rural settlements containing a high number of community and public services and facilities, areas with traffic control signals, waiting and loading restrictions, traffic calming measures and minor rural roads not constructed to accommodate frequent use by HGV.
Medium	Typically, receptors with high or medium importance and rarity on a regional scale and with limited potential for substitution. To include intermediate sized rural settlements containing some community or public facilities and services, areas with some traffic calming or traffic management measures and local A or B class roads, capable of regular use by HGV traffic.
Low	Typically, receptors with low or medium importance and rarity on a local scale (on-site or neighbouring the site). To include small rural settlements with few community or public facilities or services, areas with little or no traffic calming or traffic management measures and trunk or A-class roads, constructed to accommodate significant HGV composition.
Negligible	Typically, receptors with little importance and rarity. To include very small settlements and roads with no adjacent settlements including new strategic trunk roads or motorways that would be little effected by additional traffic and suitable for abnormal loads.

Criteria for Assessing Magnitude of Change

- 8.4.29 The magnitude of traffic effects is a function of the existing traffic volumes, the percentage increase and change due to a development, changes in the type of traffic and the temporal distribution of traffic (day of week, time of day). The determination of magnitude has been undertaken by reviewing the Proposed Varied Development, establishing the parameters of the receptors that may be affected and quantifying these effects utilising IEMA Guidelines and professional judgement.
- 8.4.30 Consideration is given to the composition of the traffic on the road network, under both existing and proposed conditions. For example, LGVs have less effect on traffic and the road system than HGVs. Similarly, standard HGVs can have less effect than abnormal load vehicles; depending on the frequency of the abnormal loads.
- 8.4.31 The criteria that have been used to make judgements on the magnitude of predicted changes on the receptor(s) are presented in Table 8.4.

Table 8.4: Magnitude of Predicted Change	
Magnitude	Description
High	The proposals could result in a significant change in terms of length and / or duration to the present traffic routes or schedules or activities, which may result in hardship. Generally, a rule of >90% change in traffic is considered to be a large magnitude.
Medium	The proposals could result in changes to the existing traffic routes or activities such that some delays or rescheduling could be required, which cause inconvenience. Generally, a rule of 60% - 90% change in traffic is considered to be a medium magnitude.
Low	The proposals could occasionally cause a minor modification to routes, or a very slight delay in present schedules, or on activities in the short term. Generally, a rule of 30 – 60% change in traffic is considered to be a small magnitude.

Table 8.4: Magnitude of Predicted Change

Magnitude	Description
Negligible	No effect on movement of road traffic above normal level. Generally, a rule of <30% change in traffic is considered to be a negligible magnitude.

Criteria for Assessing Significance

- 8.4.32 As a guide to inform the assessment, but not as substitute for professional judgement, criteria for determining the significance of traffic related effects are set out in Table 8.5. This table is based on combining the magnitude of predicted change with the receptor sensitivity.

Table 8.5: Significance Matrix

Sensitivity	Magnitude of Change			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

- 8.4.33 Effects are categorised as major, moderate, minor or negligible. Major or moderate effects are considered to be **Significant** in accordance with the EIA Regulations 2017. Minor or negligible effects are considered **Not Significant**.

Assumptions and Limitations

- 8.4.34 A number of informed assumptions have been made to enable the traffic and transport assessment.

Assessment Assumptions

- 8.4.35 The main construction phase is expected to take place over a period of 24 months with works undertaken on site six days per week for an average of 24 days per month. A copy of the construction programme is presented in Chapter 2: Description of Development (EIAR Volume 2).
- 8.4.36 Construction related activities for the Proposed Varied Development comprise all activities relating to tree felling, construction/upgrading of access tracks, construction of turbine foundation, cabling installation and erection of wind turbines.
- 8.4.37 It has been assumed that concrete would be batched on-site with water abstracted on-site. Sand, aggregates and cement would be imported to the site and sourced from local providers/quarries. These deliveries would be routed via the A9 (T) and access the site from the A836.
- 8.4.38 Steel reinforcement deliveries for turbine foundations and electrical equipment are assumed to originate from the Central Belt. These deliveries would be routed via the A9 (T) and access the site from the A836.
- 8.4.39 Stone associated with the construction of the site's access tracks would be obtained primarily from on-site borrow pits. For the purpose of the assessment, a small allowance has been made for provision of stone being sourced from local providers/quarries. These deliveries would be routed via the A9 (T) and access the site from the A836.
- 8.4.40 It has been assumed that timber resulting from tree felling will be exported to local sawmills or Central Belt. These deliveries would be routed via the A836 and A9 (T).

- 8.4.41 It is assumed that site personnel, during the construction will be transported to and from the site by car, mini-bus or van; all classed as Light Goods Vehicles (LGVs). It is not intended that these vehicles will be restricted to specific site access routes. For the purpose of the assessment it has been assumed that site personnel will approach the site from the A9 (T) and access the site from the A836.
- 8.4.42 The number of staff working employed on-site will vary dependent upon the phase of construction; for the purpose of the assessment it has been assumed that there will be approximately 100 daily movements to the site associated with construction staff.
- 8.4.43 Confirmation of the routes selected would be agreed with the appropriate road authorities when a contractor has been appointed as an integral part of the CTMP as approved by THC (in consultation with other relevant roads authorities) and adopted by the contractor.
- 8.4.44 Table 8.6 summarises an estimate of construction vehicle movements generated by construction activity.

Table 8.6: Estimated Vehicle Movements Generated by the Construction of the Proposed Varied Development		
Construction Activity	Vehicle Type	Total Vehicle Movements
Delivery of plant & equipment	Standard articulated lorry / low loader	98
Forestry felling	Standard articulated lorry	8,328
Delivery of stone for access track construction	Rigid Tipper	4,392
Delivery of steel reinforcement	Standard articulated lorry	430
Delivery of cement	Standard articulated lorry	986
Delivery of aggregate for concrete	Rigid Tipper	4,124
Delivery of sand for concrete	Standard articulated lorry	3,122
Delivery of sand for cabling trenches	Standard articulated lorry	1,792
Delivery of cables	Standard articulated lorry	42
Delivery of turbines – Abnormal Loads	Specialist vehicle	353
Delivery of turbines – Standard HGV	Standard articulated lorry	353
Other materials and equipment (e.g. pipes, geotextiles etc.)	Standard articulated lorry / rigid truck	258
Substation	Standard articulated lorry / rigid truck	40
Site servicing	20t HGV	154
Removal of plant and equipment	Standard articulated lorry / low loader	98
Construction Staff	Private cars, small vans and mini-bus	57,600
Total No. of HGV Movements		24,570
Total No. of LGV Movements		57,600
Total All Traffic Movements		82,170

- 8.4.45 Whilst a number of assumptions, based on recent and similar construction projects, have been made at this preliminary stage, it is considered that there is sufficient information to enable and inform the assessment of likely significant traffic and transport effects.

8.5 Baseline Conditions

Current Baseline

Existing Conditions

- 8.5.1 There are several local communities present in the Study Area; including those situated at Latheron, Thurso, Scarbster, Bridge of Forss, Reay and Melvich. There are also smaller residential clusters and hamlets in the locality.

Road Network and Route Profiles

- 8.5.2 The road network included in the Study Area was identified on the basis of likely felling and construction traffic routes provided by the Applicant and consultation with the relevant transport authorities.
- 8.5.3 A concise profile setting out key characteristics of the local public roads (Route Sections) within the Study Area is provided as follows. These are shown graphically on Figure 8.1a (EIAR Volume 3a).
- RS1 – A9(T) between the A99(T) and the A836: The A9 (T) throughout this section is a single carriageway road. The route passes through the hamlet of Spittal, the town of Thurso and the small village of Latheron; where the speed limit reduces to 50 mph and 30 mph respectively. Elsewhere in this route section the national speed limit applies. With the exception of Thurso, Spittal and Latheron (where residential properties front the A9), there is minimal frontage development.
 - RS2 – A9(T) between the A836 (east) and the A836 (west): This section of the A9 (T) routes through the northern part of Thurso and along some of the town's main thoroughfares; passing through built-up areas with numerous residential, retail and other commercial properties along most of its length. This section is a single carriageway road subject to a 30 mph speed limit (barring a short 250 m stretch on approach to the junction with the A836) and passes through a number of signalised junctions and formal pedestrian crossings. Both street lighting and footway provision for pedestrians are present throughout with on-street parking and bus stops present on the stretches within Thurso itself.
 - RS3 – A9(T) between Scarbster and the A836: The A9 (T) throughout this section is a single carriageway road. The route passes through the settlement of Scarbster where the speed limit reduces to 30 mph, elsewhere in this route section a 40 mph speed limit applies. In Scarbster, residential and commercial properties front the A9. There is footway provision along the entire route.
 - RS4 – A836 between the A9(T) and the A897: The A836 throughout this section is a rural single carriageway road. The route passes through the hamlet of Forss and the village of Reay; where the speed limit reduces to 40 mph. The route passes through the smaller hamlets of Buldoo and Dounreay where there is minimal frontage development. In Reay and Forss, residential properties are fronting the A836. Reay Primary School is located off the A836, at the centre of Reay, and there are local traffic management features including illuminated 20 mph signs (which operate at the beginning and end of the school day) to encourage low speeds. There is footway provision in Reay.
 - RS5 – A836 between the A897 and the site access: The A836 throughout this section is a single carriageway that routes through the small village of Melvich; where the speed limit reduces to 30 mph. In Melvich, there are a number of residential properties, as well as hotels and B&Bs, with direct frontage onto the route. With the exception of Melvich, there is minimal frontage development. There is footway provision in Melvich.

Bridges and other Structures

- 8.5.4 There are several bridges and culverts on the existing road network, however no evidence of signed weight restrictions was observed during the field study nor identified during consultation.

- 8.5.5 THC has highlighted six structures that would require to be assessed to ascertain their structural adequacy to safely accommodate the proposed abnormal loads (these structures are presented in Table 2.3 of EIAR Volume 4: Technical Appendix 8.1). Further consultation with THC would be required once detailed transport configurations are identified to agree scope of the structural assessments.

Existing Traffic Flows

- 8.5.6 To supplement and verify the traffic count data sourced from the DfT website, Mott MacDonald commissioned ATC on the A836 adjacent to the proposed site access.
- 8.5.7 Table 8.7 indicates the two-way Annual Average Daily Flow (AADF) on the route sections within the Study Area considered in this assessment.

Table 8.7: Existing Traffic Flow Data			
Route Section	AADF [Source – see Notes below]	HGV	Percentage HGV
RS1 – A9(T) between the A99(T) and the A836	2,064 [a]	187	9%
RS2 – A9(T) between the A836 (east) and the A836 (west)	8,517 [a]	209	2.5%
RS3 – A9(T) between Scrabster and the A836	3,225 [a]	95	3%
RS4 – A836 between the A9(T) and the A897	2,454 [a]	66	2.7%
RS5 – A836 between the A897 and the site access	644 [b]	18	2.8%
Notes: [a] Source: Department for Transport (DfT) database, Year 2018 [b] Source: ATC (December 2019)			

Traffic Speeds

- 8.5.8 The new ATC survey on the A836 was also used to collect speed statistics. The five-day average and 85th percentile speeds observed at this location are summarised below in Table 8.8.

Table 8.8: Speed Summary (Weekday Average Two-Way)		
Survey Location	Average Speed (mph)	85th Percentile Speed (mph)
A836 (Speed Limit: 60 mph)	57.5	67

- 8.5.9 The speed survey data indicates that on the A836 average speeds are below the speed limit of 60 mph although the 85th percentile speed is higher than the speed limit.

Personal Injury Collisions (PIC)

- 8.5.10 No concerns were raised during the consultation regarding road safety or crash ‘blackspots’ on the local or trunk road network.
- 8.5.11 Nevertheless, a road traffic collision analysis has been undertaken to appraise road safety in the Study Area. PIC records have been obtained from Crashmap for a three-year period ending in December 2018.

- 8.5.12 The data has been examined with due reference to the ROSPA Road Safety Engineering Manual, 2007⁶ (to identify any clusters and trends in the pattern and location of the collisions) and Road Casualties Great Britain, 2017⁷ to evaluate against national statistics for roads of similar classification. Where collision rates exceed the national average, these have been subject to more detailed consideration. Results of the road traffic collision analysis are summarised in Table 8.9.

Table 8.9: Summary of Collision Assessment for Public Roads within the Study Area			
Route Section	No. of collisions in three-year period [Crash rate per billion vehicle miles]	RCGB Crash rate per billion vehicle miles (Comparison %)	Assessment
RS1 – A9(T) between the A99(T) and the A836 [Road length = 23.1 miles]	12 [230]	384 (60%)	- There were 12 recorded PICs during the three-year period ending in December 2018. - HGVs were involved in 8% of the 12 collisions. Of the total 28 vehicles which were in some way involved in the 12 collisions, one involved an HGV; comprising 3.5% of the total vehicles involved in collisions. - Of the 12 collisions recorded, three resulted in serious injuries and two in fatal injuries. - The collision where an HGV was involved resulted in serious injuries. - One collision involved a cyclist.
RS2 – A9(T) between the A836 (east) and the A836 (west) [Road length = 1 miles]	5 [536]	384 (140%)	- There were five recorded PICs during the three-year period ending in December 2018. - Of the five collisions recorded, one resulted in serious injuries. - No HGVs were involved in any collision. - One collision involved a pedestrian. - Two collisions involved motorcyclists.
RS3 – A9(T) between Scrabster and the A836 [Road length = 1.4 miles]	0 [0]	384 (0%)	No collisions were recorded during the three-year period ending in December 2018.
RS4 – A836 between the A9(T) and the A897 [Road length = 15 miles]	12 [298]	384 (78%)	- There were 12 recorded PICs during the three-year period ending in December 2018. - Of the five collisions recorded, two resulted in fatal injuries. - No HGVs were involved in any collision. - No collisions involved pedestrians or cyclists and four collisions involved motorcyclists.

⁶ Road Safety Engineering Manual, Royal Society for the Prevention of Accidents, 2007

⁷ <https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2017>

Table 8.9: Summary of Collision Assessment for Public Roads within the Study Area

Route Section	No. of collisions in three-year period [Crash rate per billion vehicle miles]	RCGB Crash rate per billion vehicle miles (Comparison %)	Assessment
RS5 – A836 between the A897 and the site access [Road length = 3.6 miles]	0 [0]	384 (0%)	No collisions were recorded during the three-year period ending in December 2018.

8.5.13 From the descriptions provided in the Crashmap collision reports, it appears that for all four of the collisions resulting in a fatality, driver error played a notable part.

8.5.14 It can be reasonably concluded from a review of the collision history, that although one section of the construction access route exceeds national average collision rates for roads in its respective category, there are no notable crash clusters (accident ‘blackspots’) and there is no apparent safety problem specifically relating to vulnerable road users.

Future Baseline

8.5.15 This section presents a description of the future baseline conditions in year 2023 which is the scheduled commencement date for the main construction phase for the Proposed Varied Development.

Planned Changes to the Road Network

8.5.16 Routine periodic route maintenance is likely to occur at a variety of locations, however nothing notable is proposed in the Study Area at the time of writing and no planned changes to the road network were identified during consultation undertaken for the Proposed Varied Development.

Future Baseline Traffic Flows

8.5.17 This assessment has considered the effects of traffic generated during the main construction phase, which is scheduled to commence in January 2023 and be completed by December 2024.

8.5.18 To assess the likely effects during the construction phase, base year traffic flows were determined by applying the National Road Traffic Forecast (NRTF). The level of increase within the local road network is assessed to be ‘Low’. This equates to a 1.06% increase in background traffic between 2018 and 2023 and 1.05% increase between 2019 and 2023. Low growth was selected on the basis that the site is situated in a sparsely populated area. High or medium levels of traffic growth would only be likely if there is to be a significant increase in population and car ownership in the area, which is not foreseen. Table 8.10 presents forecast 2023 future baseline traffic flows.

Table 8.10: Future Baseline Traffic Flow Data (Year 2023)

Route Section	AADF	HGV
RS1 – A9(T) between the A99(T) and the A836	2,188	199
RS2 – A9(T) between the A836 (east) and the A836 (west)	9,027	222
RS3 – A9(T) between Scrabster and the A836	3,418	101

Table 8.10: Future Baseline Traffic Flow Data (Year 2023)

Route Section	AADF	HGV
RS4 – A836 between the A9(T) and the A897	2,601	70
RS5 – A836 between the A897 and the site access	675	19

Future Baseline Personal Injury Collisions (PIC)

- 8.5.19 The NESA Manual⁸ suggests that where traffic flow doubles, it can be expected that road traffic collisions will double (i.e. the increase in collisions is likely to be roughly proportional to the increase in traffic).
- 8.5.20 For robustness, it has been assumed that the number of PICs will increase proportionally with the increase in traffic volume; as summarised in Table 8.11.

Table 8.11: Projected PIC

Route Section	Average Annual No. of Collisions (Baseline)	Average No. of collisions (Year 2023)
RS1 – A9(T) between the A99(T) and the A836	4	4.2
RS2 – A9(T) between the A836 (east) and the A836 (west)	1.67	1.75
RS3 – A9(T) between Scrabster and the A836	0	0
RS4 – A836 between the A9(T) and the A897	4	4.2
RS5 – A836 between the A897 and the site access	0	0

Planned Local Development

- 8.5.21 E.ON proposes to construct the Strathy Wood Wind Farm; which is likely to add traffic to routes within the Study Area if consented and constructed during the same period as the Proposed Varied Development.
- 8.5.22 The 21-turbine Limekiln Wind Farm was granted planning consent in June 2019; which is likely to add traffic to routes within the Study Area if constructed during the same period as the Proposed Varied Development.
- 8.5.23 Statkraft and Brookfield Renewable UK Limited are investigating the potential of the Ackron Wind Farm situated near Melvich and Armadale Wind Farm respectively. Both developments are currently (April 2020) in Scoping.
- 8.5.24 If the Proposed Varied Development was not implemented then it is likely that there would be no significant changes to the traffic and transport situation in the vicinity of the Proposed Varied Development, other than changes to background traffic which might result from general traffic growth, intensified forestry activity or construction or operational activity generated by planned developments.

⁸ Scottish Government (2005), NESA Manual, DMRB, Volume 15, Economic Assessment of Road Schemes in Scotland

Identified Sensitive Receptors

- 8.5.25 The key receptors on the wind turbine components delivery route and general construction traffic routes are the town of Thurso, the villages of Latheron and Reay, and the hamlets of Forss and Melvich.
- 8.5.26 A summary of the sensitive receptors is provided in Table 8.12.

Table 8.12: Receptor Sensitivity					
Receptor [Route Section]	Negligible	Low	Medium	High	Comments
Latheron [RS1]		X			Trunk road constructed to accommodate significant HGV composition.
Thurso [RS2]				X	Large rural settlement containing a high number of community and public services and facilities.
Scrabster [RS3]		X			Trunk road constructed to accommodate significant HGV composition.
Forss [RS4]		X			Small rural settlement, few community or public facilities and services.
Reay [RS4]			X		Intermediate sized rural settlement, containing some community or public facilities and services.
Melvich [RS5]		X			Small rural settlement, few community or public facilities and services.

- 8.5.27 For the purpose of assessment Route Sections including high or medium sensitive receptors are classed as sensitive route sections. On this basis, RS2 and RS4 are classed as sensitive Route Sections and RS1, RS3 and RS5 are classed as non-sensitive Route Sections.

8.6 Potential Significant Effects

- 8.6.1 As indicated and explained previously, only the potential traffic and transport effects associated with the main construction phase of the Proposed Varied Development have been assessed.

Potential Construction Effects

Traffic and Transport Effects

- 8.6.2 As indicated in Table 8.6 the total traffic generated by the Proposed Varied Development is estimated as 82,170 traffic movements (note: one trip = two movements; i.e. one delivery and one return journey), of which 24,570 movements will be HGV movements over the 24 months construction period.
- 8.6.3 Using the indicative construction programme and the anticipated vehicle movements provided by the Applicant for each activity, the number of vehicle movements that are anticipated for each month of the construction programme has been calculated. The vehicle movements calculated have then been distributed over each route section as per the assumptions indicated in the Assessment Assumptions section.
- 8.6.4 Estimated daily and monthly movements generated by construction of the Proposed Varied Development against the programme are shown in Table 8.13.

Construction traffic is estimated at an average of 143 vehicle movements a day over the entire construction period, with a maximum of 188 vehicle movements occurring per day between May

2023 and August 2023. The 'peak period' for the purpose of this assessment is therefore considered to be May 2023 to August 2023 inclusive. Table 8.14 presents a summary of this information by route section.

Table 8.13: Construction Traffic Generation																								
Traffic Movements	Month and Year																							
	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24	Apr 24	May 24	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24
Total Daily Movements	127	123	153	181	188	188	188	188	157	160	160	160	145	145	145	145	111	110	107	107	107	109	107	111
Daily HGV Movements	28	23	54	82	88	88	88	88	58	59	59	59	44	44	44	44	10	9	8	8	8	10	8	12
Daily LGV Movements	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 8.14: Construction Traffic Increases				
Route Section	Entire Construction Phase		Peak Period	
	Average Increase in Total Traffic (HGV+LGV)	Average Increase in HGV Traffic	Average Increase in Total Traffic (HGV+LGV)	Average Increase in HGV Traffic
RS1: A9(T) between the A99(T) and the A836	6.5%	21%	8.5%	44%
RS2: A9(T) between the A836 (east) and the A836 (west)	1.5%	19%	2%	40%
RS3: A9(T) between Scrabster and the A836	<0.1%	1.5%	0.1%	4%
RS4: A836 between the A9(T) and the A897	5.5%	62%	7%	126%
RS5: A836 between the A897 and the site access	21%	228%	28%	463%

Link Capacity Review

- 8.6.5 The theoretical link capacities for the various route sections within the Study Area have been estimated using the NESA Manual. The theoretical capacities are detailed below:
- RS1 – A9(T) between the A99(T) and the A836 – around 28,000 vehicles (two-way flows) per 12 hours;
 - RS2 – A9(T) between the A836 (east) and the A836 (west) – around 20,000 vehicles (two-way flows) per 12 hours;
 - RS3 – A9(T) between Scrabster and the A836 – around 24,000 vehicles (two-way flows) per 12 hours;
 - RS4 – A836 between the A9(T) and the A897 – around 20,000 vehicles (two-way flows) per 12 hours; and
 - RS5 – A836 between the A897 and the site access – around 20,000 vehicles (two-way flows) per 12 hours.
- 8.6.6 From review of Table 8.14, the greatest average increase in construction traffic would be on the A836 between its junction with the A9 and the site access. However, this reflects the low volume of existing HGV traffic on these sections of the road network. When comparing the traffic volume generated by the construction of the Proposed Varied Development with the theoretical link capacities, it should be noted that there is significant spare capacity on the local road network and no link capacity issues associated with the construction traffic of the Proposed Varied Development would be anticipated.
- 8.6.7 The 'IEMA Guidelines' suggest that a 10% traffic increase threshold should be used (for sensitive road links) to determine whether a detailed assessment of traffic effects is required. Route

sections RS2 and RS4 are considered to be sensitive (see Table 8.12) and from review of Table 8.14, it can be seen that this threshold is forecast to be exceeded for HGV traffic both throughout the duration of the entire construction period and during the 'peak period' of construction activity therefore a more detailed assessment has been undertaken for RS2 and RS4.

- 8.6.8 The 'IEMA Guidelines' suggest that a 30% traffic increase threshold should be used (for non-sensitive road links) to determine whether a detailed assessment of traffic effects is required. Route sections RS1 and RS5 are not considered to be sensitive (see Table 8.12). From review of Table 8.14, it can be seen that this threshold is forecast to be exceeded for HGV traffic; during the 'peak period' of construction activity for RS1 and throughout the duration of both the entire construction period and during the 'peak period' of construction activity for RS5, therefore a more detailed assessment has been undertaken for RS1 and RS5.
- 8.6.9 Effects on RS3 of the proposed construction access route are not considered to be of sufficient scale to warrant further assessment as the percentage increase in total traffic or HGV traffic is less than 30%.

Driver Delay

- 8.6.10 There is the potential for occasional driver delay during the movement of the abnormal loads, although this would only occur over a relatively short time period during the construction phase. It should be noted that abnormal load deliveries would be typically undertaken outside peak hours and will be escorted by the Police. Once these components have been delivered, vehicles would reduce to standard HGV dimensions, and so would not qualify as abnormal loads on their return journey. Empty turbine component delivery vehicles would travel at a similar speed to general HGV traffic and would not require escort.
- 8.6.11 HGV traffic levels are projected to increase on the A836 and although the percentage increase is assessed as being high for RS4 and RS5, the maximum number of additional HGV movements per day is 88; this would equate to approximately seven HGV movements per hour, assuming a 12 hour working day. The magnitude of change in HGV traffic level with regards to driver delay is therefore considered to be negligible. Furthermore, the link capacity of RS4 and RS5 as highlighted in paragraph 8.6.5 indicates that there is significant residual capacity on these links to accommodate the expected additional traffic. On this basis and considering the medium sensitivity of RS4 of the A836, the driver delay effects associated with construction traffic generated by the Proposed Varied Development for users of the A836 are considered to be not significant in the context of the EIA Regulations 2017.
- 8.6.12 Similarly, HGV traffic levels are projected to increase on the A9 and the percentage increase is assessed as being low for RS1 and RS2, the maximum number of additional HGV movements per day is 88; this would equate to approximately seven HGV movements per hour, assuming a 12 hour working day. The magnitude of change in HGV traffic level with regards to driver delay is therefore considered to be negligible. Furthermore, the link capacity of RS1 and RS2 as highlighted in paragraph 8.6.5 indicates that there is significant residual capacity on these links to accommodate the expected additional traffic. On this basis and considering the high sensitivity of RS2 of the A9, the driver delay effects associated with construction traffic generated by the Proposed Varied Development for users of the A9 are considered to be not significant in the context of the EIA Regulations 2017.

Road Safety

- 8.6.13 The NESAs Manual suggests that where traffic flow doubles, it can be expected that road traffic collisions will double (i.e. the increase in collisions is likely to be approximately proportional to the increase in traffic). Accordingly, if the number of collisions were to increase proportionally with the increase in traffic, the effect of the construction traffic on road safety per route section can be forecast. The results of this analysis are summarised in Table 8.15.

Table 8.15: Projected PIC		
Route Section	Average No. of Collisions (2023 Baseline)	Average No. of Collisions (2023 Baseline + Traffic generated by construction of the Proposed Varied Development)
RS1: A9(T) between the A99(T) and the A836	4.2	4.5
RS2: A9(T) between the A836 (east) and the A836 (west)	1.75	1.75
RS4: A836 between the A9(T) and the A897	4.2	4.4
RS5: A836 between the A897 and the site access	0	0

- 8.6.14 Using this basis of assessment, there would be a negligible increase in PICs in RS1 and RS4 route sections within the Study Area as a consequence of the increased traffic generated by the Proposed Varied Development and no increase on RS5 and RS2. On this basis, and, considering the medium and low sensitivity of RS4 and RS1 respectively, the road safety effects associated with construction traffic generated by the Proposed Varied Development for users of the A9 and the A836 are considered to be not significant in the context of the EIA Regulations 2017.

Community Effects (severance, pedestrian amenity / fear and intimidation and pedestrian delay)

- 8.6.15 The 'IEMA Guidelines' define severance as 'the perceived division that can occur within a community when it becomes separated by a major traffic artery'. Severance may result from a road carrying large traffic flows or a physical barrier created by the road itself, and the 'IEMA Guidelines' suggest that consideration is given to the severity of existing severance and how this might be exacerbated by proposed construction traffic generated by a development.
- 8.6.16 RS1, RS2, RS4 and RS5 would continue to operate below their theoretical capacity, even with the addition of traffic generated by construction of the Proposed Varied Development. Severance should not occur when there is such a notable level of residual road capacity and traffic generated by the Proposed Varied Development would be relatively low (seven HGV movements per hour, assuming a 12 hour working day). On this basis, the effect on severance for users of the A9 and A836 associated with construction traffic generated by the Proposed Varied Development is considered to be not significant in the context of the EIA Regulations 2017.
- 8.6.17 Traffic volume⁹, composition, speed, pedestrian footways and crossings all contribute to the level of general pleasantness, fear, intimidation and delay experienced by pedestrians and other vulnerable road users.
- 8.6.18 Site observations indicate that pedestrian activity on RS1 and RS5 is low. It is therefore considered that the sensitivity of this location to pedestrian delay and amenity effects is negligible. The magnitude of the temporary increase in construction traffic is considered to be negligible (seven HGV movements per hour during the 'peak period', assuming a 12 hour working day). On this basis and considering the low sensitivity of RS1 and RS5, the effects to pedestrian delay and amenity to users of RS1 and RS5 associated with construction traffic generated by the Proposed Varied Development are considered to be not significant in the context of the EIA Regulations 2017.
- 8.6.19 The construction access route traverses Thurso (RS2), where pedestrian activity can be notable. The magnitude of the temporary increase in construction traffic is however considered to be

⁹ It is anticipated that there would be 100 daily LGV movements associated with construction staff. This equates to a maximum of 50 arrivals and departures at the start and end of each working day resulting in a very small increase in overall traffic volume, therefore the assessment of pedestrian delay and amenity effect has focussed on the increase in HGV movements only.

negligible (seven HGV movements per hour during the 'peak period', assuming a 12 hour working day). It should also be noted that there is an existing pedestrian infrastructure network in Thurso; including footways, controlled crossings and informal crossings. Combining the magnitude of the increase with the sensitivity of the Thurso, it is considered that the pedestrian delay and amenity effects at this location associated with construction traffic generated by the Proposed Varied Development would be not significant in the context of the EIA Regulations 2017.

- 8.6.20 The construction access route traverses Reay (RS4), where a school is situated in close proximity to the A836 and pedestrian activity can be notable during school pick-up and drop-off times. The magnitude of the temporary increase in construction traffic is however considered to be negligible (seven HGV movements per hour during the 'peak period', assuming a 12 hour working day). It should be noted that there are local traffic management features including illuminated 20 mph signs (which operate at beginning and end of school day) to encourage low speeds and footway provision in Reay. Combining the magnitude of the increase with the sensitivity of Reay, it is considered that the pedestrian delay and amenity effects at this location associated with construction traffic generated by the Proposed Varied Development are considered to be not significant in the context of the EIA Regulations 2017.

- 8.6.21 Overall based on professional judgment, the effects upon community receptors associated with construction traffic generated by the Proposed Varied Development are considered to be not significant in the context of the EIA Regulations 2017.

Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure

- 8.6.22 Based on site observations and professional judgement, the current standard of RS1, RS2, RS4 and RS5 public road infrastructure is considered adequate to withstand the predicted 'wear and tear' of the construction traffic associated with the Proposed Varied Development. On this basis, the effects to the RS1, RS2, RS4 and RS5 public road infrastructure associated with construction traffic generated by the Proposed Varied Development are considered to be not significant in the context of the EIA Regulations 2017.

Potential Cumulative Construction Effects

- 8.6.23 An assessment of the likely construction effects of the Proposed Varied Development and other cumulative developments has been undertaken to robustly take account of the likely interrelation of overlapping construction programmes and the resultant cumulative effect upon the local road network.
- 8.6.24 The following developments have been included together with the Proposed Varied Development for the cumulative traffic and transport assessment:
- Strathy Wood Wind Farm (Strathy Wood Wind Farm, Further Environmental Information, Chapter A 12 Traffic, Transport and Access, dated May 2015); and
 - Limekiln Wind Farm (Limekiln Wind Farm Resubmission Environmental Statement, Chapter 7 Traffic and Transport, dated June 2016).

Wind Farms Access Arrangements

- 8.6.25 The following assumptions have been made to inform the assessment, as derived from review of relevant supporting ES Reports for the cumulative developments:
- Construction traffic accessing the cumulative developments would do so from the east; originating in Scrabster and via the A9 and A836.

Table 8.16 presents how much traffic would be added to each route section by the cumulative developments, during the most intense period of construction.

Table 8.16: Strathy Wood and Limekiln Wind Farms Traffic Generation		
Route Section	Daily Additional All Traffic (LGV + HGV)	Daily Additional HGV Traffic
RS1: A9(T) between the A99(T) and the A836	0	0
RS2: A9(T) between the A836 (east) and the A836 (west)	0	0
RS3: A9(T) between Scrabster and the A836	153	73
RS4: A836 between the A9(T) and the A897	153	73
RS5: A836 between the A897 and the site access	49	9

Total Cumulative Construction Effects

- 8.6.26 This section assesses the maximum development case assuming that all the developments being considered as part of the cumulative assessment will proceed to construction.
- 8.6.27 It is uncertain if and when the construction phases of the cumulative developments and the Proposed Varied Development might overlap. To robustly assess cumulative traffic generation, cumulative assessment has been undertaken for route sections within the Proposed Varied Development's Study Area that are utilised by other cumulative developments. This is based on the sum of the average traffic generation of the cumulative developments listed above and the Proposed Varied Development peak traffic generation. This is considered to represent a maximum case scenario as, in reality, it is considered highly improbable that peak traffic generation for all developments would align.
- 8.6.28 Table 8.17 presents a summary of predicted traffic increases generated cumulatively during the 'peak period' of construction activity (May 2023 and August 2023 inclusive).

Table 8.17: Summary of Predicted Traffic Increase Generated Cumulatively (i.e. Proposed Varied Development + Cumulative Developments) during the 'peak period'		
Route Section	Peak Period	
	Average Increase in Total Traffic (HGV+LGV)	Average Increase in HGV Traffic
RS1: A9(T) between the A99(T) and the A836	8.5%	44%
RS2: A9(T) between the A836 (east) and the A836 (west)	2%	40%
RS3: A9(T) between Scrabster and the A836	4.5%	72%
RS4: A836 between the A9(T) and the A897	13%	230%
RS5: A836 between the A897 and the site access	28%	510%

- 8.6.29 From review of Table 8.17, the greatest average increase in construction traffic generated cumulatively would be on the A836 between its junction with the A9 and the site access, i.e. RS4 and RS5. However, this reflects the low volume of existing HGV traffic on these sections of the road network. When comparing the traffic volume generated cumulatively with the theoretical link

capacities, it should be noted that there is significant spare capacity on the local road network and no link capacity issues associated with the construction traffic generated cumulatively would be anticipated.

- 8.6.30 The 'IEMA Guidelines' suggest that a 10% traffic increase threshold should be used (for sensitive road links) to determine whether a detailed assessment of traffic effects is required. Route sections RS2 and RS4 are considered to be sensitive (see Table 8.12). From a review of Table 8.17, it can be seen that this threshold is forecast to be exceeded for both HGV traffic and total traffic (HGV + LGV) on RS4 and for HGV traffic on RS2, therefore a more detailed assessment has been undertaken for RS2 and RS4.
- 8.6.31 The 'IEMA Guidelines' suggest that a 30% traffic increase threshold should be used (for non-sensitive road links) to determine whether a detailed assessment of traffic effects is required. Route sections RS1, RS3 and RS5 are not considered to be sensitive (see Table 8.12) and from review of Table 8.14, this threshold is forecast to be exceeded for HGV traffic, therefore, a more detailed assessment has been undertaken for RS1, RS3 and RS5.

Driver Delay

- 8.6.32 In a cumulative scenario, the cumulative developments would generate several abnormal load deliveries per day and create a notable increase in the volume of traffic (particularly HGV traffic). It should be noted however, that abnormal load deliveries would typically be undertaken outside peak hours and would be escorted by the Police and empty turbine components delivery vehicles would reduce to standard HGV dimensions, and so would not qualify as abnormal loads on the return journey. Empty turbine component delivery vehicles would travel at a similar speed to general HGV traffic and would not require escort.
- 8.6.33 HGV traffic levels are projected to increase on the A9 and although the percentage increase is assessed as being low for RS1 and RS2, the maximum number of additional HGV movements per day is 88; this would equate to approximately seven HGV movements per hour, assuming a 12 hour working day. The magnitude of change in HGV traffic level with regards to driver delay is therefore considered to be negligible. Furthermore, the link capacity of RS1 and RS2 as highlighted in paragraph 8.6.5 indicates that there is significant residual capacity on these links to accommodate the expected additional traffic. On this basis and considering the high sensitivity of RS2 of the A9, the driver delay effects associated with traffic generated cumulatively for users of the A9 are considered to be not significant in the context of the EIA Regulations 2017.
- 8.6.34 HGV traffic levels are predicted to increase on RS3 where HGV traffic flow generated cumulatively would reach 77 HGV movements per day, this would equate to approximately 6 HGV movements per hour, assuming a 12 hour working day. The magnitude of change in HGV traffic level with regards to driver delay is therefore considered to be low. The link capacity of RS3 as highlighted in paragraph 8.6.5 indicates that there is significant residual capacity along these links to readily accommodate the expected additional traffic flow. On this basis and considering the low sensitivity of RS3, the driver delay effects associated with traffic generated cumulatively for users of RS3 are considered to be not significant in the context of the EIA Regulations 2017.
- 8.6.35 HGV traffic levels are predicted to increase notably on the A836, specifically on RS4 where HGV traffic flow generated cumulatively would reach 161 HGV movements per day, this would equate to approximately 14 HGV movements per hour, assuming a 12 hour working day. The magnitude of change in HGV traffic level with regards to driver delay is therefore considered to be low. Furthermore, the link capacity of RS4 as highlighted in paragraph 8.6.5 indicates that there is significant spare capacity along these links to accommodate the expected additional traffic flow. On this basis and considering the medium sensitivity of RS4, the driver delay effects associated with traffic generated cumulatively for users of RS4 are considered to be not significant in the context of the EIA Regulations 2017.

- 8.6.36 HGV traffic levels are predicted to increase on RS5 and although the percentage increase is assessed as being high, the maximum number of additional HGV movements generated cumulatively per day is 97, this would equate to approximately eight HGV movements per hour, assuming a 12 hour working day. The magnitude of change in HGV traffic level with regards to driver delay is therefore considered to be negligible. Furthermore, the link capacity of RS5 as highlighted in paragraph 8.6.5 indicates that there is significant spare capacity along this link to readily accommodate the expected additional traffic flow. On this basis and considering the medium sensitivity of RS5, the effects of driver delay associated with traffic generated cumulatively for users of RS5 are considered to be not significant in the context of the EIA Regulations 2017.

Road Safety

- 8.6.37 The NESAs Manual suggests that where traffic flow doubles, it can be expected that road traffic collisions will double (i.e. the increase in collisions is likely to be approximately proportional to the increase in traffic). Accordingly, if the number of collisions were to increase proportionally with the increase in traffic, the effect of the construction traffic on road safety per route section can be forecast. The results of this analysis are summarised in Table 8.18.

Table 8.18: Projected PIC		
Route Section	Average No. of Collisions (2023 Baseline)	Average No. of Collisions (2023 Baseline + Traffic generated cumulatively)
RS1: A9(T) between the A99(T) and the A836	4.2	4.5
RS2: A9(T) between the A836 (east) and the A836 (west)	1.75	1.78
RS3: A9(T) between Scrabster and the A836	0	0
RS4: A836 between the A9(T) and the A897	4.2	4.75
RS5: A836 between the A897 and the site access	0	0

- 8.6.38 Using this basis of assessment, there would be a negligible increase in PICs in RS1, RS2 and RS4 route section within the Study Area as a consequence of the increased traffic generated cumulatively by the developments and no increase on RS3 and RS5. On this basis and considering the high sensitivity of RS2 of the A9, the road safety effects associated with traffic generated cumulatively for users of RS2 are considered to be not significant in the context of the EIA Regulations 2017. Similarly, considering the medium and low sensitivity of RS1 and RS4 respectively, the road safety effects associated with traffic generated cumulatively for users of RS1 and RS4 are considered to be not significant in the context of the EIA Regulations 2017.

Community Effects (severance, pedestrian amenity / fear and intimidation and pedestrian delay)

- 8.6.39 The 'IEMA Guidelines' define severance as "the perceived division that can occur within a community when it becomes separated by a major traffic artery". Severance may result from a road carrying large traffic flows or a physical barrier created by the road itself, and the 'IEMA Guidelines' suggest that consideration is given to the severity of existing severance and how this might be exacerbated by proposed construction traffic generated by a development.
- 8.6.40 RS1, RS2, RS3, RS4 and RS5 would continue to operate below their theoretical capacity, even with the addition of traffic generated cumulatively. Severance should not occur when there is such a notable level of residual road capacity and traffic generated cumulatively would be relatively low.

On this basis, the effect on severance for users of the A9 and A836 associated with traffic generated cumulatively is considered to be not significant in the context of the EIA Regulations 2017.

- 8.6.41 Traffic volume¹⁰, composition, speed, pedestrian footways and crossings all contribute to the level of general pleasantness, fear, intimidation and delay experienced by pedestrians and other vulnerable road users.
- 8.6.42 Site observations indicate that pedestrian activity on RS1 and RS5 is low. It is therefore considered that the sensitivity of this location to pedestrian delay and amenity effects is negligible. The magnitude of the temporary increase in construction traffic is considered to be negligible (seven HGV per hour and eight HGV movements per hour for RS1 and RS5 respectively during the 'peak period', assuming a 12 hour working day). On this basis and considering the low sensitivity of RS1 and RS5, the effects to pedestrian delay and amenity to users of RS1 and RS5 associated with traffic generated cumulatively are considered to be not significant in the context of the EIA Regulations 2017.
- 8.6.43 The construction access route traverses Thurso (RS2), where pedestrian activity can be notable. The magnitude of the temporary increase in construction traffic is however considered to be low (seven HGV movements per hour during the 'peak period', assuming a 12 hour working day). It should also be noted that there is an existing pedestrian infrastructure network in Thurso; including footways, controlled crossings and informal crossings. Combining the magnitude of the increase with the sensitivity of the Thurso, it is considered that the pedestrian delay and amenity effects at this location associated with traffic generated cumulatively would be not significant in the context of the EIA Regulations 2017.
- 8.6.44 The construction access route traverses Scrabster (RS3), where pedestrian activity can be notable. The magnitude of the temporary increase in construction traffic is however considered to be low (10 HGV movements per hour during the 'peak period', assuming a 12 hour working day). It should also be noted that there is existing footway provision along that route section and local traffic management features including speed limit roundel road markings to encourage low speeds. Combining the magnitude of the increase with the sensitivity of Scrabster, it is considered that the pedestrian delay and amenity effects at this location associated with traffic generated cumulatively would be not significant in the context of the EIA Regulations 2017.
- 8.6.45 The construction access route traverses Reay (RS4), where a school is situated in close proximity to the A836 and pedestrian activity can be notable during school pick-up and drop-off times. The magnitude of the temporary increase in construction traffic is however considered to be low (14 HGV movements per hour during the 'peak period', assuming a 12 hour working day). It should be noted that there are local traffic management features including illuminated 20 mph signs (which operate at beginning and end of school day) to encourage low speeds and footway provision in Reay. Combining the magnitude of the increase with the sensitivity of Reay, it is considered that the pedestrian delay and amenity effects at this location associated with traffic generated cumulatively would be not significant in the context of the EIA Regulations 2017.
- 8.6.46 Overall based on professional judgment, the effects upon community receptors associated with traffic generated cumulatively are considered to be not significant in the context of the EIA Regulations 2017.

¹⁰ It is anticipated that cumulatively there would be 180 daily LGV movements associated with construction staff. This equates to a maximum of 90 arrivals and departures at the start and end of each working day resulting in a small increase in overall traffic volume, therefore the assessment of pedestrian delay and amenity effect has focussed on the increase in HGV movements only.

The Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure.

- 8.6.47 Based on site observations and professional judgement, the current standard of RS1, RS2, RS3, RS4 and RS5 public road infrastructure is considered adequate to withstand the predicted 'wear and tear' of the construction traffic generated cumulatively by the developments. On this basis, the effects to the RS1, RS2, RS3, RS4 and RS5 public road infrastructure associated with traffic generated cumulatively are considered to be not significant in the context of the EIA Regulations 2017.

8.7 Mitigation

- 8.7.1 No potentially significant effects are identified based on the results of the above. However, public road infrastructure accommodation works would be necessary to safely accommodate the abnormal load vehicle movements for the Proposed Varied Development.

Mitigation by Design

Site Access

- 8.7.2 The existing site access to the Strathy North Wind Farm off the A836 would be upgraded and designed to safely accommodate all construction traffic, including the proposed abnormal loads.
- 8.7.3 A preliminary design, showing proposed public road accommodation works, has been developed for the site access as part of the abnormal load route study and is included in the framework CTMP as Technical Appendix 8.1 (EIAR Volume 4).
- 8.7.4 Further consultation with THC, as local roads authority, would be required to further develop and agree the necessary infrastructure accommodation works and it is proposed that the full extent of all improvements works would be agreed through the CTMP as a condition of consent.

Abnormal Load Route

- 8.7.5 As part of the abnormal load route access study, swept path analysis has been undertaken to identify locations where public road infrastructure remedial works would be required to safely accommodate the proposed abnormal loads. An indication of the scale and extent of proposed public road infrastructure remedial works required is included in the framework CTMP; as Technical Appendix 8.1 (EIAR Volume 4).
- 8.7.6 Further consultation with THC and TS and/or their Agent, as local and trunk roads authorities, would be required to further develop and agree the necessary infrastructure accommodation works and it is proposed that the full extent of all improvements works would be agreed through the CTMP as a condition of consent.

Mitigation during Construction

- 8.7.7 Whilst not necessary to address the environmental effects associated with the increase in construction traffic within the Study Area (in terms of EIA Regulations 2017), it is proposed that construction traffic would be managed through adoption of a regulated and approved CTMP. A framework CTMP is provided in Technical Appendix 8.1 (EIAR Volume 4).
- 8.7.8 The Applicant would agree temporary traffic management measures then adopt and monitor an appropriate way of working in consultation with THC Roads Department, TS and/or their Agent and the Police, as appropriate. Construction activity generated vehicles (with the exception of site personnel in cars and vans) would travel on pre-defined routes to and from the site to reduce effects on existing local traffic.

- 8.7.9 Timing and frequency of vehicle movements would be managed to ensure, where practical, that vehicle movements are spaced adequately to reduce disruption and coincide (if/where applicable) with existing/current local forestry operations.
- 8.7.10 The framework CTMP would be further developed as necessary in consultation with Roads Authorities and the Police prior to construction commencing. The CTMP would outline measures to promote the efficient transportation of components and materials to site, whilst reducing congestion and disruption. The CTMP should be considered a 'live' document that includes:
- Proposed traffic management and mitigation measures on the access route;
 - Proposed measures to mitigate the impact of general construction traffic on the local road network following detailed assessment of relevant roads;
 - A procedure for the regular monitoring of road conditions and the implementation of any remedial works required during the construction period;
 - Details of appropriate upgrading works at the junction of the site access and the public road;
 - Measures to ensure that all affected public roads are kept free of mud and debris arising from the development;
 - A contingency plan prepared by the abnormal load haulier;
 - A detailed protocol for the delivery of abnormal loads/vehicles, prepared in consultation and agreement with interested parties, including THC, the Police, TS and, as required, community representatives; and
 - A detailed delivery programme for abnormal load movements.
- 8.7.11 In partnership with the Applicant, the appointed contractors would be required to maintain close liaison with local community representatives, landowners and statutory consultees throughout the construction period. This is likely to include circulation of information about ongoing activities; particularly those that could potentially cause disturbance, including due to traffic. A telephone number would be provided and persons with appropriate authority to respond to calls and resolve or escalate any problems arising will be available.
- 8.7.12 Practical precautions would be implemented to prevent damage to the public road network caused by construction related activities. Damage to the public road infrastructure which is agreed (between THC and the Applicant) to be as a result of Proposed Varied Development construction activities would be made good; with the repairs implemented and/or funded by the Applicant.

8.8 Assessment of Residual Effects

Residual Construction Effects

- 8.8.1 No significant effects have been identified in relation to road and traffic receptors and therefore there are no significant residual effects.

Residual Cumulative Construction Effects

- 8.8.2 Whilst no significant cumulative effects have been identified, if the construction of any notably sized development(s), e.g. wind farm development(s) (as considered in the cumulative assessment) appears likely to overlap with the Proposed Varied Development, as a matter of best practice, the Applicant would seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effect of combined construction.

8.9 Monitoring

- 8.9.1 The requirement for construction monitoring would be agreed among the Applicant, Roads Authority representatives and other relevant stakeholders prior to commencement of works.

- 8.9.2 The Applicant would enter into a legal agreement under Section 96 of the Roads (Scotland) Act 1984 to formalise an inspection and maintenance regime with THC for agreed sections of road.

8.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

- 8.10.1 An updated assessment of the Consented Scheme has been carried out against the 2023 baseline taking into consideration the wider Study Area and an expanded scope including potential cumulative effects. The assessment is presented in Technical Appendix 8.3 (EIAR Volume 4) and indicates that the total traffic generated by the Consented Scheme is estimated as 70,436 traffic movements, of which 12,836 GHV movements over the 24 month construction period. The updated assessment concludes that the Consented Scheme would not generate any significant residual effects.
- 8.10.2 In comparison, the total traffic generated by the Proposed Varied Development is estimated as 82,170 traffic movements of which 24,570 movements would be HGV movements over the 24 month construction period. The increase in HGV movements between the Proposed Varied Development and the Consented Scheme is largely due to the increase in turbine size necessitating larger foundations and therefore requiring a greater quantity of construction materials and also an increase in forestry felling, generating additional timber to be exported. Despite the increased traffic movements, the residual traffic and transport effects have been assessed as being not significant in terms of the EIA Regulations 2017.
- 8.10.3 Table 8.19 presents a summary comparison of residual effects of the Consented Scheme compared to the Proposed Varied Development based on the 2023 baseline.

Table 8.19: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Roads and Traffic Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Construction				
Driver Delay	No significant effects predicted	No significant effects predicted	No significant effects predicted	No material change
Road Safety	Not considered in the assessment	No significant effects predicted	No significant effects predicted	No material change
Community Effects	Not considered in the assessment	No significant effects predicted	No significant effects predicted	No material change
Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure	No significant effects predicted	No significant effects predicted	No significant effects predicted	No material change
Cumulative Construction				
Driver Delay	Not considered in the assessment	No significant effects predicted	No significant effects predicted	No material change
Road Safety	Not considered in the assessment	No significant effects predicted	No significant effects predicted	No material change
Community Effects	Not considered in the assessment	No significant effects predicted	No significant effects predicted	No material change
Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the	Not considered in the assessment	No significant effects predicted	No significant effects predicted	No material change

Table 8.19: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Roads and Traffic Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Public Road Infrastructure				It should be noted that the A9(T) is a strategic road with substantial residual capacity and designed to carry high level of HGV traffic. Based on site observations and professional judgement, the current standard of the A836 public road infrastructure is considered adequate to withstand the predicted 'wear and tear' of the construction traffic generated cumulatively by the developments. Nevertheless, practical precautions would be implemented to prevent damage to the public road network caused by construction related activities. Damage to the public road infrastructure which is agreed (between THC and the Developer) to be as a result of the Proposed Varied Development's construction activities would be made good; with the repairs implemented and/or funded by the Applicant.

8.11 Summary and Conclusions

- 8.11.1 The construction programme associated with the Proposed Varied Development is anticipated to cover a 24-month period. During this time 24,570 HGVs would access the site equating to 88 daily HGV movements during the 'peak period' (May 2023 to August 2023 inclusive). Total construction traffic (HGV + LGV) could increase traffic flows on the A836 in the Study Area during the 'peak period' by 7% on the section between the A9(T) and the A897 and by 28% on the section between the A897 and the site access. Total construction traffic could increase traffic flows on the A9 (T) in the Study Area during the 'peak period' by 8.5% on the section between the A99(T) and the A836 and by 2% on the section between the A836 (east) and the A836 (west).
- 8.11.2 The predicted percentage increases in HGVs on the A836 in the Study Area during the 'peak period' are 126% on the section between the A9(T) and the A897 and 463% on the section between the A897 and the site access. The predicted percentage increases in HGV traffic on the A9 (T) in the Study Area during the 'peak period' are 44% on the section between the A9(T) and the A897, 40% on the section between the A897 and the site access and 4% on the section between Scrabster and the A836.
- 8.11.3 It is noted that the large percentage increase in HGVs on the A836 is due to the very low number currently, and the robust case scenario of 88 HGV movements per day during the 'peak period' only equates to approximately seven HGVs per hour, assuming a 12 hour working day. The effect of this increase is not deemed to be significant.
- 8.11.4 This Roads and Traffic chapter has considered the potential traffic and transport effects associated with the construction of the Proposed Varied Development. During construction, effects would be temporary, and the residual traffic and transport effects have been assessed as being not significant in terms of the EIA Regulations 2017.
- 8.11.5 These effects would be further reduced and managed through the implementation of additional good practice measures through the development and implementation of an appropriate CTMP, monitoring of road conditions, implementation of any remedial works required during the construction period as deemed necessary and suitable liaison with THC, TS and Police Scotland prior to and during the construction phase.
- 8.11.6 Cumulative effects associated with cumulative developments which are likely to generate traffic that would utilise local public roads within the Study Area at the same time as traffic generated by the Proposed Varied Development have also been assessed and the effects were found not to be significant in terms of the EIA Regulations 2017.
- 8.11.7 In addition to the CTMP, if the construction phase of any notably sized development(s), e.g. wind farm development(s) (as considered in the cumulative assessment) appears likely to overlap with the Proposed Varied Development, as a matter of best practice, the Applicant would seek to liaise with the appropriate developer organisation regarding the scheduling of deliveries to identify potential means of reducing the effect of combined construction.
- 8.11.8 During operation, generated traffic levels would be so low that there would be no discernible effects. For decommissioning, the future baseline situation is not reliably predictable given the long period between construction and decommissioning. Relevant authorities would therefore be consulted with respect to decommissioning and an appropriate level of assessment undertaken at that time, if deemed appropriate.
- 8.11.9 The residual effects are presented in Table 8.20.

Table 8.20: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development				
Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Construction				
Driver Delay	Not significant	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects
Road Safety	Not significant	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects
Community Effects	Not significant	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects
Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure	Not significant	Whilst no significant effects predicted, the Applicant would enter into a legal agreement under Section 96 of the Roads (Scotland) Act 1984 to formalise an inspection and maintenance regime with THC for agreed sections of road.	To be delivered as condition of consent during the construction phase.	No significant residual effects
Operation				
N/A				
Decommissioning				
N/A				
Cumulative Construction				
Driver Delay	Not significant	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	N/A	No significant residual effects

Table 8.20: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Road Safety	Not significant	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	N/A	No significant residual effects
Community Effects	Not significant	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects
Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure	Not significant	Whilst no significant effects predicted, the Applicant would enter into a legal agreement under Section 96 of the Roads (Scotland) Act 1984 to formalise an inspection and maintenance regime with THC for agreed sections of road.	To be delivered as condition of consent during the construction phase.	No significant residual effects
Cumulative Operation				
N/A				

8.12 Glossary and Abbreviations

Abbreviation (in alphabetical order)	Expanded Term
AADF	Annual Average Daily Flow
ATC	Automatic Traffic Counts
CTMP	Construction Traffic Management Plan
DfT	UK Government Department for Transport
EIA Regulations 2017	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
EIAR	Environmental Impact Assessment Report
HGV	Heavy Goods Vehicle
IEMA Guidelines	Institute of Environmental Assessment (now the Institute of Environmental Management and Assessment (IEMA) (1993), Guidelines for the Environmental Assessment of Road Traffic, Guidance Notes No. 1

Abbreviation (in alphabetical order)	Expanded Term
LGV	Light Goods Vehicle
NTRF	National Road Traffic Forecast
PIC	Personal Injury Collision
RS	Route Section
SPA	Swept Path Assessment
TA	Transport Assessment
THC	The Highland Council
Theoretical link capacity	Maximum design capacity of a given road link for motorised traffic
TS	Transport Scotland

9. ECOLOGY (NON-AVIAN)

9.1 Executive Summary

- 9.1.1 The potential impacts and their likely significant effects from the construction and operation of the Proposed Varied Development have been assessed. The baseline data collected for the Consented Scheme was reviewed and considered suitable to support the assessment of the likely significant effects of the Proposed Varied Development. However, through consultation with Scottish Natural Heritage (SNH) it was identified that:
- Habitat survey data should be ground-truthed to check its continued accuracy;
 - Deer population and herbivore impact assessments should be updated considering the change in landscape utilisation from the construction of the neighbouring Strathy North Wind Farm;
 - Following a change in SNH Guidance, bat surveys should be completed to assess the utilisation of the site by bat species; and
 - No further protected species surveys were deemed necessary as land use activities within the site and wider landscape have not altered sufficiently enough to change their utilisation of the area.
- 9.1.2 Surveys undertaken in 2019 to update the baseline for the Proposed Varied Development found that:
- Habitats recorded for the Consented Scheme's assessment continued to provide a true reflection of the current baseline for the Proposed Varied Development;
 - Deer populations were found to be consistent with those previously recorded despite the low cull level completed in the years between assessments;
 - Impacts to the surrounding Caithness and Sutherland Peatlands Special Area of Conservation (SAC) habitats were assessed as low; and
 - The utilisation of the site by five bat species generally varied from low to moderate.
- 9.1.3 In light of the updated baseline and the proposed infrastructure for the Proposed Varied Development the following Important Ecological Features (IEFs) were identified:
- Habitats within the main site;
 - Habitats outwith the main site;
 - Protected species;
 - Aquatic species;
 - Qualifying habitats of the surrounding Caithness and Sutherland Peatlands SAC.
- 9.1.4 Effects identified which could have an impact on the above IEFs were:
- Permanent and Temporary Habitat Loss and Permanent Habitat Change to habitats both within and outwith the main site during the Construction and Operational Phases of the Proposed Varied Development and associated access tracks;
 - Effects to protected species through habitat loss, disturbance from the Construction and Operational Phases and reduced availability of food resources;
 - Effects to aquatic species through pollution and sedimentation in both the Construction and Operational Phases;
 - Effects to bat species from Construction Phase activities and through the Operational Phase of the Proposed Varied Development;
 - Effects to designated habitats of the surrounding Caithness and Sutherland Peatlands SAC from deer dispersal caused by Construction Phase activities and ongoing phased felling in the first two years of the Operational Phase of the Proposed Varied Development;

- Effects to qualifying habitats of the Caithness and Sutherland Peatlands SAC from construction and update of the Common Access and Yellow Bog tracks which pass through the SAC; and
- Cumulative effects from the above in conjunction with surrounding wind farm developments within a 20 km buffer of the site (and a 100 km buffer for bat species).

A number of impacts to IEFs were identified which could experience a potentially significant effect during either the Construction or Operational Phase of the Proposed Varied Development. Suitable mitigation both through the design of the Proposed Varied Development and IEF specific mitigation measures were identified which would reduce all predicted likely significant effects to a level of no significance for residual predicted effects.

9.2 Introduction

9.2.1 This Chapter considers the likely significant effects on ecological (non-avian) receptors associated with the construction, operation and decommissioning of the Proposed Varied Development. The specific objectives of the Chapter are to:

- describe the Ecology (non-avian) baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the predicted likely significant effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the predicted likely significant effects;
- assess the residual effects remaining following the implementation of mitigation; and
- provide a comparison of effects between the Consented Scheme and the Proposed Varied Development.

9.2.2 This Chapter is supported by the figures and technical appendices presented in Table 9.1.

Table 9.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figures - Figure 9.1 – Desk Study Area and Cumulative Wind Farm Locations	New Figure.	The Figure presents the location of the Proposed Varied Development in the context of surrounding cumulative wind farm developments. Due to the time that has elapsed since the previous reports were prepared a new Figure is required to show the current cumulative wind farm context and the wind farms that have been considered in the cumulative impact assessment.
EIAR Volume 3a: Figures - Figure 9.2a – Main Site NVC Survey Area (2011) and Ground-Truthing Locations (2019)	New Figure.	Figure created to show the survey area of the 2011 NVC survey used to collect the vegetation baseline for the Proposed Varied Development in the main site, and the survey locations of the ground-truthing points assessed in 2019 to check the baseline remains valid.

Table 9.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
		Information is used to illustrate the assessment areas used for the 2011 and 2019 surveys.
EIAR Volume 3a: Figures - Figure 9.2b – Access Track and Yellow Bog NVC Survey Area (2012)	New Figure.	Figure created to illustrate the survey area of the 2012 NVC survey used to collect the vegetation baseline for the Proposed Varied Development in the areas surrounding the access track route and Yellow Bog track. Information from the survey area used for the assessment of the potential impacts of upgrading the access track and Yellow Bog track.
EIAR Volume 3a: Figures - Figure 9.2c – Main Site Protected Species Survey Area (2007 & 2012)	New Figure.	Figure created to show the survey area of the 2012 Protected Species survey used to collect the representative baseline for the Proposed Varied Development in the main site.
EIAR Volume 3a: Figures - Figure 9.2d – Access Track Protected Species Survey Area (2007 & 2012)	New Figure.	Figure created to illustrate the area covered in collecting representative baseline information with regards to protected species using areas surrounding the access track
EIAR Volume 3a: Figures - Figure 9.2e – Static Bat Recorder Survey Locations (2019-2020)	New Figure.	Figure presents the static bat recording locations and potential roosting features from the 2019-2020 field surveys. The Figure illustrates the survey strategy used to assess the main site for its use by bat species.
EIAR Volume 3a: Figures - Figure 9.2f – Deer Population Assessment and Herbivore Impact Assessment Survey Area (2019)	New Figure.	Figure presents the survey area for the 2019 deer population assessment and herbivore impact assessment both within the main site and across a 1 km buffer within the Caithness and Sutherland Peatlands SAC.
EIAR Volume 3a: Figures - Figure 9.3a – National Vegetation Classification Survey Results – Main Site (2011)	Reused information from Figure A10.8 of Technical Appendix 9.8 – Copy of the 2013 ES Addendum, Volume 4, Technical Appendix A10.2 Habitats, Vegetation and Protected Species	The Figure provides mapping of the vegetation communities present across the main site which have been used to assess the potential effects of the Proposed Varied Development to habitats. Re-use of the 2011 baseline information allows a direct comparison of the likely significant effects of the Proposed Varied

Table 9.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
		Development and the Consented Scheme.
EIAR Volume 3a: Figures – Figure 9.3b – National Vegetation Classification Survey Results: Access and Yellow Bog Tracks (2012)	Reused information from Figure A10.6 of Technical Appendix 9.8 – Copy of the 2013 ES Addendum, Volume 4, Technical Appendix A10.2 Habitats, Vegetation and Protected Species).	The Figure provides mapping of the vegetation communities present across the surrounding the Access and Yellow Bog track which have been used to assess the potential effects of the Proposed Varied Development to habitats. Re-use of the 2012 baseline information allows a direct comparison of the likely significant effects of the Proposed Varied Development and the Consented Scheme.
EIAR Volume 3a: Figures – Figure 9.4 – Protected Species Survey Results (2007 & 2012)	Reused information from Figure A10.10 and A10.12 of Technical Appendix 9.8 – Copy of the 2013 ES Addendum, Volume 4, Technical Appendix A10.2 Habitats, Vegetation and Protected Species.	The figure provides the protected species survey results from 2007 and 2012. No further protected species surveys have been completed for the Proposed Varied Development as agreed with Statutory Consultees, and the information is considered to be representative of the current baseline for the main site and surrounding area. The information is used to inform the impact assessment for the Proposed Varied Development and allow a comparison of the likely significant effects of the Consented Scheme and the Proposed Varied Development to protected species.
EIAR Volume 3a: Figures - Figure 9.5 – Phased Felling Plan	New Figure.	The Figure is presented to illustrate the progressive removal of the conifer plantation from the main site over a period of five years to allow construction of the Proposed Varied Development and implementation of peatland restoration.
EIAR Volume 3a: Figures - Figure 9.6 – Access Track Route Options	New Figure.	The Figure presents the consented route options for the main site (common access, preferred access and alternative access) plus the inclusion of the existing Yellow Bog Track proposed for upgraded use by construction traffic which are under consideration for the Proposed Varied Development.

Table 9.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 4: Technical Appendices - Technical Appendix 9.1 – Habitats and Protected Species Survey Update	New information.	Summary of protected species information collected for the Consented Scheme, an update of the desk-based information available for the surrounding area, and an assessment of the habitats present within the main site and the validity of the 2011 survey data to support the assessment of the Proposed Varied Development. Provides an update and confirms the suitability of the baseline used for the Consented Scheme for continued use of the assessment of the Proposed Varied Development.
EIAR Volume 4: Technical Appendices - Technical Appendix 9.2 – Bat Survey Report 2019-2020	New information.	Bat survey results and the assessment of the likely significant effects of the Proposed Varied Development to bat species following SNH (2019) ¹ Guidelines.
EIAR Volume 4: Technical Appendices - Technical Appendix 9.3 – Deer Population and Habitat Impact Assessment Report 2019	New information.	To update previous assessment of the current deer population in and surrounding the main site, and the current herbivore impacts to the Caithness and Sutherland Peatlands SAC. Baseline was deemed necessary to be updated due to felling of neighbouring conifer plantations and therefore the potential changes in habitat use by the local deer population.
EIAR Volume 4: Technical Appendices - Technical Appendix 9.4 – Assessment of the Effects of the Construction and Operation of the Access and Yellow Bog Tracks and the Associated Grid Connection to Qualifying Habitats of the Caithness and Sutherland Peatlands Special Area of Conservation	New information.	Update of the access track and grid connection assessment originally presented in the 2013 ES Addendum Technical Appendix A10.6 due to alterations to the methods of construction for the access track and inclusion of the Yellow Bog track. The document updates the assessment of the potential likely significant effects of construction and operational through use of these tracks to the Caithness and Sutherland Peatlands SAC.
EIAR Volume 4: Technical Appendices - Technical Appendix 9.5 – Strathy	New information.	The document provides an updated Outline Habitat Management Plan for the

¹ Scottish Natural Heritage (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation

Table 9.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
South Outline Habitat Management Plan		Proposed Varied Development following the same principles as those proposed for the Consented Scheme. The document reflects the proposed 50-year operational lifespan of the Proposed Varied Development and implementation of the Phased Felling Plan as provided in Technical Appendix 9.6 – Strathy South Forest Management Plan (EIAR Volume 4).
EIAR Volume 4: Technical Appendices - Technical Appendix 9.6 – Strathy South Forestry Management Plan	New information.	The document provides an update of the previous forestry assessment (2013 ES Addendum, Volume 4, Technical Appendix A11.2 Management at Strathy South: Forestry Removal, Habitat Management and an Assessment of the Effect on Birds Connected with the Caithness and Sutherland Peatlands Special Protection Area), and present an update of the proposed methods of felling based on current technologies and updated forest information for the main site.
EIAR Volume 4: Technical Appendices - Technical Appendix 9.7 – Habitat Loss Methodology and Calculations	New information.	Presents a summary of the methods used to calculate the effects of the Proposed Varied Development to habitats from construction of the Proposed Varied Development. This document provides the results of all habitat loss calculations for the Proposed Varied Development and revised habitat loss calculations for the Consented Scheme using the same parameters as that for the Proposed Varied Development. This document allows a comparison of effects between the Consented Scheme and the Proposed Varied Development.
EIAR Volume 4: Technical Appendices – Technical Appendix 9.8 – Copy of the 2013 ES Addendum, Volume 4, Technical Appendix A10.2 Habitats, Vegetation and Protected Species	Information reused from the 2013 ES Addendum Volume 4, Technical Appendix A10.2.	Ground-truthing surveys completed in 2019 (EIAR Volume 4: Technical Appendix 9.1) confirmed the baseline information collected for the Consented Scheme in 2011 remains valid for use in this EIAR. It is used for the assessment of the

Table 9.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
		likely significant effects of the Proposed Varied Development.
EIAR Volume 4: Technical Appendices – Technical Appendix 9.9 – Copy of the 2013 ES Addendum, Technical Appendix A10.4 Assessment of Fish Habitats and Populations 2012	Information reused from the 2013 ES Addendum, Technical Appendix A10.4.	Information reused for the assessment of the Proposed Varied Development from the Consented Scheme because the baseline was deemed not to have altered in the intervening years.
EIAR Volume 4: Technical Appendices – Technical Appendix 9.10 – Copy of the 2013 ES Addendum, Technical Appendix A10.5 Freshwater Invertebrate Survey 2012	Information reused from the 2013 ES Addendum Technical Appendix A10.5.	Information reused for the assessment of the Proposed Varied Development from the Consented Scheme because the baseline was deemed not to have altered in the intervening years.
EIAR Volume 4: Technical Appendices – Technical Appendix 9.11 – Copy of the 2013 ES Addendum, Technical Appendix A10.6 Strathy South Wind Farm, Report 5b: An Updated Assessment of Impacts of Access Track Construction on the Caithness and Sutherland Peatlands Special Area of Conservation 2013	Information reused from the 2013 ES Addendum Technical Appendix A10.6.	Information reused to inform the updated report on the assessment of effects in relation to the access tracks (EIAR Volume 4: Technical Appendix 9.4) and the assessment of the likely significant effects of the Proposed Varied Development on qualifying habitats of the Caithness and Sutherland Peatlands SAC.

Competent Expert Summary

- 9.2.3 The assessment has been carried out by Stephen Lockwood, of RPS Group. Stephen is a Chartered Ecologist and Full Member of the Chartered Institute of Ecology and Environmental Management. Stephen has extensive experience of wind farm development within Scotland, particularly within afforested and peatland habitats, and has supported numerous large-scale wind farm developments through the consenting process over the past ten years. Stephen specialises in the development of Habitat Management Plans, in particular peatland restoration schemes, for both renewable energy developers and government agencies, to aid in meeting the Scottish Government's ambitious climate change targets. A table presenting his relevant qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).

9.3 Summary of Effects of Consented Scheme

- 9.3.1 The 2007 Environmental Statement (ES) assessed the effects of the construction and operation of the Original 2007 Scheme on habitats and fauna. The adverse impact pathways identified were habitat loss, sedimentation/nutrication of watercourses, disturbance and destruction of habitat, and increased risk of road traffic injury. Positive impact pathways were peatland habitat restoration

following removal of the conifer plantation and additional habitat creation. The assessment concluded that there would be no significant adverse impacts presented by the Original 2007 Scheme to habitats or fauna either within or outwith the Caithness and Sutherland Peatlands SAC, while there would be significant beneficial impacts.

- 9.3.2 The subsequent 2013 ES Addendum assessed the effects of alterations made to the design with the removal of 30 turbines. The assessment found *“In general, the effects on habitats remained unchanged from those outlined in the 2007 Environmental Statement”*², however, there were changes to the way the effects on habitats were calculated and assessed. In the 2007 ES, effects associated with borrow pits, cabling and the construction compound were assessed as being reversible through habitat reinstatement, a view which was not adopted for the 2013 ES Addendum. Instead these effects were considered to be *“operation and ongoing effects (i.e. permanent habitat loss or direct effects due to changes in hydrology)”*² and they were therefore reassessed as such. The effects on fauna were considered to remain unchanged from the 2007 ES due to there being no change in the habitats or species present on the site. The assessment concluded that residual impacts of the Modified 2013 Scheme would be minor adverse at worst and considered to be not significant, while there were likely to be moderate beneficial impacts.
- 9.3.3 The impacts of the Consented Scheme were assessed in the 2014 Further Information Report (FIR). The assessment updated the habitat loss and direct and indirect impacts on habitats based on a reduction in turbines, met masts and associated infrastructure. Habitat loss decreased by 14.17% compared with the Modified 2013 Scheme, while commitments made to peatland restoration and management remained unchanged. The *“predicted construction, operation and ongoing effects on protected species remain as outlined in the 2007 Environmental Statement”*³. Table 9.2 provides a summary of the residual predicted effects from construction, operation and decommissioning of the Consented Scheme.

Table 9.2: Summary of the Consented Scheme residual effects

Effects	Details	Consented Scheme Effect Significance
Construction		
Temporary loss or disturbance to SAC-designated habitats	Upgrading/widening and laying grid cables adjacent to the access track.	With the application of mitigation measures, the magnitude of effect was assessed as Low and the overall effect as Minor (Not Significant).
Temporary loss or disturbance to non-designated habitats	Installation of c. 7 km grid connection along forest rides within Strathy North, Strathy Wood and Strathy South conifer plantations.	With the application of mitigation measures, the magnitude of effect was assessed as Low and the overall effect as Minor (Not Significant).
Disruption to protected fauna from noise, habitat fragmentation, road related mortality, decrease in prey resources, changes to water quality and habitat loss/change and disturbance	Risks assessed for each of the following fauna: otter, pine marten, wildcat, badger, water vole, and fish.	The magnitude of effects ranged from Neutral to Low and the overall effect from Negligible to Low (Not Significant).

² 2013 ES Addendum, Chapter A10: Ecology, Section A10.5.2

³ 2014 Further Information Report Section 5.3.3 Revised Impacts on Fauna

Table 9.2: Summary of the Consented Scheme residual effects

Effects	Details	Consented Scheme Effect Significance
Operation/Ongoing		
Direct and indirect impacts on SAC-designated habitat	Alteration to the access route would result in predicted direct impact on 0.66 ha to a 10 m buffer and indirect impacts of 2.25 ha to a 15 m buffer on designated habitats.	With the application of design stage mitigation measures the magnitude of effect was assessed as Low and the overall effect as Moderate (Significant). Once habitat restoration mitigation in the form of compensation for the impact area was applied the residual effect was reduced to Neutral/Minor Beneficial.
Direct and indirect impact on non-designated protected habitats	Total combined predicted loss of 20.64 ha of EU Annex 1 habitats for the main site and Preferred Access Track route.	The magnitude of this effect was assessed as Medium and the overall effect as Moderate (Significant). Once mitigation in the form of peatland restoration was applied the residual effect was reduced to Likely Minor Beneficial.
Indirect impacts on SAC-designated habitat by displaced deer from Strathy South conifer plantation	Disturbance effects from machinery are limited, however, the removal of the conifer plantation is assumed to cause dispersal of deer populations onto the surrounding SAC.	With the application of mitigation measures the magnitude of effect was assessed as Low and the overall effect as Minor (Not Significant).

9.4 Summary of Mitigation for the Consented Scheme

9.4.1 To mitigate the potential effects of the Consented Scheme to the IEFs identified in both the 2013 ES Addendum and the 2014 Further Information Report (FIR) the following measures were proposed:

- Implementation of a Construction Environmental Management Plan (CEMP), the CEMP would include details of:
 - Pre-construction surveys for protected species;
 - A record of protected species survey completed and their results to inform ongoing construction works;
 - Details of any micro siting of infrastructure during construction works (an allowance of up to 50 m) to avoid areas of sensitive habitats;
 - Control measures for pollution and sedimentation prevention;
 - Techniques for habitat reinstatement.
- Implementation of a Water Quality Monitoring Plan (WQMP) to assess water quality prior to, during and post-construction and would detail any procedures to be implemented to protect aquatic species;
- Implementation of a Forestry Management Plan (FMP) to detail the phased felling of the conifer plantation and mitigation implemented during these works to protect environmental receptors;
- Implementation of a Habitat Management Plan to compensate for direct and indirect effects to habitats both within the Caithness and Sutherland Peatlands SAC and the main site;
- Implementation of a Deer Management Plan to ensure deer dispersal during the phased removal of the conifer plantation is controlled to minimise effects to the surrounding Caithness and Sutherlands Peatland SAC's qualifying habitats.

- The design of the Consented Scheme considered peat depths across the site and designed the wind farm infrastructure to avoid areas of deep peat, wherever possible;
- A buffer of 70 m was applied to water courses and water bodies (excluding watercourse crossings) during the design stage of the Consented Scheme to ensure limited effects to species utilising these areas.

9.4.2 The Applicant is committed to continuing to provide the mitigation as detailed for the Consented Scheme, and where appropriate updates have been made to these commitments to ensure they remain relevant for the Proposed Varied Development. The commitments are provided in Section 9.8 of this Chapter.

9.5 Methodology

Scope of the Assessment

- 9.5.1 This Chapter identifies and assesses the potential for likely significant effects on the IEFs of the Proposed Varied Development as a result of changes to the Consented Scheme.
- 9.5.2 Variations between the Consented Scheme and Proposed Varied Development relevant to ecological receptors are:
- Increase of the turbine tip height of up to 65 m;
 - Deletion of up to 0.5 km of track within the site;
 - Additional land take of 0.11 ha per turbine (in a 'worst case' scenario);
 - Inclusion of the Yellow Bog Track for use by construction traffic and its associated upgrade to facilitate its use for this purpose; and,
 - Alterations to the construction method of the access track, in particular in relation to the installation of the grid connection cables.
- 9.5.3 The effects of these changes are largely restricted to bat and habitat IEFs associated with the change in turbine dimensions, alterations in track lengths and increases of foundations extent, hardstanding areas, number of borrow pits and size of the substation.
- 9.5.4 Through consultation with Scottish Natural Heritage (SNH) (meetings held on 11.09.2019 and 27.11.2019) it was confirmed that no additional surveys for protected terrestrial species were required to update previous assessments, with the exception of bat surveys for which new Guidance in relation to wind farm developments has been issued in 2019¹. Technical Appendix 9.1 (EIAR Volume 4) and Technical Appendix 9.8 (EIAR Volume 4) provide full details of the protected species surveys completed for the Proposed Varied Development. Technical Appendix 9.2 (EIAR Volume 4) provides full details for the bat surveys completed for the Proposed Varied Development.
- 9.5.5 Effects to Ground Water Dependent Terrestrial Ecosystems (GWDTEs) were scoped out of this assessment through consultation with the Scottish Environment Protection Agency (SEPA). The likelihood of potential vegetation communities being reliant on groundwater influences was determined to be negligible based on the underlying geology of the site as report in Chapter 10: Soil and Water (EIAR Volume 2).
- 9.5.6 Ground-truthing of the current National Vegetation Classification (NVC) survey information was completed for the Proposed Varied Development to ensure the information remains relevant for this 2020 submission. Details of the NVC surveys are provided in Technical Appendix 9.1 (EIAR Volume 4) and Technical Appendix 9.8 (EIAR Volume 4) and the results of these assessment provided in Figures 9.3a and 9.3b (EIAR Volume 3a: Figures).
- 9.5.7 In the intervening period between the submission of the 2013 ES Addendum and 2014 FIR (to assess the Consented Scheme) and the application for this Proposed Varied Development there has been considerable felling activity at the Strathly North Wind Farm c. 1.5 km north of the site. This felling

activity has potentially altered the deer and habitat baseline through displacement into the wider landscape. Deer populations and impacts to habitats were therefore reassessed in 2019 to establish changes to deer density within the site, and whether the effect of displacement to the Caithness and Sutherland Peatlands SAC has changed following the proposed phased removal of the conifer plantation for the purpose of the Proposed Varied Development. Full details of these surveys are provided in Technical Appendix 9.3 (EIAR Volume 4).

- 9.5.8 The effects on the qualifying interests of the Caithness and Sutherland Peatlands SAC are considered in this assessment in light of the proposed change of use of the section of current forestry track crossing Yellow Bog (referred to as the Yellow Bog track) to allow its use by construction traffic, and therefore the necessary widening of the track to accommodate this along with the placement of the necessary grid connection cable running in proximity to the track. Details of the proposed construction related activities and the likely significant effects on the Caithness and Sutherland Peatlands SAC are provided in Technical Appendix 9.4 (EIAR Volume 4).
- 9.5.9 Updated cumulative assessments of likely significant effects for the Proposed Varied Development have been updated for this 2020 EIAR and the residual cumulative effects are provided in Section 9.9 of this Chapter.
- 9.5.10 The assessment of the effects of the Proposed Varied Development has followed the standard CIEEM Guidance⁴ for Ecological Impact Assessment, utilising the same dataset as that of the 2013 ES Addendum and 2014 FIR, where updates to information have not been required, thereby allowing a direct comparison to be made.
- 9.5.11 Table 9.3 provides a summary of the surveys completed for ecological receptors for the Consented Scheme and those which were required to be updated to inform this assessment of the Proposed Varied Development.

Table 9.3: Summary of the baseline information used for the EIAR for the Proposed Varied Development and where data from the Consented Scheme has been used or updated				
Survey	Method	Scope	Survey Year	Update Required
Habitat Surveys	Phase 1 Habitat Survey	Main site plus 500 m buffer and potential access route area between the main site and Strathy North wind farm.	2004	Yes, ground-truthing of these surveys was completed in conjunction with those for the NVC surveys to confirm their continued accuracy.
		Access track between Strathy Wood and the main site plus a 200 m buffer.	2012	No update required. No works have been completed surrounding the access tracks and ground-truthing of NVC data for the main site showed data collected for the Consented Scheme remains accurate for the EIAR for the Proposed Varied Development.
	NVC Classification	Main site plus 500 m buffer and potential access route area.	2005	Yes, ground-truthing to determine if survey results remain accurate or if further site wide assessment would be required to update these.
		Main site plus 100 m buffer.	2011	

⁴ CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

Table 9.3: Summary of the baseline information used for the EIAR for the Proposed Varied Development and where data from the Consented Scheme has been used or updated

Survey	Method	Scope	Survey Year	Update Required
		Access track between Strathy Wood and main site plus a 200 m buffer	2012	
Faunal Surveys	Otter, pine marten, wildcat, badger, water vole, bats.	Main site plus 500 m buffer and potential access route area between main site and Strathy North wind farm.	2004 / 2005	Yes, for bats only as Guidance relating to the requirements of the assessment for bats has been updated since previous submissions for the Consented Scheme.
		Main site and part of the proposed access tracks and grid connection plus a 250 m and 200 m buffer respectively.	2012	
	Fish and aquatic invertebrates	Habitat suitability, obstacles presence to fish migration, and fish species composition and distribution for all main watercourses within the site.	2007 / 2009 / 2012	No, SNH confirmed through consultation that further surveys were not required.
	Effective deer utilisation (EDU) population assessment	Within the main site.	2010	Yes, construction of the Strathy North Wind Farm and the associated felling of the conifer plantation could have altered the utilisation of the wider landscape by deer. As such reassessment for the main site is required.

Consultation

- 9.5.12 To inform the environmental impact assessment work for the Proposed Varied Development, consultation was undertaken with statutory and non-statutory agencies to determine and agree upon the appropriate approach. Agencies relevant to this Chapter are Energy Consents Unit (ECU), SNH, Marine Scotland Science (MSS), Scottish Environmental Protection Agency (SEPA), the Royal Society for the Protection of Birds (RSPB), and Scottish Forestry. A summary of the consultation responses and the Applicant's response in relation to each consultee is presented in Table 9.4 below.

Table 9.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
MSS 15 May 2019	Scoping	There is unlikely to be alterations to the previously predicted impacts on water quality and fish populations than that of the Consented Scheme	No further action required for the 2020 assessment.
SEPA 16 May 2019	Scoping	Welcome scoping in the effects of additional land take on habitats present on the Site, and are content with "ground-truthing" the existing NVC survey and producing an updated GWDTE assessment.	Ground-truthing survey detail provided in Technical Appendix 9.1 (EIAR Volume 4). A GWDTE assessment is presented in Technical Appendix 10.3 (EIAR Volume 4) and concludes that the areas of potential GWDTE on-site

Table 9.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		Welcomes the production of an updated Peat Management Plan if enough baseline peat probing data has been collected to meet current guidance and extended excavations do not impact deep peat should peat depth be scoped out. SEPA are content for borrow pits to be scoped out on the understanding that the increase in turbine footprint does not results in the need for greater volumes of aggregate.	are not sustained by groundwater. Therefore, GWDTE and can be scoped out of the assessment as detailed in paragraph 9.5.5 of this Chapter and Chapter 10: Soil and Water. The Peat Management Plan for the Proposed Varied Development is provided in Technical Appendix 10.2 (EIAR Volume 4). Since the Scoping Opinion was received there were further design revisions to the foundations which has necessitated the requirement to increase the amount of aggregate required on-site. Therefore, a Borrow Pit Assessment has been completed and is included in Technical Appendix 2.2 (EIAR Volume 4).
SEPA 30 May 2019	Scoping	A revision to the Habitat Management Plan should ensure that current best practice guidance is followed in relation to removing timber and brash from the site, harvesting techniques and use of any mulch in restoration proposals.	Technical Appendix 9.6 (EIAR Volume 4) provides a revised Strathy South Forest Management Plan and details the forest felling methods to be employed to ensure the greatest potential for peat restoration.
SNH 31 May 2019	Scoping	No specific comments received relating to ecological receptors.	N/A
SNH consultation meetings 11.09.19, 27.11.19 and 03/06/20	Consultation	No issued raised regarding the proposed scope of ecology survey and assessment. SNH agreed that no additional protected species surveys were required for this submission but surveys for protected species should be completed prior to construction commencing. It was agreed that split season assessment of the utilisation of the site by bat species was sensible to ensure that all periods of the bat activity season were captured. SNH agreed that ground-truthing surveys of the habitat data collected for the Consented Scheme should be undertaken to assess if any change had occurred in the intervening time period between submissions. Only if	Surveys and assessment completed are summarised in the Baseline Conditions section of this Chapter and supported by the relevant Technical Appendices. This includes the protected species reported on in EIAR Volume 4: Technical Appendices – Technical Appendix 9.8 – Copy of the 2013 ES Addendum, Volume 4, Technical Appendix A10.2 Habitats, Vegetation and Protected Species, fish and macro-invertebrate survey information from the Consented Scheme reported in EIAR Volume 4: Technical Appendices – Technical Appendix 9.9 – Copy of the 2013 ES Addendum, Technical

Table 9.4: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		changes were recorded would further habitat surveys for the Proposed Varied Development be required to update the current baseline information. SNH agreed to the revised approach to habitat loss calculations.	Appendix A10.4 Assessment of Fish Habitats and Populations 2012, habitat survey information from the Consented Scheme reported on in EIAR Volume 4: Technical Appendices – Technical Appendix 9.8 – Copy of the 2013 ES Addendum, Volume 4, Technical Appendix A10.2 Habitats, Vegetation and Protected Species, the ground-truthing surveys for the Proposed Varied Development reported on in EIAR Volume 4: Technical Appendices - Technical Appendix 9.1 – Habitats and Protected Species Survey Update, bat surveys completed for the Proposed Varied Development reported on in EIAR Volume 4: Technical Appendices - Technical Appendix 9.2 – Bat Survey Report 2019-2020 and the habitat loss calculation methodology provided in EIAR Volume 4: Technical Appendices - Technical Appendix 9.7 – Habitat Loss Methodology and Calculations.).
RPSB 29 May 2019	Scoping	Peatland The assessment of the impact on peat should account for the S36c Application as a new development and the difference between the Consented Scheme and the S36C Application. The number of cubic metres of peat extracted should be updated within the new EIAR and the end use stated. See a detailed plan for significant bog and peatland restoration within the site boundary once trees have been felled; and details of how the impacts of the permanent infrastructure and drainage will be mitigated. Have concerns that the proposed habitat management will be less effective than envisaged.	A Draft Peat Management Plan has been prepared for the Proposed Varied Development (EIAR Volume 4: Technical Appendix 10.2). An updated HMP for the Proposed Varied Development is presented in EIAR Volume 4: Technical Appendix 9.5 Strathy South Outline Habitat Management Plan which discusses peatland restoration.
Scottish Forestry 21 May 2019	Scoping	There are no changes to number and location of turbines, as such the proposed development will have the	EIAR Volume 4: Technical Appendix 9.6 details the Phased Felling Plan for the Proposed Varied Development taking into

Table 9.4: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		same impact on forestry as Consented Scheme. The large-scale non-native conifer plantation removal will have a significant effect on the forestry operations and forestry section, and will therefore require a woodland management plan, as per the requirements of the Consented Scheme. The removal of forestry is in line with Scottish Government's Policy on Control of Woodland Removal and does not require compensatory planting.	account all relevant legislation and guidance.
ECU 18 July 2019	Scoping	Ministers did not agree with Scoping Out the effects to protected terrestrial and aquatic species or qualifying interests of the Caithness and Sutherland Peatland SAC from the EIAR for the Proposed Varied Development. In order to assess the environmental impacts a baseline needs to be established using up-to-date information and methods. It is a matter for the Developer to determine whether information presented in the former applications is still up to date and suitable for inclusion in the new application, and whether updates or new analysis are appropriate. Should any data be resubmitted, or analysis produced prior to the 2018 Consent it must satisfy Ministers that the information remains up to date and appropriate for the currently environmental baseline and provide an updated analysis or justification why this is not thought necessary. Mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion for each chapter.	Table 9.3 of this Chapter details the surveys completed through all stages of the application process for the Consented Scheme and those which were deemed necessary to update to inform a robust impact assessment of the likely significant effects of the Proposed Varied Development to ecological receptors. Paragraphs 9.5.15 – 9.5.20 detail the baseline used within the assessment of the likely significant effects on IEF. As detailed in paragraph 9.5.4 of this Chapter, further consultation was undertaken with SNH to determine the appropriate scope of assessment for ecological receptors.

Baseline Conditions

Desk Study

- 9.5.13 Table 9.5 below provides a summary of wind farm developments within 20 km of the site. A review of all publicly available information with regards to ecological surveys for these developments was

completed. Figure 9.1 (EIAR Volume 3a: Figures) provides the locations of the wind farm developments considered.

Table 9.5: Cumulative Wind Farm Developments within 20 km of the Site included within the Desk Study Exercise

Wind Farm	Planning Status	Distance / Direction from the Site
Strathy North Wind Farm	Existing / Consented	2 km north
Bettyhill Wind Farm		6.8 km northwest
Limekiln Wind Farm		17.5 km northeast
Baillie Wind Farm*		23.8 km northeast
Strathy Wood Wind Farm	In Planning	1.8 km north
Armada Wind Farm	In Scoping	7.4 km north
Akron Wind Farm		12.9 km northeast

Table notes:

*Baillie Wind Farm has been included within the desk-based exercise for completeness despite falling just outside of buffer search area.

- 9.5.14 Similarly, the Highland Biological Records Group (HBRG) was consulted in November 2019 for all records of protected or notable species or habitats within 10 km of the site recorded within the last ten years. Figure 9.1 (EIAR Volume 3a: Figures) defines the 10 km buffer used for the data search with HBRG.

Field Study

- 9.5.15 Field surveys were conducted for the Modified 2013 Scheme, which updated existing data for the main site (the Strathy South conifer plantation) from surveys associated with the 2007 ES. The main site and a 100 m buffer (shown in Figure 9.2a (EIAR Volume 3a: Figures) as the area between the site boundary and survey boundary 2011) was surveyed for NVC communities⁵ in July/August 2011 for the EIA work for the Modified 2013 Scheme and used for 2014 FIR (which assessed the Consented Scheme). Similarly, NVC surveys with a 100 m buffer surrounding the access track passing from Strathy North Wind Farm's southern boundary to the northern boundary of the main site were completed in 2012 (see Figure 9.2b (EIAR Volume 3a: Figures)). Full details of these assessments for Segment 1 and Segment 2 of the access track (Non-SAC qualifying habitats and SAC qualifying habitats, respectively) are provided in Technical Appendix 9.11 (EIAR Volume 4). The survey area remains unchanged for the current assessment, the results of which were ground-truthed in 2019 to ensure there have been no changes to the baseline conditions during the intervening period. Details of the ground-truthing surveys completed in 2019 are provided in Technical Appendix 9.1 (EIAR Volume 4).
- 9.5.16 Protected species surveys for the Modified 2013 Scheme were completed between June and August 2012 encompassing the access track route and grid connection out to a 200 m buffer, and main site out to a 250 m buffer (see Figures 9.2c and 9.2d (EIAR Volume 3a: Figures)). Surveys searched for indicative signs of UK and European protected species using standard methods as detailed in Technical Appendix 9.8 (EIAR Volume 4). No further surveys were completed for protected species to inform this 2020 EIAR for the Proposed Varied Development. No changes in the habitats present on-site have occurred and as such it is considered that the utilisation of the site by protected species would not have altered since the previous field surveys were conducted in 2012.

⁵ Rodwell, J. S. (2006) NVC Users' Handbook. 68 pages, ISBN 978 1 86107 574 1.

- 9.5.17 Aquatic surveys for fish habitats / populations and macro-invertebrates were completed in 2007, with a subset of survey points repeated in 2009 and 2012 for fish population surveys. Surveys included fish habitat assessment, electro-fishing and invertebrate kick and surber sampling following standard methods detailed in Technical Appendix 9.9 (EIAR Volume 4) and Technical Appendix 9.10 (EIAR Volume 4), respectively. No additional field surveys were completed to inform this assessment. There have been no known alterations to the habitats or watercourses in the catchment surrounding the Proposed Varied Development and as such their use by fish and macro-invertebrate is considered to remain unaltered since the previous assessments were completed.
- 9.5.18 SNH was consulted on the re-use of the survey information compiled to support the Consented Scheme. SNH agreed that with appropriate ground truthing, where baseline conditions for the Proposed Varied Development have not altered in the intervening time period, no additional surveys were necessary. Technical Appendix 9.1 (EIAR Volume 4) provides details of the ground truthing completed for habitats within the main site along with updated desk based information relating to protected species presence in the wider area.
- 9.5.19 Since the granting of the 2018 Consent, there have been changes to the methods used to assess the potential effects of onshore wind energy developments on bats¹ replacing the previous guidance on the subject^{6, 7}. Therefore, to inform the assessment of the Proposed Varied Development, surveys for bats were undertaken in 2019 in accordance with the new SNH Guidance¹ across the site. Surveys assessed habitat suitability of the site for foraging and commuting bats, completed a preliminary roost potential assessment of the Strathly River Bridge and Croft House, and deployed 20 static bat detectors across the site to assess bat activity. Surveys were completed between August and October 2019 to capture the dispersal period for bat species, collecting significantly more data than required by the Guidance¹. Further surveys to capture the remaining activity periods for bat species on site have been completed between April/May (spring) and June/ July (summer) 2020 to fulfil the requirements of the Guidance¹. Full details of the surveys and methods are provided in Technical Appendix 9.2 (EIAR Volume 4) with Figure 9.2e (EIAR Volume 3a: Figures) providing the locations of the static bat recorders deployed for the assessment.
- 9.5.20 Deer population assessment and herbivore impact assessment surveys were completed between January and May 2019. These followed Campbell *et al.* (2008)⁸ and SNH Best Practice Guidance⁹, respectively. The surveys quantified the use of the Strathly South conifer plantation and the immediate area of the surrounding Caithness and Sutherland Peatlands SAC (1 km buffer) by the local deer population and their current impacts to qualifying features (blanket bog and wet heath) of the SAC. Figure 9.2f (EIAR Volume 3a: Figures) provides the survey area and strategy used for these assessments. Full details of the methods used are provided in Technical Appendix 9.3 (EIAR Volume 4).

Cumulative Baseline

- 9.5.21 Consideration has been given to the developments summarised in Table 9.5 and their potential to affect ecological receptors cumulatively with the Proposed Varied Development. Desk based data for such development was collected and is presented where appropriate in Technical Appendix 9.1 (EIAR Volume 4).

⁶ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London. ISBN-13 978-1-872845-96-1.

⁷ Natural England Technical Information Note TUIN051 (2014) *Bats and onshore wind turbines Interim guidance* (3rd edn). ISBN 978-1-78354-0985-2

⁸ Swanson, G. Campbell, D. Armstrong, H. (2008) *Estimating deer abundance in woodlands: the combination plot technique*. Edinburgh. ISBN 978-0-85538-750-1

⁹ <https://www.bestpracticeguides.org.uk/> (accessed 19.03.2020)

Identification of Potential Effects

- 9.5.22 The assessment process follows the approach detailed in CIEEM (2018)² which now places a greater emphasis on professional judgement of the reporting Ecologist rather than the table-based assessment used for the Consented Scheme. The term Important Ecological Feature (IEF) is used for those species and habitats identified to be included in the assessment. For each impact with the potential to affect the relevant IEFs, the assessment considers the following parameters:
- Whether the impact is positive or negative in its influence;
 - The extent of the impact;
 - The magnitude, duration and timing of the impact; and
 - The impact's frequency and ease of reversibility.
- 9.5.23 The assessment identifies potential effects that could give rise to likely significant effects which are then considered in further detail. The assessment similarly identifies any potential cumulative impacts from surrounding developments prior to determining the significance of any effect, be this negligible, minor, moderate or major. Effects could be either beneficial or adverse.

Assessment of Residual Effects

- 9.5.24 The assessment of residual effects includes the consideration of any proposed mitigation measures to avoid or minimise the effect of any likely significant effects on the relevant IEFs. The residual effect will take into account the effectiveness of the proposed mitigation measures to reduce the extent, magnitude and duration of predicted likely significant effects prior to determining the residual significance of any effect.

Criteria for Assessing Sensitivity of Receptors

- 9.5.25 The approach to the assessment of the sensitivity and importance of an ecological species or habitat is first to consider its conservation status and then the importance of the feature present on the site. These are then used to assess the conservation value of the species.
- 9.5.26 The conservation status of a species or habitat is based primarily on its UK status, modified by its regional status. The scheme uses a two-dimensional matrix, using UK status and regional status as the two dimensions, to give a species' resultant conservation status in a particular area.
- 9.5.27 The national conservation status of species and habitats in the UK can be divided into five categories¹⁰; these are:
- Species and habitats given special protection under EU legislation listed on the EU Habitats Directive;
 - Species and habitats given special protection under UK legislation;
 - Species and habitats of serious conservation concern; Scottish Biodiversity List (SBL) Priority species;
 - Species and habitats of some conservation concern listed on Local Biodiversity Action Plan (LBAP); and
 - Species and habitats for which there is little or no conservation concern; species common and widespread throughout the UK.
- 9.5.28 The regional conservation status of IEFs can be divided into three categories:

¹⁰ Note: Species or habitats in a sixth category, International Union for Conservation of Nature (IUCN) globally- threatened species, are unlikely to occur on any proposed UK development site, but if they did would be considered to be of International status irrespective of their regional status.

- Rare in the region and/or LBAP Priority Species; species for which a Species Action Plan recommends safeguarding of all sites and species with a need to protect all populations above a certain size;
- Uncommon or patchily distributed in the region; and
- Common and/or widespread in the region.

9.5.29 The resultant conservation value of a species or habitats for the site depends on the interaction between its UK conservation status and its conservation status in northern Scotland. Table 9.6 sets out the resultant conservation status of species and habitats. Note that the categories shown may be modified according to the national or regional circumstances of a particular species. In Table 9.6, “National” refers to the whole of the UK; “Regional” refers to northern Scotland; and “Local” refers to the site and immediate environs.

Table 9.6: The Resultant Conservation Value of Protected Species and Habitats			
National Conservation Status	Regional Conservation Status		
	Rare	Uncommon	Common
EU Legislative Protection	International/ National	National	Regional
UK Legislative Protection	National	National	Regional
SBL Listed	National	National/Regional	Regional/Local
LBAP Listed	Regional	Regional	Local
Common/widespread	Regional	Local	Local

Criteria for Assessing Magnitude of Change

9.5.30 The criteria used for assessing the magnitude of effects on IEFs are as follows:

- Negligible – potential effect that is not expected to affect the habitat/population in any way;
- Low – effect of small scale or short duration that results in no long-term harm to the habitat/populations viability. For example, a loss or damage of under 10% of the habitat;
- Medium – effect that is detectable in the short to medium term, but which should not alter the long-term viability of the feature/population. For example, between 10-20% habitat loss or 10-20% reduction of a species population; and
- High – effect that would cause major loss of habitat/population on site and have a sufficient effect to alter the nature of the habitat/population in the short to long term effecting the long-term viability. For example, more than 20% habitat loss or long-term damage, or more than 20% loss of a species’ population.

9.5.31 The duration of an effect is hard to quantify across all habitats and species due to inherent differences in life histories. Therefore, the duration of each effect on receptors has been assessed on an individual basis taking into account species and habitats ecological characteristics.

Criteria for Assessing Significance

9.5.32 The significance of each effect upon each IEF has been assessed. An ecologically significant effect is defined as an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species (CIEEM, 2018)². The effect can be adverse, neutral or beneficial and is assessed within a specific geographic context i.e. at the scale at which the ecological feature was valued (e.g. local/ national/ international). The significance of effects is described as negligible, minor, moderate or major. Effects are considered to be significant under the 2017 EIA Regulations where the effect is classified as being of ‘major’, ‘moderate’, or ‘minor’ where:

- Major: effects which are likely to be important considerations at a regional or district scale but which, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision-making process;
- Moderate: effects which, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource; or,
- Minor: effects which may be raised as local issues, but which are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in the detailed design of the project.

9.5.33 The final assessment of whether a significant effect is likely was completed by taking the mitigation measures into account, including both the mitigation incorporated into the design of the Proposed Varied Development and mitigation required to address residual impacts. This requires an assessment on the likelihood of successful mitigation being achieved and the mitigation proposed needs to be qualified in terms of the probability of success. The assessment of mitigation success can be based on both professional judgement and experience of other mitigation schemes. In general, a precautionary approach has been adopted in determining the outcome. In relation to determining likely significant effects on European protected sites a precautionary approach is always adopted.

Assumptions and Limitations

- 9.5.34 Identified limitations associated with this assessment are with the use of the Ecobat analysis tool as required by SNH (2019)¹. This tool is reliant on third party data, and the accuracy of the results returned using the Ecobat tool requires a substantial amount of records to be present. Due to the novelty of the Ecobat tool, the location of the wind farm and the number of records provided to Ecobat in the surrounding 100 km buffer of the main site, a substantially small reference range of data was used to inform the above assessment of the operational effects of the Proposed Varied Development to the local populations of the bat species present. This reduced reference range would have increased the importance of bat species in the proximity of the Proposed Varied Development, and as such the assessment of the potential effects would be an over-estimation.
- 9.5.35 No further limitations to the assessment completed for the Proposed Varied Development were identified. Surveys, where required, have been completed, updated or ground-truthed as agreed with the relevant statutory agency, SNH, to ensure that baseline information is valid against which the assessment of effects can be completed. As required by the relevant professional guidance (CIEEM, 2018)², the precautionary principle has been adopted when undertaking the assessment to ensure that conclusions on residual effects are robust and realistic. Any assumptions made regarding effects to IEFs are based on current guidance, scientific knowledge, and the expert professional opinion of the author and are therefore deemed appropriate in the context of the site.

9.6 Baseline Conditions

Current Baseline

Desk Study

- 9.6.1 Additional desk studies were undertaken to update the information presented in the 2013 ES Addendum utilising data provide by the HBRG and, where possible, relevant Ecological Chapters in EIA reports for other wind farm developments within a 20 km radius of the Proposed Varied Development. Full details of the results can be found in Technical Appendix 9.1 (EIAR Volume 4).
- 9.6.2 In summary, the information provided by HBRG provided one record of a common pipistrelle 7 km north of the main site, and no records of other terrestrial protected species within 10 km of the site were received. Nineteen records of flora species with a relevant nature conservation status were provided, however the closest of these was c.5 km from the site.

Terrestrial protected species records were present for the consented Limekiln Wind Farm site (c.17.5 km northeast of the main site) and the proposed Strathy Wood Wind Farm site (c.1.8 km north of the main site). Otter, water vole, pine marten and common pipistrelle were found to be present at the site for the proposed Limekiln Wind Farm at the time of the 2012 surveys, with the presence of otters, water vole, pine marten and pipistrelle bat species recorded during the 2018 surveys. Pre-construction surveys for Strathy North Wind Farm (2012/13) identified a badger sett within proximity to the access and grid connection routes for the Proposed Varied Development, with a further sett identified in the 2007 ES for the proposed Strathy South Wind Farm. No records were found for all other developments in the 20 km search area.

Field Surveys

Habitats

- 9.6.3 The NVC habitat assessment for the 2013 ES Addendum (completed in 2011 and 2012) remains relevant for this assessment, as confirmed by SNH, and has been used for the purposes of establishing the baseline habitat conditions. Full details of the method and results can be found in Technical Appendix 9.8 (EIAR Volume 4) for the main site and Technical Appendix 9.11 (EIAR Volume 4) for the access and Yellow Bog tracks.
- 9.6.4 Habitat change occurs at a slow rate in the absence of active management and it is therefore unlikely that there have been significant changes to the habitat communities previously recorded. Nevertheless ground-truthing of the habitat communities recorded during the 2011 surveys within the main site was undertaken in May 2019 to confirm that the data remains up to date. Full details of the ground-truthing results can be found in Technical Appendix 9.1 (EIAR Volume 4). Figure 9.3a (EIAR Volume 3a: Figures) presents the 2011 NVC survey results for the main site which have been determined as remaining accurate for this 2020 EIAR for the Proposed Varied Development. Figure 9.3b (EIAR Volume 3a: Figures) provides the NVC information for the access and Yellow Bog tracks collected in 2012 which, based on the results of the ground-truthing of the NVC data, is similarly deemed to remain accurate for the assessment of the Proposed Varied Development.

Terrestrial Protected Species

- 9.6.5 No further surveys were undertaken for terrestrial protected species, excluding bats. Data collected for the 2007 ES and 2013 ES Addendum therefore provide the baseline to assess the impact of the Proposed Varied Development, a summary of which is included below. Protected species survey results remained largely consistent between the initial surveys in 2004/05 and 2012.
- 9.6.6 Evidence of otter presence was concentrated around Loch nan Clach and Allt nan Clach, with signs also recorded along the Allt Badain and River Strathy during the 2004/05 surveys, the distribution and scale of which remained similar for the 2012 surveys. A holt, previously identified on the Yellow Bog Burn, was not present during the 2012 surveys.
- 9.6.7 Water vole presence signs were concentrated on the banks of Loch nan Clach and Allt nan Clach and along the River Strathy, with several other isolated records within the survey area. The distribution and scale of water vole signs were similar in 2012, with the addition of further signs of water vole colonies along a tributary of Allt Dhonuill Ghuinne Burn.
- 9.6.8 Pine marten scat was recorded on a similar scale and distribution in 2012 to that of 2004/05, along existing forestry tracks and rides throughout the survey area. In addition, a live sighting was recorded at the eastern end of the track crossing Yellow Bog in 2012.
- 9.6.9 There was no evidence of badgers found during the 2004/05 and 2012 protected species surveys of Original 2007 Scheme or the Modified 2013 Scheme. Pre-construction surveys undertaken in 2012/13 within 200 m of the proposed access track and grid connections routes within the Strathy North Wind Farm site found no signs of otter, pine marten or water voles. The presence of a badger sett was identified in close proximity to the badger sett identified in the Strathy North 2007 ES.

Details of the badger sett can be found in the confidential annex of the 2013 ES Addendum (Technical Appendix A10.3). Figure 9.4 (EIAR Volume 3a: Figures) provides the non-confidential survey results from the 2007 and 2012 protected species surveys. Technical Appendix 9.8 (EIAR Volume 4) provides the non-confidential results of the 2012 protected species surveys.

Aquatic Species

- 9.6.10 Within the catchments in which the Proposed Varied Development is located, the River Strathy contains most of the spawning, juvenile and adult habitats for salmon. In general, habitat suitable for salmon spawning is sparse in tributaries of the River Strathy and in most streams juvenile habitat appeared better suited to trout than salmon. Full details of the habitat survey results for each watercourse can be found in Technical Appendix 9.9 (EIAR Volume 4). No ground truthing or additional surveys were completed for aquatic species for this 2020 submission as agreed with SNH during the Scoping process for the Proposed Varied Development. It was concluded that habitat suitability for fish species within the catchment would not have altered in the intervening time period between surveys completed for the Consented Scheme and this submission. This approach is corroborated by long term monitoring of the catchment completed for the Strathy North Wind Farm.
- 9.6.11 Salmon were present at all 12 of the 2007 survey points, along with the lower reaches of Allt na Dubh-chlaise, The Uair, Allt Badian, Yellowbog Burn, Allt nana Clach and Allt Dhonuill Ghuinne. Results suggest that River Strathy is the main area for salmon breeding within the catchment, with only limited contribution from tributaries. The average salmon densities would be classified as 'good' by regional standards.
- 9.6.12 Trout were recorded at all but two of the survey points. In contrast trout distribution and abundance was found to be higher in the tributaries and upper reaches of the River Strathy, the opposite of which was true for salmon. The average trout densities in tributaries would be classified as 'excellent' by regional standards.
- 9.6.13 In addition to salmon and trout, lamprey and eels were also present within the survey area. Lamprey larvae was found at one survey point in 2007, and again at a few different sites, including the lower reaches of Allt nan Clach, during subsequent surveys. European eel was recorded during all survey visits and present at most sites across the survey area. Eel abundance was highest in the lower reaches of the River Strathy with smaller individuals, while there were fewer larger eels present further upstream. Full details of the results can be found in the Technical Appendix 9.9 (EIAR Volume 4).
- 9.6.14 Aquatic invertebrates present in watercourses across the site were common species, with no rare species being recorded. The relative proportions of invertebrate groups indicated clean, well oxygenated conditions with no significant organic enrichment. Abundance, diversity and biomass of invertebrates appeared moderate in all watercourses and should support sustainable salmon populations. Full details of the results can be found in the Technical Appendix 9.10 (EIAR Volume 4).

Bats

- 9.6.15 The habitat suitability assessment of the site identified several features that have potential to be used by bats. There are several watercourses that intersect the site, along with riparian habitat associated with lochans and forest edge offer foraging and commuting potential. The conifer plantation constitutes the majority of the site habitat cover, which offers little foraging, commuting or roosting potential. Overall, the site is considered to have a moderate potential for foraging and commuting bats with limited potential for roosting bats. Two structures were assessed for their potential to support roosting bats, the Croft House and Strathy River Bridge (EIAR Volume 3a: Figure 9.2e). The roost potential of the Strathy River Bridge was assessed as being low, while the Croft House was confirmed to support roosting bats through faecal eDNA analysis.
- 9.6.16 Activity surveys recorded a total of five species using the site:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius pipistrelle;
- Myotis spp; and
- Nyctalus spp.

- 9.6.17 Common pipistrelle were the most abundant species. Activity levels of all species was low overall. Two nights recorded either high or moderate relative activity levels, both of which were at survey points close to the known Croft House roost or along adjacent commuting pathways. It was assessed likely that this high activity level was associated with a small number of bats utilising areas of preferential forage at a high frequency on these nights, likely associated with the small number of bats using the Croft House roost. Overall, activity levels across the site were assessed as moderate and being comparable to other sites with similar habitats using Ecobat (albeit the reference range provided by Ecobat was below that recommended). Presence / absence surveys completed of the Croft House during the main bat activity season in 2020 confirmed the building to be a transient / occasional non-breeding summer roost and given the low number of bats using the roost, its hibernation potential is assessed as low. Full details of the surveys are provided in Technical Appendix 9.2 (EIAR Volume 4).
- 9.6.18 Records provided by HBRG contained one common pipistrelle roost located 3.35 km north-northeast and one common pipistrelle sighting 7 km north of the main site.

Deer and Herbivore Impact Assessment Surveys of the Caithness and Sutherland Peatlands SAC

- 9.6.19 Surveys completed across the Strathy South conifer plantation and surrounding 1 km buffer of the Caithness and Sutherland Peatlands SAC found Effective Deer Utilisation (EDU) to be 12.5 deer/km² within the survey area (total estimated population of 533 individuals). The population was deemed to comprise wholly red deer (from information provided from cull records for the site). Higher EDUs were found within the conifer plantation than in the surrounding SAC habitats (17.6 deer/km² and 9.6 deer/km² respectively). EDUs for both habitat types are assessed as moderate - high and at a level where impacts to habitats may occur without ongoing deer management. EDUs estimated during the 2019 assessment were on the whole consistent with those calculated for the 2010 surveys for the submission of the 2013 ES Addendum.
- 9.6.20 Herbivore Impact Assessments completed within the surrounding 1 km buffer of the Caithness and Sutherland Peatlands SAC found impacts to habitats to be low, with limited poaching, browsing and enlargement of naturally occurring areas of bare peat caused from a high deer population. As such, it can be concluded that, whilst deer numbers within the area are currently above those which might be expected to cause potential impacts to sensitive habitats, at this time, there is sufficient ground for a non-enclosed population to utilise for such impacts to be minimal.

Future Baseline

- 9.6.21 Felling of the Strathy South conifer plantation is proposed in a phased process over a five year period with the forest removed from site to allow for restoration of peatland habitats. As such, the future baseline of the site for the Proposed Varied Development would be substantially different from that of the current conifer plantation. The Strathy South Wind Farm Outline Habitat Management Plan is provided in Technical Appendix 9.5 (EIAR Volume 4) and details the proposals for restoration work to return habitats to those similar to the surrounding Caithness and Sutherland Peatlands SAC. Technical Appendix 9.6 (EIAR Volume 4) details the proposed methods and rationale for phased felling which includes the Phased Felling Plan for the site.
- 9.6.22 The future baseline at the time of commencement of the operation of the Proposed Varied Development would therefore be one of a partially felled conifer plantation, of which some areas would have restoration activities ongoing. As the site progresses all forest would be successively

felled and these areas would come under restoration using the most appropriate techniques as determined by on-site investigation and in consultation with SNH as described in Technical Appendix 9.5: Strathy South Wind Farm Outline HMP (EIAR Volume 4).

- 9.6.23 Without construction of the Proposed Varied Development the baseline of the site is unlikely to alter; a conifer plantation will be located as an island in a large expanse of blanket bog. The conifer plantation will slowly mature, and in time trees will reach a terminal height. At this point there may be some windthrow of areas of the plantation. Due to the inaccessible location of the conifer plantation and the unsuitable nature of the access tracks for large vehicles which would be required to extract any felled timber for commercial purposes, the conifer plantation would be unlikely to be felled without construction of the Proposed Varied Development. Forest Management activities have been limited since the planting the conifer plantation and would be unlikely to alter in the foreseeable future. Refer to Technical Appendix 9.6 (EIAR Volume 4) for a more detailed explanation of the above.

Identified Sensitive Receptors

- 9.6.24 Sensitive receptors remain the same as those identified for the Consented Scheme, with the addition of bat species which were “scoped-out” of the 2013 ES Addendum and 2014 FIR submissions. Therefore, the identified sensitive receptors are habitats, otters, pine marten, wildcat, water vole, fish, bats and those to qualifying habitats for the surrounding Caithness and Sutherland Peatlands SAC. The term Important Ecological Feature (IEF) (CIEEM, 2018)² therefore applies to these, and all have been ‘scoped-in’ to the assessment for further consideration in this Chapter.
- 9.6.25 This Chapter assesses likely significant effects of the Proposed Varied Development to the identified IEFs and, where appropriate, proposes mitigation to offset the predicted likely significant effects to such receptors.

9.7 Potential Significant Effects

- 9.7.1 The potential significant effects of the Proposed Varied Development are likely to be similar in magnitude and significance as those identified for the Consented Scheme. These include:
- habitat loss and disturbance to both habitats within the Strathy South conifer plantation (the main site) and to those in the surrounding Caithness and Sutherland Peatland SAC;
 - disturbance to and loss of habitat for protected species including otters, water voles, pine marten and badgers;
 - displacement of deer out with the Strathy South conifer plantation to areas of the surrounding SAC;
 - potential pollution of watercourses which could affect fish and macro-invertebrate populations; and,
 - the turbines once constructed, could cause a collision risk to bats foraging and commuting across and around the main site and removal of the conifer plantation for the purposes of peat restoration would alter the habitats utilised by bats for foraging and commuting.
- 9.7.2 These potential effects, their duration, magnitude and significance are detailed in the following sections by IEF for both the Construction, Operational and Decommissioning Phases of the Proposed Varied Development, and are considered cumulatively with the cumulative developments identified in Table 9.5.

9.8 Predicted Construction Effects

Habitats Outwith the Caithness and Sutherland Peatlands SAC

- 9.8.1 Habitat loss calculations have been completed for the Proposed Varied Development; the parameters used are described in Technical Appendix 9.7 – Habitat Loss Calculation Methodology (EIAR Volume

4). The parameters used for the Proposed Varied Development have been refined from those used for the Consented Scheme due to an increased understanding of the potential effects of construction in afforested and peatland habitats since the submission of the EIA work for the Consented Scheme. Parameters used for areas outwith the Caithness and Sutherland Peatlands SAC (the main site and the preferred and alternative access track options) are thus:

- Direct Habitat Loss – the permanent footprint of any component of the infrastructure of a development which would not be restored following construction. This includes tracks, turbine bases and hardstandings, substations and all areas of permanent drainage;
- Temporary Habitat Loss – any infrastructure component that would be restored following construction, for example batching plants, turbine laydown areas and construction compounds. This area also includes a 4 m buffer surrounding infrastructure to allow machinery to work outwith the permanent footprint of any infrastructure component. Such areas would all be restored following construction as detailed in the CEMP for the Proposed Varied Development; and
- Permanent Habitat Change (indirect effect) – a 10 m buffer has been applied to the permanent footprint for each component of the Proposed Varied Development where hydrologically dependent habitats are present to account for the potential alterations to habitats through changes to hydrological flows to these.

9.8.2 Table 9.7 details the quantities of habitat loss in respect of the Phase 1 habitat classifications and the associated NVC communities, which would be affected by the Proposed Varied Development within the main site.

Table 9.7: Predicted Construction Phase Habitat Loss Effects within the Main Site by Phase 1 and NVC Community for the Proposed Varied Development					
Phase 1 Habitat	NVC Community	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Affect Area (ha)
Blanket bog	M17	0.02	0.02	0.03	0.06
	M17a	0.50	1.88	1.24	3.62
	M17b	2.18	7.41	9.30	18.89
	M19a	0.31	0.28	0.57	1.16
	Subtotal	3.00	9.59	11.14	23.73
Wet heath	M15a	0.26	0.41	0.65	1.32
	M15b	2.19	5.95	8.70	16.84
	M15c	0.27	0.20	0.34	0.81
	M25	1.23	1.92	2.01	5.16
	M25a	0.23	0.35	0.52	1.09
	M25b	0.00	0.01	0.00	0.01
	Subtotal	4.17	8.84	12.22	25.23
Acid flush	M6c	0.21	0.07	0.15	0.43
	Subtotal	0.21	0.07	0.15	0.43
Dry heath	H10b	0.00	0.16	0.00	0.16

Table 9.7: Predicted Construction Phase Habitat Loss Effects within the Main Site by Phase 1 and NVC Community for the Proposed Varied Development					
Phase 1 Habitat	NVC Community	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Affect Area (ha)
	Subtotal	0.00	0.16	0.00	0.16
Modified bog	M20	0.17	0.35	0.46	0.98
	Subtotal	0.17	0.35	0.46	0.98
Marshy grassland	M23a	0.05	0.04	0.07	0.16
	Subtotal	0.05	0.04	0.07	0.16
Acid grassland	U6d	0.05	0.06	0.15	0.11
	Subtotal	0.05	0.06	0.00	0.11
Conifer plantation	Forest	20.71	31.74	0.00	52.45
	Subtotal	20.71	31.75	0.00	52.45
	Totals Predicted Effects	28.38	50.85	24.19	103.42

- 9.8.3 The Proposed Varied Development identifies a total overall effect to habitats of 103.42 ha caused during the Construction Phase. This includes 28.38 ha of direct habitat loss, 50.85 ha of temporary habitat change and 24.19 ha of permanent habitat change. It should be noted that of the 103.42 ha of the total effects, 52.45 ha of this is to conifer plantation habitat. Similarly, it should also be noted that the majority of the habitats which may be affected by alterations to hydrological influences from construction of the Proposed Varied Development will have already been affected by the conifer plantation, altering the composition and hydrology of these habitats. As such, the permanent habitat change predicted in Table 9.7 will already have occurred and the realistic effects of the Proposed Varied Development to habitats within the main site would be limited to those of direct habitat loss (28.36 ha) and temporary habitat change (50.85 ha) totalling 79.23 ha.
- 9.8.4 Table A5 in Technical Appendix 9.8 (EIAR Volume 4) quantifies the coverage of habitats within the main site. In summary, blanket bog, wet heath and modified bog habitats account for approximately 251 ha, 87 ha and 98 ha respectively of the habitats present within the main site. Consequently, using the value of 79.23 ha for the potential effects from the Proposed Varied Development, the effects on these areas of habitat equate to an approximate loss or disturbance of 5.0%, 14.9% and 0.5% for blanket bog, wet heath and wet modified bog habitats, respectively. It should also be considered that all such habitats will be atypical forms of these having been affected by impacts from the surrounding conifer plantation during the last thirty years. However, habitats lost to the footprint of the Proposed Varied Development would be substantially reduced as temporary habitat losses would be restored post-construction. As such, a true estimate of the loss of habitat is reflected in the direct habitat loss figures which equates to approximately 1.2%, 4.8% and 0.2% respectively of total blanket bog, wet heath and wet modified bog habitats present within the main site.
- 9.8.5 Table 9.6 provides the methods of ascertaining conservation value for the habitats present within the main site. Habitats which are mostly likely to be affected are blanket bog, wet heath and wet modified bog, outwith afforested areas. These habitats all have European legislation pertaining to them, but are common in a regional context; consequently, their conservation value is assessed as Regional. The magnitude of the impact is assessed as Moderate in that there could be up to 10% loss for each habitat type using the predicted direct habitat loss values. As such, the unmitigated effect of construction to habitats within the main site is assessed as Moderate adverse (Significant).

- 9.8.6 Effects from the construction of the access track passing from the boundary of the Strathy North Wind Farm to the northern boundary of the main site of the Consented Scheme were considered in Chapter 10: Ecology, Section A10.5.2 (b) i) of the 2013 ES Addendum and Technical Appendix 9.11 (EIAR Volume 4) of this EIAR.
- 9.8.7 Two access route options have been considered, the Preferred and Alternative route options. Figure 9.6 (EIAR Volume 3a: Figures) presents the access route options. Segment 1 of the access track shows the Preferred and Alternative Options, whilst Segment 2, which passes through the Caithness and Sutherland Peatlands SAC, provides the Common Access using the existing forestry track. In addition, to the access track route options, the upgrade of the Yellow Bog track crossing the Yellow Bog and joining the two “arms” of the main site is also considered for the Proposed Varied Development to allow for its use during construction. These are discussed in Technical Appendix 9.4 (EIAR Volume 4).
- 9.8.8 Table 9.8 provides a summary of the predicted direct habitat loss, temporary habitat loss and permanent habitat change caused by construction of the route options in Segment 1 (those outwith the Caithness and Sutherland Peatlands SAC). The methods of habitat loss are as provided in paragraph 9.8.1 with further detail in Technical Appendix 9.7 (EIAR Volume 4), and although the routes of the access tracks have not altered from the Consented Scheme’s submission, the methods of habitat loss calculation have been updated accordingly.

Table 9.8 Predicted Effects to Habitats for the Preferred and Alternative Route Options in Segment 1 of the Access Track for the Construction Phase of the Proposed Varied Development					
Track Option	Phase 1 Habitat	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Affected Area (ha)
Segment 1 - Preferred Access	Blanket bog	0.03	0.02	0.06	0.11
	Wet heath	0.08	0.08	0.22	0.38
	Conifer plantation	0.92	0.85	0.00	1.77
	Sub-Total	1.03	0.95	0.28	2.26
Segment 1 - Alternative Access	Acid flush	0.02	0.01	0.03	0.06
	Conifer plantation	1.76	1.99	0.00	3.75
	Wet heath	0.04	0.06	0.15	0.25
	Sub-Total	1.82	2.06	0.18	4.06

- 9.8.9 Construction effects to habitats associated with Segment 1 either for the Preferred or Alternative Access options are predominately to afforested habitats. Effects to peatland habitats are predicted as 0.49 ha and 0.31 ha respectively for the Preferred and Alternative Access options. However, as within the main site the peatland habitats present are likely to have been affected by the surrounding conifer plantation and permanent change to habitats would not occur as their hydrological requirements are atypical. As such, a true reflection of the effects of the construction of either the Preferred or Alternative Access would be from direct habitat and temporary habitat loss. Both route options are therefore predicted to cause small losses (0.21 ha and 0.13 ha respectively for the Preferred and Alternative Access) to peatland habitats; these losses are considered Negligible adverse (Not Significant), particularly as these habitats have been affected by influences from the surrounding conifer plantation (as stated for the Consented Scheme).

Habitats within the Caithness and Sutherland Peatlands SAC

- 9.8.10 Technical Appendix 9.4 and 9.7 (EIAR Volume 4) detail the proposed changes to the methods of track widening and laying of the grid connection and the methods of associated habitat loss calculation for the Common Access track (Segment 2) and Yellow Bog track which pass through the Caithness and

Sutherland Peatlands SAC. The methods have been considered in detail to reduce likely significant effects to qualifying species of the surrounding Caithness and Sutherlands Peatlands SAC.

- 9.8.11 Construction proposals for the Common Access would now no longer require the removal of the current peat bund (created by previous construction activities in the area) to allow track widening and laying of the grid connection (as was proposed for the Consented Scheme, see Technical Appendix 9.11 (EIAR Volume 4)). Construction works would be completed on the western side (downslope side) of the track to limit hydrological effects to surrounding habitats, and the footprint of all works has been planned to sit within the mapped area of disturbed habitat from the existing track's construction (see Technical Appendix 9.4 (EIAR Volume 4)). As such, the following habitat loss parameters would apply:
- Direct Habitat Loss – the footprint of the track's running surface and associated drainage. For the purposes of the habitat loss calculations the existing track's running surface and drainage have been excluded from this overall footprint area;
 - Temporary Habitat Loss – all works would be limited to the mapped area of disturbed habitat caused by construction of the existing track. All earthworks would be completed in this area and restored following construction;
 - Permanent Habitat Change (indirect effect) - this is defined as a 10 m buffer of the Direct Habitat Loss (footprint) of the track with the current areas of disturbed habitat excluded from this. Due to construction activities taking place on the downslope (western side) of the track, this buffer is applied to the western side only (as it was for the Consented Scheme).
- 9.8.12 The upgrade of the Yellow Bog track has similarly been considered with regards to the effects this would have to habitats. The same parameters have been applied for this section of track as for the Common Access with all construction activities to be completed within the mapped area of disturbance caused by construction of the existing track. As such, construction phase effects would be limited to the defined footprint of the track (Direct Habitat Loss), with all defined earthworks being reinstated, forming the area of Temporary Habitat Loss. As there is no definable slope surrounding the Yellow Bog track, the Permanent Habitat Change buffer has therefore been applied to both side of the track as a 10 m buffer of the area of Direct Habitat Loss.
- 9.8.13 Technical Appendix 9.4 and 9.7 (EIAR Volume 4) provide further detail regarding the methods of track upgrade, areas of mapped disturbance, the proposed footprint and earthworks for the track's upgrade and further detail on the habitat loss calculation parameters for the Yellow Bog track.
- 9.8.14 Table 9.9 provides a summary of the predicted construction phase effects to habitats for the Common Access (Segment 2) and the Yellow Bog Track.

Table 9.9 Predicted Habitat Loss from the Construction Phase of the Proposed Varied Development for the Common Access (Segment 2) and Yellow Bog Track					
Track Option	Phase 1 Habitat*	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Affected Area (ha)
Segment 2 – Common Access	Wet heath	1.23	1.38	0.26	2.87
	Blanket bog	0.07	0.07	0.00	0.14
	Conifer Plantation	0.22	0.11	0.00	0.33
	Sub-Total	1.52	1.56	0.26	3.34
Yellow Bog Track	Wet heath	0.00	0.17	0.00	0.17
	Blanket bog	0.03	0.06	0.43	0.52
	Acid grassland	0.01	0.01	0.00	0.02

Table 9.9 Predicted Habitat Loss from the Construction Phase of the Proposed Varied Development for the Common Access (Segment 2) and Yellow Bog Track

Track Option	Phase 1 Habitat*	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Affected Area (ha)
	Wet modified bog	0.00	0.01	0.00	0.01
	Sub-Total	0.04	0.25	0.43	0.72
*Habitats associated with direct habitat loss and temporary habitat loss for the Common Access and Yellow Bog track upgrades are atypical having been affected by the construction of the existing tracks and therefore are not qualifying features of the Caithness and Sutherland Peatlands SAC.					

- 9.8.15 Habitat loss associated with the Common Access is predicted to total 3.34 ha, of which 3.01 ha are peatland habitats. Those peatland habitats associated with Direct Habitat Loss (1.3 ha) and Temporary Habitat Change (1.45 ha) have been affected by the construction of the existing track, are atypical habitat types, and are therefore not qualifying habitats of the surrounding SAC. Only those habitats within the area of Permanent Habitat Change (0.26 ha of wet heath) are qualifying habitats of the SAC.
- 9.8.16 Similarly, for the Yellow Bog track only habitats associated with the area of Permanent Habitat Change are those which have been unaffected by construction of the existing track and are therefore classified as qualifying habitats of the SAC (0.43 ha of blanket bog). The remaining 0.29 ha of habitats fall within the mapped area of disturbance from construction of the existing track.
- 9.8.17 Wet heath and blanket bog habitats in the context of the Proposed Varied Development are assessed to be of Regional conservation value (see Table 9.6). The magnitude of the effect is assessed as low as it would result in small losses (approximately 3.71 ha of peatland habitats) in the context of the wider area and 3.02 ha of these habitats are atypical forms due to effects associated with the current access track's construction. As such, the unmitigated effects to habitats from the construction of the Common Access and Yellow Bog track are assessed as Minor adverse (Not Significant).

Protected Species

- 9.8.18 The results of both the 2007 and 2012 protected species surveys are provided in Figure 9.4 (EIAR Volume 3a: Figures). Paragraph 9.5.2 summarises the alterations proposed to the Consented Scheme for this Proposed Varied Development. Whilst turbine foundations and their associated infrastructure, the number and size of borrow pits and the size and location of the Proposed Varied Development's substation have altered, these are deemed unlikely to alter the effects of the Proposed Varied Development to otters, water vole, badgers, pine marten or wildcat if these are present.
- 9.8.19 Felling of the Strathy South conifer plantation would be undertaken through a five year programme commencing prior to the Construction Phase of the Proposed Varied Development in line with the Outline Habitat Management Plan (EIAR Volume 4: Technical Appendix 9.5), as provided for the Consented Scheme and updated for the Proposed Varied Development. The proposed Phased Felling Plan is presented on Figure 9.5 (EIAR Volume 3a: Figures) and provided in Technical Appendix 9.6 (EIAR Volume 4). This phased approach would allow dispersal of protected species from areas of felling thereby reducing the potential effects from these activities.
- 9.8.20 Protected species conservation values (using Table 9.6) range from Regional for otters, water voles, badgers, pine marten to National for wildcat. The magnitude of any effect to protected species is likely to be low, with species able to disperse to other areas of suitable habitat in the wider landscape without this affecting their populations' viability. Unmitigated effects to otters, water voles, badgers,

pine marten and wildcat from effects associated with the Construction Phase of the Proposed Varied Development are therefore assessed as Minor adverse (Not Significant).

Aquatic Species

- 9.8.21 No further assessments of the utilisation of the site and the surrounding watercourses was completed to inform the Proposed Varied Development EIA. The assessments completed for the 2013 ES Addendum submission and provided in Technical Appendix 9.9 and 9.10 (EIAR Volume 4) are considered to present a sufficiently robust baseline to assess the potential impacts and associated effects of the Proposed Varied Development to these IEFs.
- 9.8.22 Alterations to the infrastructure for the Proposed Varied Development would be unlikely to cause changes in effects to aquatic species, with the main potential pathways identified in the 2013 ES Addendum of sedimentation, pollution events, construction of water crossings and peat slide remaining relevant to this assessment.
- 9.8.23 The conservation value of aquatic species was assessed as Regional during both the 2013 ES Addendum and the 2007 ES EIA work and remains relevant to this assessment. The proposed magnitude of any effect to aquatic species from the identified pathways is assessed as low, although it is recognised that there could exist a greater potential for these to occur without appropriate mitigation being implemented due to the larger footprint of the Proposed Varied Development and therefore the increased earthworks required. However, the majority of the infrastructure locations remain the same and have been designed to be at least 70 m away from watercourses with the increase in turbine foundations and associated infrastructure making up a large proportion of this increase in earthworks. Consequently, the potential unmitigated effects associated with the Proposed Varied Development to aquatic species IEFs is assessed as Minor adverse (Not Significant).

Bats

- 9.8.24 Bats were scoped out of further assessment for the 2013 ES Addendum as the Strathy South conifer plantation lacked suitable roosting habitat, and surveys completed for the 2007 ES recorded limited activity by these species (Section A10.1.6 of the 2013 ES Addendum). However, updated SNH Guidance¹ based on an increased understanding of the use of habitats by bat species, and the potential effects that wind farms might have to these, requires that an updated assessment be carried out for the Proposed Varied Development.
- 9.8.25 Technical Appendix 9.2 (EIAR Volume 4) details the surveys completed for the Proposed Varied Development in 2019 and 2020, the species of bats present at the site and their associated levels of activity. Bat activity across the site was assessed as moderate and a common pipistrelle summer roost was identified within the Croft House in the south of the site; Figure 9.2e (EIAR Volume 3a: Figures) provides the location of the building in the context of the main site.
- 9.8.26 An assessment of the conservation value of the bat species in the context of the site using Table 9.6 of this document classifies soprano and common pipistrelle species as common but covered by international legislation and therefore of Regional conservation value. Nathusius' pipistrelle, *Myotis* species and *Nyctalus* species recorded during the surveys are rare, particularly in the location of the Proposed Varied Development, and as such their conservation value is assessed as National.
- 9.8.27 Potential construction effects to bat species could be caused by night time working and illumination of foraging and commuting pathways, noise disturbance to roosting bats within the Croft House building, and removal of the conifer plantation for the construction of the Proposed Varied Development, which could alter previously defined foraging and commuting pathways. These impacts could cause disturbance and / or a reduction in use of the site by the local populations. Effects are deemed to be detectable in the short to medium term, but they would be unlikely to alter the long-term viability of the population of bats present in the medium duration; the impact is therefore assessed as of Medium magnitude to bat species.

- 9.8.28 Taking the National conservation value as a conservative approach for the bat species recorded on site, the likely significant effects to these species from the above impacts are therefore assessed as Moderate adverse (Significant) prior to the implementation of any mitigation.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.8.29 Technical Appendix 9.3 (EIAR Volume 4) details the population of red deer utilising the main site and the immediately surrounding 1 km buffer of the Caithness and Sutherland Peatlands SAC. The red deer population is assessed as moderate – high for the habitats present, however only low effects to the surrounding SAC were recorded during the assessment.
- 9.8.30 The potential effects of the Consented Scheme to the Caithness and Sutherland Peatlands SAC were reported in the 2013 ES Addendum (Section A10.5.2 (b) (iii) *Secondary Impacts on Designated Sites due to Herbivore Displacement*). The assessment concluded that effects from such impacts to the SAC would be dependent on the decisions made regarding the site's surrounding deer fence and the ability for deer to disperse away from construction activities, utilising suitable habitats within their home range which would include both the open habitats of the surrounding SAC and the other forestry plantations, and thereby avoid concentrated browsing and trampling of sensitive habitats.
- 9.8.31 As stated in the 2013 ES Addendum, if the deer fence surrounding the site is removed this would allow dispersal of deer at a density which would be unlikely to affect qualifying habitats of the Caithness and Sutherland Peatlands SAC. If it is proposed to keep the deer fence (predominately for blanket bog restoration purposes) an appropriate cull would be implemented to reduce deer numbers within the site. As such deer would not be displaced onto the Yellow Bog area of the Caithness and Sutherland Peatlands SAC at a density which would be likely to cause an effect on the qualifying interests of the site. Effects from deer are therefore predicted to be Negligible (Not Significant).

Predicted Operational Effects

Habitats

- 9.8.32 Potential impacts on habitats outwith the SAC (those associated with the main site and the Preferred and Alternative Access tracks) from the Proposed Varied Development during its Operational Phase are considered to be limited, resulting from small-scale maintenance operations and potential small-scale pollution incidents.
- 9.8.33 Within the main site the conservation value of the habitats which would be present is difficult to gauge as this would be dependent on the timeframe (operational years) in which any impact could occur. For example, habitats present in operational Year 50 of the Proposed Varied Development would have a higher conservation value than those in Year 1 from the habitat restoration measures implemented. Habitats surrounding the Preferred or Alternative tracks are predominately those remaining following removal of conifer plantation habitats, and whilst these will recolonise through the lifespan of the Proposed Varied Development their conservation value would be limited.
- 9.8.34 Using Table 9.6 and a conservative approach, the potential conservation value of the habitats outwith the SAC could attain a value of Regional (listed in EU / UK and SBL documents but common in the wider context of the site). The magnitude of any maintenance operation or pollution event would be likely to be of a small-scale and short duration, and unlikely to affect the habitat viability in the short-medium term; as such, the magnitude of change is assessed as Low. The predicted likely significant effects of any from the Operational Phase of the Proposed Varied Development to habitats outwith the SAC is therefore assessed as Minor adverse (Not Significant) prior to any mitigation being implemented.
- 9.8.35 Impacts to habitats within the SAC during the Operational Phase of the Proposed Varied Development are predicted to be limited to small-scale operational maintenance which would cause short-term habitat disturbance and potential small-scale pollution incidents. These incidents are likely to be of a

low magnitude and would affect habitats immediately adjacent to the track and not associated with the surrounding SAC (i.e. previously disturbed habitats of low conservation value). As such, these predicted likely significant effects are assessed as Minor adverse (Not Significant).

Protected Species

- 9.8.36 Effects to protected species from the Operational Phase of the Consented Scheme were considered to be as outlined in the 2007 ES with the likely significant effects assessed as being Not Significant. The alterations of the design and components of the infrastructure of the Proposed Varied Development from that of the Consented Scheme would not change the potential impacts, their magnitude, or, the conservation value of the protected species present. As such, the assessment completed for the Consented Scheme remains relevant for the Proposed Varied Development and effects to all protected species are assessed as Negligible (Not Significant).

Aquatic Species

- 9.8.37 Impacts to aquatic species (fish and macro-invertebrates) from the Operational Phase of the Proposed Varied Development would be limited to potentially small-scale pollution events from maintenance activities. The conservation value of these receptors has been assessed as Regional and the magnitude of any effect would be localised, short in duration and therefore low. As such, the unmitigated likely significant effect of the Operational Phase of the Proposed Varied Development to aquatic species is assessed as Minor adverse (Not Significant).

Bats

- 9.8.38 Operational effects and their impacts to bat species present on site and the continued viability of their local populations are detailed in Technical Appendix 9.2 (EIAR Volume 4). The assessment of the data collected during the initial study period followed the latest SNH Guidance for bat surveys and wind farms (SNH, 2019)¹. In summary, the assessment concluded that prior to mitigation being implemented the Proposed Varied Development would have a Moderate adverse (Significant) effect to the local bat populations present, with the exception of *Myotis* species which are unlikely to be affected and therefore the effect to these species is assessed as Negligible (Not Significant).
- 9.8.39 However, as previously stated in paragraph 9.5.34 there are limitations associated with this assessment in so far as the use of the Ecobat analysis tool as required by SNH (2019)¹ is reliant on third party data, and the accuracy of the results returned using the Ecobat tool requires a substantial amount of records to be present. Due to the novelty of the Ecobat tool, the location of the wind farm and the number of records provided to Ecobat in the surrounding 100 km buffer of the main site, a substantially small reference range of data was used to inform the above assessment of the operational effects of the Proposed Varied Development to the local populations of the bat species present. This reduced reference range would have increased the importance of bat species in the proximity of the Proposed Varied Development, and as such the assessment of the likely significant effects would be an over-estimation.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.8.40 Impacts from deer during the Operational Phase impacts to the surrounding Caithness and Sutherland Peatlands SAC for the Proposed Varied Development are considered to be similar in nature or lower than that for the Construction Phase. However, the management of deer within the main site and the decision as to whether the deer fence surrounding the Proposed Varied Development would be retained or be removed would determine the significance of effects on qualifying habitats of the SAC. During the first two years of the Operational Phase all of the conifer plantation from the main site would be removed, and as such deer dispersal would be greatest during this period. If appropriate management is not implemented during this period, impacts and their associated effects from this dispersal could be Significant (adverse). However, the Applicant are committed to implementing appropriate management and as such the effects from deer displacement are likely to be Negligible (Not Significant).

Predicted Decommissioning Effects

- 9.8.41 Decommissioning effects are predicted to be similar in nature to those as described for the Construction Phase of the Proposed Varied Development. However, the baseline at the time of decommissioning of the Proposed Varied Development is likely to have altered substantially from that detailed for this 2020 EIAR given the removal of all conifer plantation from site and the proposed site wide blanket bog restoration activities proposed within the Outline Habitat Management Plan (EIAR Volume 4: Technical Appendix 9.5) for the Proposed Varied Development. These activities would see restoration implemented and managed throughout the 50-year lifespan of the Proposed Varied Development, restoring habitats within the main site to those similar to the surrounding Caithness and Sutherland Peatlands SAC. Consequently, it is not possible to accurately assess the effects of these potential impacts at this time.

Predicted Cumulative Construction Effects

- 9.8.42 Cumulative effects from the construction of the Proposed Varied Development have been considered for all wind farm developments within a 20 km radius of the site (Table 9.5).

Habitats

- 9.8.43 Section A10.5.5 (a) of the 2013 ES Addendum details that potential cumulative construction effects are limited to the interaction of the Strathy South access track and the proposed neighbouring Strathy Wood Wind Farm to the surrounding Caithness and Sutherland Peatlands SAC. Cumulative construction effects to habitats caused by these two developments were assessed as Negligible and given the improved construction methods proposed to be used for Segment 2 of the Strathy South access track passing through the Caithness and Sutherland Peatlands SAC (see Technical Appendix 9.4 (EIAR Volume 4)), impacts and their effects are predicted to be further reduced for the Proposed Varied Development. As such, the predicted cumulative effects are assessed as Negligible (Not Significant).

Protected Species

- 9.8.44 Section A10.5.5 (b) of the 2013 ES Addendum found predicted cumulative effects to wildcat, otter, water vole and pine marten to be in the worst-case Minor adverse (Not Significant). None of the wind farms within the 20 km buffer considered for this assessment are likely to increase the predicted cumulative effects during their Construction Phase and a number of the developments considered are currently operational which further decreases their potential effects to protected species. Alterations to the design of the Proposed Varied Development have not increased the significance of effects to protected species within the Construction Phase; it is therefore assessed that the predicted significance of cumulative construction effects are Minor adverse (Not Significant) for protected species in the wider area.

Bats

Likely significant effects for the Construction Phase to bat species from the Proposed Varied Development are assessed as Moderate adverse (Significant). Many of the developments within the 20 km cumulative assessment zone are already operational (Strathy North Wind Farm, Baillie Wind Farm, Betty Hill Wind Farm) and will be having an effect to bat populations within the surrounding area. Construction effects of the Proposed Varied Development, as detailed in paragraph 9.8.37, are assessed as Moderate Adverse (Significant) prior to any implementation of mitigation measures. Consequently, the predicted significance of cumulative effects from the Construction Phase of the Proposed Varied Development is considered Moderate adverse (Significant) in conjunction with the effects from the other surrounding developments, prior to mitigation being implemented.

Aquatic Species

There is a potential cumulative effect to aquatic species from wind farm development within the River Strathy catchment. The developments included within the cumulative assessment which could affect the River Strathy are the Strathy North Wind Farm, the Strathy Wood Wind Farm, the Armadale Wind Farm and the Proposed Varied Development. Developments included in Table 9.5 which do not fall within the River Strathy Catchment (Akron Wind Farm, Baillie Wind Farm, Limekilns Wind Farm and Betty Hill Wind Farm) have no receptor pathway for cumulative effects to occur. For those developments which are within the River Strathy Catchment the potential cumulative effects from these developments are also unable to be accurately assessed as a number of parameters such as timing of construction, mitigation and monitoring measures to be implemented for each development are unknown. However, construction of the Strathy North Wind Farm has been successfully completed without detrimental effect to aquatic species, with aquatic species populations remaining at a consistent level both pre and post construction, as such cumulative effects are likely to be Not Significant.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.8.45 The Construction Phase of the Proposed Varied Development has the potential to cause Significant effects to the surrounding Caithness and Sutherland Peatlands SAC if careful deer management is not undertaken. However, effects from the Proposed Varied Development are likely to be at a local scale, and once deer disperse to the wider area these effects (including trampling and browsing of qualifying habitats) are unlikely to be measurable. Other surrounding developments within the 20 km buffer of the Proposed Varied Development are not located in conifer plantation and so these are likely to support fewer numbers of deer. Their construction, whilst it may cause displacement of deer, would likely be at a lower density and so the predicted cumulative effects of simultaneous construction are likely to be Not Significant.

Predicted Cumulative Operational Effects

Habitats

- 9.8.46 No cumulative effects to habitats from the operation of wind farms within the 20 km cumulative assessment buffer are predicted. Impacts to habitats would be limited to small-scale maintenance operations or small-scale pollution events of a low magnitude and short duration and would be unlikely to occur in conjunction with one another between wind farm developments. Whilst construction of the proposed wind farms in the 20 km cumulative effects buffer could in their own right have likely significant effects to habitats, these are currently not available for comment. As such, taking into account that the unmitigated effects of the operational phase of the Proposed Varied Development are predicted to be Minor Adverse (Not Significant) in paragraphs 9.8.34 and 9.8.35, the unmitigated cumulative effects from the Proposed Varied Development in combination with surrounding developments are similarly assessed as Minor adverse (Not Significant).

Protected Species

- 9.8.47 None of the wind farms within the 20 km buffer considered for this assessment are likely to increase the potential cumulative effects to protected species through operational activities (Strathy Wood wind farm is the closest development to the Proposed Varied Development was considered in the 2013 ES Addendum). Alterations to the design of the Proposed Varied Development have not altered the predicted significance of effects during the Operational Phase which are assessed as Negligible (Not Significant) as reported in paragraph 9.8.36. As with the Proposed Varied Development, construction effects from other wind farms to protected species are likely to be similar in nature and are assumed to be Minor Adverse (Not Significant). Given the availability of habitats in the surrounding area (20 km buffer of the Proposed Varied Development) for any protected species to disperse to, the effects of the Proposed Varied Development in combination with others are predicted as Negligible (Not Significant).

Bats

- 9.8.48 Technical Appendix 9.2 (EIAR Volume 4) assesses the potential cumulative effects of the Proposed Varied Development using the on-line Ecobat tool. The assessment found, in the context of the other available data from wind farms within 100 km of Proposed Varied Development, that likely significant cumulative effects to local bat populations prior to mitigation being implemented are Moderate (Significant), with the exception of *Myotis* species for which impacts are assessed as Negligible (Not Significant).

Aquatic Species

- 9.8.49 No cumulative effects to aquatic species are predicted from the Proposed Varied Development and those in the surrounding River Strathy catchment during its Operational Phase.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.8.50 Operational effects from the Proposed Varied Development would likely be limited to the first two years of the Proposed Varied Development whilst the conifer plantation felling is undertaken. Surrounding operational wind farm sites within the 20 km buffer of the Proposed Varied Development are not located within conifer plantations which provide habitats to support higher deer populations. These developments (if deer are present) will have a Deer Management Plan (DMP) associated with them and so will ensure appropriate deer management is completed to reduce any likely significant effects to qualifying interest of designated sites e.g. the Strathy North Wind Farm which has successfully reduced deer numbers from a previously afforested site to a deforested site without causing negative effects to the qualifying interest of the surrounding Caithness and Sutherland Peatlands SAC. Consequently, it is predicted that in a worst-case scenario during the first two years of operation the cumulative effects to the Caithness and Sutherland SAC would be Not Significant.

9.9 Mitigation

- 9.9.1 Mitigation measures proposed for the Consented Scheme are summarised in Section 9.4 of this Chapter. These commitments would continue to be implemented for the Proposed Varied Development.
- 9.9.2 Further to the commitments made for the Consented Scheme, additional consideration has been given to reduce effects to IEFs through the sensitive design of the Proposed Varied Development. Additional commitments include:
- The redesign of the Common Access and the associated grid connection construction methods to reduce the overall footprint of the track. Technical Appendix 9.4 (EIAR Volume 4) details the substantial body of work completed to ensure that the track design falls within mapped areas of disturbed habitat;
 - Design of the Yellow Bog track upgrade to reduce effects to the surrounding SAC, as detailed in Technical Appendix 9.4 (EIAR Volume 4). As with the Common Access a substantial amount of work has been completed to minimise any effects to the qualifying habitats of the surrounding SAC, with these limited to Permanent Habitat Change rather than Habitat Loss;
 - Design of the Phased Felling Plan as provided in Technical Appendix 9.6 (EIAR Volume 4) to allow restoration of peatland habitats to commence at the earliest opportunity;
 - The revision of the Outline Construction Environment Management Plan (CEMP) which was previously provided for the Consented Scheme to ensure it is relevant to the Proposed Varied Development, is compliant with all current guidance and legislation, and provides protection to environmental receptors based on up to date information collected for the Proposed Varied Development;

- The redesign and removal of sections of track between T13 and T19, and T24 and T26, which previously crossed areas of deep peat. These formed loops which, whilst they would make construction of the Proposed Varied Development simpler, would increase the effects of construction. These track loops have therefore been removed to reduce the overall effects of the Proposed Varied Development;
- A commitment to use a floating track construction in areas of peat greater than 0.5 m where other engineering parameters allow;
- A substantial amount of additional peat probing and assessment has been completed to inform the revision of the infrastructure for the Proposed Varied Development, including that for additional borrow pits, LiDAR locations, batching plants and the substation. This work has informed the locations of these infrastructure components to ensure that they are located away from areas of deep peat; and
- An increased micro-siting allowance of turbine locations has been sought to allow further placement of turbines away from areas of deep peat during the Construction Phase of the Proposed Varied Development to reduce to the potential effects of the development.

9.9.3 All in-design mitigation measures have sought to reduce the effects of the Proposed Varied Development to environmental receptors. The following sections discuss the mitigation to be implemented to reduce the unmitigated effects of the Proposed Varied Development to IEFs during each phase of the Proposed Varied Development's lifespan.

Mitigation during Construction

Habitats

- 9.9.4 The Strathy South Outline HMP was provided for the Consented Scheme at Public Local Inquiry in 2015 to provide compensation for the loss of peatland habitats and additional enhancement over and above the predicted effects of the Consented Scheme. Its implementation is secured through Condition 23 of the 2018 Consent. The HMP seeks to provide a mechanism for site-wide blanket bog restoration, along with additional enhancement measures within the Caithness and Sutherland Peatlands SAC. The Strathy South HMP has been updated for the Proposed Varied Development and is provided as Technical Appendix 9.5 (EIAR Volume 4).
- 9.9.5 The HMP provides substantial commitments over and above the potential effects of the construction of the Proposed Varied Development. The revised Outline HMP now commits to delivering peatland restoration and ongoing management and monitoring for the 50-year lifespan of the Proposed Varied Development. This additional 25-year lifespan of the HMP ensures the aims and objectives proposed to mitigate the predicted likely significant effects from construction of the Proposed Varied Development would be robustly managed to ensure the best possible outcomes for restoration of the peatlands present.
- 9.9.6 In addition to the Outline HMP, a Phased Felling Plan is provided in Technical Appendix 9.6 (EIAR Volume 4), which details the proposed timeline of felling of the conifer plantation within the main site. Considerable thought has been given to this, highlighting those areas of the main site where felling should be prioritised to allow restoration activities to commence at the earliest opportunity.
- 9.9.7 The Proposed Varied Development's Outline CEMP (EIAR Volume 4: Appendix 2.1) provides further mitigation to ensure protection of habitats through the employment of a team of Ecological Clerk of Works (ECoW) for the duration of the Construction Phase. The ECoW would be responsible for the implementation and monitoring of habitat reinstatement associated with construction of the infrastructure for the Proposed Varied Development and to ensure best practice guidance is followed to minimise the disturbance to habitats in the long-term.

Protected Species

- 9.9.8 No significant effects are predicted to protected species during the Construction Phase of the Proposed Varied Development. The Strathy South Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) provides species-specific protection plans for mammals which may be present on site both prior to and during the Construction Phase of the Proposed Varied Development.

Aquatic Species

- 9.9.9 No significant effects are predicted to aquatic species during the Construction Phase of the Proposed Varied Development, and as such no specific mitigation is required. However, the Strathy South Outline CEMP (EIAR Volume 4: Technical Appendix 2.1), outlines the measures to protect watercourses and the aquatic environment through the construction phase of the Proposed Varied Development which would protect aquatic species from the potential effects of construction activities.

Bats

- 9.9.10 Best practice guidelines¹ will be followed with regards to construction to ensure night time working is limited, and where necessary lighting would be deflected away from foraging and commuting routes. These include the confirmed common pipistrelle roost at the Croft House, water courses and water bodies, existing tree lines and linear features.
- 9.9.11 During the Construction Phase phased felling of the conifer plantation is proposed, with early felling including the footprint of the infrastructure for the Proposed Varied Development. A buffer to the construction footprint of the Proposed Varied Development has been considered during the design phase of the Phased Felling Plan to ensure a separation distance of greater than 85.4 m is achieved from the turbine tip of the rotor swept area to the forest edge; this would continue to be used by bat species for foraging and commuting (see Technical Appendix 9.6 (EIAR Volume 4)). This measure would ensure that during the Construction Phase disturbance to bats would be limited.
- 9.9.12 Micro-siting of turbines during the construction phase of the Proposed Varied Development would be completed, where necessary, to ensure that all turbines are at least 85.4 m from watercourses and waterbodies as required by the relevant SNH Guidance (SNH, 2019)¹.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.9.13 The significance of effects would be determined by the actions completed prior to construction commencing. A Deer Management Plan (DMP) would be prepared in consultation with SNH and its implementation would be commenced prior to construction to provide appropriate management of the deer populations. Either to allow dispersal across the wider Caithness and Sutherland Peatlands SAC through removal of the deer fence surrounding the wind farm area, or through culling of deer to reduce potential dispersal and the effects of trampling and grazing within the SAC.
- 9.9.14 In addition to the implementation of the DMP, the Phased Felling Plan provided in Technical Appendix 9.6 (EIAR Volume 4) would gradually reduce suitable deer habitat within the main site, causing a phased dispersal of the deer population to the Caithness and Sutherland Peatlands SAC thereby reducing the temporal impact of dispersal.

Mitigation during Operation

Habitats

- 9.9.15 No significant effects to habitats are predicted during the Operational Phase of the Proposed Varied Development. The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented through the Operational Phase of the Proposed Varied Development providing ongoing benefits through the 50-year lifespan. .

Protected Species

- 9.9.16 No significant effects to protected species are predicted during the Operational Phase of the Proposed Varied Development. Consequently, no specific mitigation is proposed.

Aquatic Species

- 9.9.17 No significant effects to aquatic species are predicted during the Operational Phase of the Proposed Varied Development. Consequently, no specific mitigation is proposed.

Bats

- 9.9.18 Unmitigated Operational Phase effects to bats are predicted as Moderate adverse (Significant) as detailed in Technical Appendix 9.2 (EIAR Volume 4) and paragraph 9.8.38 and 9.8.39 of this Chapter. The design of the Phased Felling Plan for the Operational Phase of the Proposed Varied Development would ensure that remaining conifer plantation edges are at least 85.4 m from the rotor swept area as required by the relevant Guidance (SNH, 2019¹).
- 9.9.19 The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented through the Operational Phase of the Proposed Varied Development. Objectives and prescriptions of the HMP seek to restore blanket bog habitats across the main site. Such habitats provide unsuitable foraging and commuting habitat for bat species, reducing the attractiveness of areas of high risk to bat species. Bats would therefore be directed to use watercourses away from the turbine rotor swept area for foraging and commuting, in turn reducing their risk from the operation of the Proposed Varied Development. All turbines would be located at least 85.4 m from watercourses to ensure there is a suitable buffer between the rotor-swept area and the watercourse, as required by SNH Guidance¹.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.9.20 Potential Operational Phase effects from deer dispersal on to the Caithness and Sutherland Peatlands SAC are as detailed for the Construction Phase and are predicted to be greatest in the first two years of operation when felling is ongoing. Mitigation as outlined for the Construction Phase would continue to be implemented throughout the Operational Phase of the Proposed Varied Development to reduce the likely significant effects.

Mitigation during Decommissioning

- 9.9.21 Those mitigation measures outlined for the Construction Phase of the Proposed Varied Development would be implemented (where relevant) during the Decommissioning Phase. Where technical improvements have been made in the intervening period or best practices updated, the most appropriate mitigation measure would be implemented to limit any potential effects to IEFs.

9.10 Assessment of Residual Effects

- 9.10.1 The following Section details the residual effects to IEFs from each phase of the Proposed Varied Development's lifespan.

Residual Construction Effects

Habitats

- 9.10.2 Predicted effects to habitats before taking account of proposed mitigation during the Construction Phase of the Proposed Varied Development are assessed as Moderate adverse (Significant) within the main site, Negligible (Not Significant) for the Preferred and Alternative Access tracks and Minor adverse (Not Significant) for the Common Access and Yellow Bog tracks and the surrounding habitats of the Caithness and Sutherland Peatland SAC.

- 9.10.3 Through the implementation of the Outline HMP as proposed, mitigation would be delivered to provide landscape wide benefits to peatland habitats providing substantial peatland restoration over and above that lost through construction of the Proposed Varied Development, both within the main site and the surrounding SAC.
- 9.10.4 The presence of the ECoW during the construction phase would also ensure that best practice with regard to habitat reinstatement is achieved, reducing the predicted effects to habitats during this phase of the Proposed Varied Development.
- 9.10.5 Furthermore, the revised design of the infrastructure for the Proposed Varied Development within the main site (e.g. reducing the length of tracks required, seeking an increased micro-siting limit and additional peat probing for borrow pits) have further reduced adverse effects to peatland habitats. The revised design of both the Common Access and the Yellow Bog track have also sought to reduce substantially the predicted effects of upgrading these sections of track for the Proposed Varied Development.
- 9.10.6 Taking the above mitigation into consideration and its likely success in reducing the predicted effects of the Proposed Varied Development to habitats, the residual effects to all habitats within the main site are assessed as Negligible / Minor beneficial (Not Significant). Residual effects following the implementation of mitigation to habitats associated with all sections of the access track and Yellow Bog track, and to qualifying habitats of the surrounding Caithness and Sutherland Peatlands SAC are assessed as Negligible / Minor beneficial (Not Significant).

Protected Species

- 9.10.7 Predicted effects to protected species from the construction of the Proposed Varied Development are predicted as Minor adverse (Not Significant), in the worst case scenario. The implementation of Proposed Varied Development's Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) which includes Species Specific Protection Plans which would be overseen by the ECoW would seek to minimise any predicted effects from the Construction Phase of the Proposed Varied Development to protected species, although these cannot be completely removed. Consequently, residual effects continue to be assessed as Minor adverse (Not Significant) for a worst-case scenario.

Aquatic Species

- 9.10.8 No significant effects are predicted to aquatic species during the Construction Phase of the Proposed Varied Development, and as such no specific mitigation is proposed. The implementation of best practice guideline and the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) (including sedimentation and pollution prevention measures and the Water Quality Monitoring Plan) during the Construction Phase would seek to further reduce any predicted effects, however it is unlikely these could be completely removed. Consequently, the predicted residual effects from the Construction Phase of the Proposed Varied Development continue to be assessed as Minor adverse (Not Significant).

Bats

- 9.10.9 Predicted effects to bats before taking into account proposed mitigation measures during the construction of the Proposed Varied Development are assessed as Moderate adverse (Significant), and are predicted to include potential disturbance of the known roost at the Croft House, alterations to commuting and foraging flight lines through the phased felling of the conifer plantation, and lighting of such flight lines if night time working is required.
- 9.10.10 The implementation of the proposed mitigation, which includes directing all lighting during night time working away from potentially suitable areas of habitat for bat species, the implementation of a suitable buffer of at least 85.4 m surrounding wind turbines to remaining forest edges during felling activities (as included in the Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.6) to reduce effects to suitable foraging and commuting habitats, coupled to the reduction in overall habitat

suitability in proximity to wind turbines and construction operations through peatland restoration activities, would seek to reduce the predicted effects during the Construction Phase of the Proposed Varied Development. However, felling of the conifer plantation cannot be mitigated and the removal of current foraging and commuting flight lines would still occur. As such, the residual predicted effects, whilst reduced, are assessed as Minor adverse (Not Significant) to bat species during this construction.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.10.11 The predicted effects to deer and qualifying habitats during the Construction Phase of the Proposed Varied Development to the Caithness and Sutherland Peatlands SAC are predicted before mitigation, in a worst case scenario, as Significant (adverse). However this is dependent on the deer management implemented and the decisions made regarding the future of the deer fence surrounding the main site.
- 9.10.12 The implementation of a DMP would seek to reduce the deer population within the main site prior to construction commencing. Monitoring of the deer population following the cull would allow an assessment of the success of these actions, with the DMP continuing to be reviewed on an annual basis to ensure that management activities are sufficiently robust to protect the surrounding habitats of the Caithness and Sutherland Peatlands SAC.
- 9.10.13 As has been demonstrated at the neighbouring Strathy North Wind Farm, the above process can be successfully implemented to protect the surrounding Caithness and Sutherland Peatlands SAC. Consequently, there is a high level of confidence that this approach could be successfully implemented for the Proposed Varied Development and on that basis the residual effects from deer dispersal to habitats of the SAC are therefore assessed as Not Significant.

Residual Operational Effects

Habitats

- 9.10.14 Predicted effects to habitats both within the main site and from construction and upgrade of the proposed access track options and Yellow Bog track, and to qualifying habitats of the surrounding Caithness and Sutherland Peatlands SAC are assessed as Minor adverse (Not Significant) before taking into account proposed mitigation measures, during the Operational Phase of the Proposed Varied Development. The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented through the lifespan of the Proposed Varied Development and would provide ongoing benefits to habitats through the Operational Phase. Whilst effects to habitats of conservation concern cannot be completely removed, these would be sufficiently small that with the continued implementation of the HMP through the 50-year lifespan of the Proposed Varied Development the overall residual effect to habitats is assessed as Minor beneficial (Not Significant).

Protected Species

- 9.10.15 Effects to protected species are predicted as Negligible (Not Significant) during the Operational Phase of the Proposed Varied Development. Consequently, no specific mitigation is proposed, and the predicted residual effects continue to be assessed as Negligible (Not Significant).

Aquatic Species

- 9.10.16 Effects to aquatic species are predicted as Minor adverse (Not Significant) during the Operational Phase of the Proposed Varied Development. Consequently, no specific mitigation is proposed, and the predicted residual effects continue to be assessed as Minor adverse (Not Significant).

Bats

- 9.10.17 Predicted effects during the Operational Phase to bat species before taking into account mitigation proposed have been assessed as being Moderate adverse (Significant), as detailed in Technical Appendix 9.2 (EIAR Volume 4). The mitigation proposed to be implemented includes site wide

peatland restoration which would reduce the suitability of habitats beneath and surrounding wind turbines, and the implementation of a minimum buffer of 84.5 m from any suitable feature which could be used by bats for foraging and commuting, to the blade tip of the rotor swept area of the turbines.

- 9.10.18 The proposed mitigation is considered to have a high likelihood of success and follows suggested mitigation proposed in the current SNH Guidance for the assessment of onshore wind farms and bat species (SNH, 2019)¹. As such, there is a high degree of confidence that the proposed mitigation would be successful in reducing the predicted Operational Phase effects to bat species. Following the successful implementation of the mitigation, the residual effect is therefore assessed as Minor adverse (Not Significant).

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.10.19 Predicted effects during the Operational Phase from deer to the surrounding Caithness and Sutherland Peatlands SAC before taking account of mitigation have been assessed as Significant.
- 9.10.20 Phased felling of the conifer plantation through the first two years of the Operational Phase would see the removal of all of the conifer plantation from the main site, and as such deer dispersal would be greatest during this period. The appropriate management during this period in the form of a DMP (and for the lifespan of the Proposed Varied Development) would reduce any potential impacts and thereby reduce the predicted likely significant effects. Strathy North Wind Farm has successfully implemented such measures and monitoring has shown no increase in effects to the surrounding SAC from deer dispersal. Consequently, there is a high degree of confidence in this type of mitigation and on that basis the residual predicted effects for the Operational Phase are therefore assessed as Not Significant.

Residual Decommissioning Effects

- 9.10.21 Residual effects from the Decommissioning Phase of the Proposed Varied Development are predicted to be similar in nature to those as described for the Construction Phase. However, the baseline at the time of decommissioning of the Proposed Varied Development is likely to have altered substantially from that detailed for this 2020 EIAR through the implementation of landscape scale peatland restoration over the 50-year lifespan of the Proposed Varied Development. Consequently, it is not possible to accurately assess the impact of the predicted effects at this time but they are not expected to be significant with the implementation of suitably designed mitigation measures such as those proposed for the Construction Phase.

Residual Cumulative Construction Effects

Habitats

- 9.10.22 Predicted cumulative effects to habitats of the Caithness and Sutherland Peatlands SAC were assessed as Negligible (Not Significant) for the Construction Phase of the Proposed Varied Development in combination with the proposed Strathy Wood Wind Farm before taking into account mitigation. The implementation of the CEMP measures for the Proposed Varied Development during the Construction Phase (and the likely requirement of similarly documents for the proposed Strathy Wood Wind Farm), the reduced predicted effects of the revised construction methods of the Common Access and Yellow Bog tracks which would substantially reduce any potentially effects to surrounding habitats, and the implementation of HMP measures for the Proposed Varied Development (and likely for the proposed Strathy Wood Wind Farm) within the Caithness and Sutherland Peatlands SAC, would ensure the residual effects to habitats remain Negligible (Not Significant).

Protected Species

- 9.10.23 Unmitigated cumulative effects from the Construction Phase of the Proposed Varied Development are assessed as Minor adverse (Not Significant) in a worst-case scenario. Mitigation to reduce the potential effects of the construction phase of the Proposed Varied Development, and other developments identified in the 20 km buffer area when in construction are likely to have similarly mitigation measures implemented. It is also unlikely that construction of all proposed developments in the 20 km buffer area will occur simultaneously. The phased felling of the conifer plantation within the main site of the Proposed Varied Development would reduce the predicted effects to protected species by the Proposed Varied Development, allowing their dispersal away from potential areas of disturbance and to suitable connected habitats outwith the site. Similar construction methods would be implemented for the surrounding proposed developments. Operational developments in the surrounding 20 km buffer are likely to have a lesser effect to protected species so are unlikely to increase any predicted cumulative effect. Taking the above into consideration, the predicted cumulative residual effects to protected species are therefore assessed as Negligible (Not Significant).

Aquatic Species

- 9.10.24 Monitoring of the River Strathy catchment has been ongoing in association with the Strathy North Wind Farm for both its Construction and Operational phases. Monitoring has shown that construction and operation of a large-scale wind farm in proximity to the River Strathy can be completed without adversely affecting the water quality of the river or the aquatic species present. Further details of monitoring completed of the River Strathy for the Strathy North Wind Farm are provided in Chapter 10: Soil and Water (EIAR Volume 2).
- 9.10.25 All developments within the River Strathy catchment have been designed to reduce their potential effects to watercourses and the associated aquatic species, and relevant pollution prevention plans and a water quality monitoring programme would be in place prior and during construction as detailed in the Strathy South Wind Farm Outline CEMP (EIAR Volume 4: Technical Appendix 2.1). As such, the residual cumulative effects from the Construction Phase of the Proposed Varied Development to aquatic species is assessed as Not Significant.

Bats

- 9.10.26 The predicted cumulative effects of the Construction Phase of the Proposed Varied Development on bats has been assessed as Moderate adverse (Significant) before taking into account proposed mitigation. Sensitive construction of the Proposed Varied Development (and it is reasonably assumed those cumulative developments included within the 20 km cumulative impact assessment buffer) would seek to reduce these potential effects through site-specific species mitigation, although effects cannot be completely removed. For those developments which were constructed prior to the latest SNH (2019)¹ Guidance, it is assumed that these will have followed the relevant guidance of the time with regards to construction of the development and associated stand-off distances from important features; this information has not been updated / altered in the SNH (2019)¹ Guidance. Consequently, the cumulative effects to bat species continues to be assessed as Minor adverse (Not Significant) assuming the implementation of appropriate mitigation measures for all developments within the 20 km buffer.

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.10.27 Predicted cumulative effects from deer to the surrounding SAC during the Construction Phase of the Proposed Varied Development, in conjunction with those cumulative developments identified within the 20 km buffer area, have been assessed as Not Significant before taking into account proposed mitigation. The implementation of appropriate mitigation for all cumulative developments where deer species are present would further reduce the likelihood of any residual cumulative significant effects to the Caithness and Sutherland Peatlands SAC. Post-construction monitoring at the operational Strathy North Wind Farm has concluded the construction of the Wind Farm that involved

removal of the conifer plantation on site, did not cause any deer related effects to the SAC. As such, given the area available for deer to disperse to and assuming the implementation of appropriate DMPs for developments in proximity to the Caithness and Sutherland Peatlands SAC, the predicted residual cumulative effects during the Construction Phase of the Proposed Varied Development are assessed as Not Significant.

Residual Cumulative Operational Effects

Habitats

- 9.10.28 No significant cumulative effects to habitats are predicted during the Operational Phase of the Proposed Varied Development in combination with those identified within the 20 km cumulative assessment buffer, before taking into account proposed mitigation. Effects to habitats would be limited to small-scale maintenance operations or small-scale pollution events of a low magnitude and short duration. Even if such events were to occur simultaneously with effects from other developments, the magnitude and scale of such events would be unlikely to increase overall effects to habitats in combination with other wind farm developments.
- 9.10.29 The implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) for the 50-year lifespan of the Proposed Varied Development coupled with those HMPs which form part of the consents for the surrounding operational cumulative development would reduce the predicted effects further. The residual cumulative operational effects therefore continue to be assessed as Negligible adverse (Not Significant) for the Proposed Varied Development.

Protected Species

- 9.10.30 Predicted cumulative effects on protected species from the operation of the cumulative developments identified within 20 km of the Proposed Varied Development before taking into account mitigation measures are assessed in the worst-case to be Minor adverse (Not Significant). No specific additional mitigation is proposed to reduce this predicted effect, and therefore the residual effects continue to be assessed as Minor adverse (Not Significant).

Aquatic Species

- 9.10.31 No cumulative effects to aquatic species are predicted from the operation of the Proposed Varied Development and those in the surrounding River Strathy catchment during their Operational Phases. The residual cumulative effects are therefore assessed as Negligible (Not Significant).

Bats

- 9.10.32 Technical Appendix 9.2 (EIAR Volume 4) assesses the potential cumulative operational effects of the Proposed Varied Development using the on-line Ecobat tool. The assessment found, in the context of the other available data from wind farms within 100 km of the site, that predicted cumulative effects to local bat populations prior to mitigation being implemented are Moderate adverse (Significant). This is with the exception of *Myotis* species for which predicted cumulative effects are assessed as Negligible (Not Significant). However, it should continue to be noted that the reference range of data provided by the Ecobat tool was substantially below that recommended to perform an accurate assessment of the predicted effects of the Proposed Varied Development to bat species. This is likely due to the remote location of the Proposed Varied Development and the novelty of the tool which is reliant on third parties to submit information freely. Consequently, the importance of the bat populations present within the main site could be estimated by the Ecobat tool as disproportionately high.
- 9.10.33 The mitigation proposed for the Proposed Varied Development follows that detailed in the relevant Guidance (SNH, 2019)¹ and such mitigation would similarly be required for new wind farm developments within the surrounding 100 km buffer of the site. Similarly, any operational development constructed prior to the SNH (2019)¹ Guidance would be in compliance with the

guidance of the time. Mitigation measures such as stand off distances of turbines from important features used by bats was not updated for the SNH (2019)¹ Guidance and as such all developments would be required to meet the 50 m buffer from the blade tip to the features as has been applied for the Proposed Varied Development and as detailed in Technical Appendix 9.2 – Bat Survey Report 2019-2020 (EIAR Volume 4). There is a high confidence that such mitigation measures are successful in reducing the predicted likely significant cumulative effects on the bat species present. Consequently, the residual cumulative effects to bat species are assessed as Minor adverse (Not Significant).

Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC

- 9.10.34 Operational effects from the Proposed Varied Development from deer to the surrounding SAC are likely to be limited to the first two years of the Proposed Varied Development as felling of the conifer plantation is completed (EIAR Volume 4: Technical Appendix 9.6). Both surrounding operational wind farm sites and those proposed to be constructed within the 20 km buffer of the Proposed Varied Development would have a DMP associated with them and so would ensure appropriate deer management is completed to reduce any potential effects to qualifying interests of designated sites e.g. the Strathy North Wind Farm. Consequently, it is predicted that with appropriate deer management implemented during the Operational Phases of all cumulative developments, the cumulative residual significance of effect of the Proposed Varied Development in conjunction with these other wind farm developments to the Caithness and Sutherland Peatlands SAC would be Minor adverse (Not Significant) during the removal of the conifer plantation, (i.e. the first two years of the Operational Phase). Following this the cumulative residual effects would be Negligible (Not Significant) following deer dispersal from the Strathy South conifer plantation, assuming appropriate mitigation is implemented for the other wind farm developments.

9.11 Monitoring

- 9.11.1 No significant residual effects to IEFs have been identified following the implementation of appropriate mitigation. Monitoring of the mitigation measures outlined in relevant management plans (Phased Felling Plan, DMP, HMP) would be required to allow activities to be updated and altered to ensure the required objectives are achieved. The monitoring required would be provided in detail in each of the management plans and agreed in consultation with the relevant statutory authority (Forestry Land Scotland (FLS), SEPA and SNH).
- 9.11.2 Post construction monitoring in years 1, 3 and 5 of the Operational Phase of the Proposed Varied Development would be completed to assess bat activity across the main site. Monitoring would seek to assess the use of the main site by bat species, that areas in proximity to turbines are not being used by bats following felling of the conifer plantation and as the progressing peatland restoration measures are implemented across these areas. It will also be used to assess whether the remaining foraging and commuting habitats such as water bodies and water courses on the main site continue to provide suitable habitats to support the local bat population.

9.12 Comparison of Predicted Significant Effects between the Consented Scheme and Proposed Varied Development

- 9.12.1 Six significant predicted effects prior to appropriate mitigation being implemented have been identified for the Proposed Varied Development. These are likely significant direct effects from habitat loss during the Construction Phase within the main site, potential significant effects to the Caithness and Sutherland Peatlands SAC from deer dispersal, and, likely significant effects during both the Construction and Operational Phase to bat species, including likely significant cumulative effects during both Phases.
- 9.12.2 Predicted significant effects to the surrounding Caithness and Sutherland Peatlands SAC from dispersal of red deer populations within the main site were also identified, although the significance

of effects are dependent on the plans for the deer fence surrounding the main site and the implementation of a successful DMP. This effect was previously identified for the Consented Scheme.

- 9.12.3 Effects to bat species were only assessed in the 2007 ES for the Consented Scheme and scoped out of further assessment during the 2013 ES Addendum and 2014 FIR. As such a direct comparison is not possible.
- 9.12.4 A detailed comparison of the direct effects of the Consented Scheme and the Proposed Varied Development to habitats through habitat loss has been completed using the parameters outlined in Section 9.7 of this Chapter and as detailed in Technical Appendix 9.7 (EIAR Volume 4). For completeness a summary of the predicted effects of both construction and ongoing operation of the Proposed Varied Development and the Consented Scheme to habitats is provided in Table 9.10 below. As the assessment uses the 2020 EIAR habitat loss parameters for both developments, the figures quoted for the Consented Scheme will differ from those included in the 2013 ES Addendum and 2014 FIR.

Table 9.10 Predicted Unmitigated Effects of the Consented Scheme and Proposed Varied Development to Habitats

		Consented Scheme				Proposed Varied Development			
Wind Farm Area	Phase 1 Habitat ¹	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Effects (ha)	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Effects ² (ha)
Main Site	Wet heath	3.38	7.51	11.67	22.56	4.18	8.84	12.22	25.24 (+2.68)
	Blanket bog	3.10	9.27	10.25	22.62	3.01	9.59	11.14	23.74 (+1.12)
	Modified bog	0.14	0.35	0.42	0.91	0.17	0.35	0.46	0.98 (+0.07)
	Acidic Flush	0.01	0.05	0.07	0.13	0.21	0.07	0.15	0.43 (+0.3)
	Dry heath	0.00	0.16	-	0.16	0.00	0.16	-	0.16 (0.00)
	Acid grassland	0.04	0.05	0.13	0.22	0.05	0.06	0.15	0.26 (+0.04)
	Marshy Grassland	0.00	0.00	0.00	0.00	0.05	0.04	0.07	0.16 (+0.16)
	Conifer Plantation	14.62	24.42	-	39.04	20.71	31.74	-	52.45 (+13.41)
Preferred Access	Wet heath	0.08	0.08	0.22	0.38	0.08	0.08	0.22	0.38 (0.00)
	Blanket bog	0.03	0.02	0.06	0.11	0.03	0.02	0.06	0.11 (0.00)
	Conifer Plantation	0.92	0.85	-	1.77	0.92	0.85	-	1.77 (0.00)
Alternative Access	Acidic Flush	0.02	0.01	0.03	0.06	0.02	0.01	0.03	0.06 (0.00)
	Wet heath	0.04	0.06	0.15	0.25	0.04	0.06	0.15	0.25 (0.00)
	Conifer Plantation	1.76	1.99	-	3.75	1.76	1.99	-	3.75 (0.00)
Common Access	Wet heath	-	-	0.29 ³	2.87	1.23	1.38	0.26	2.87 (-0.03⁴)
	Blanket bog	-	-	0.37 ³	0.14	0.07	0.07	0.00	0.14 (-0.4⁴)
	Conifer Plantation	-	-	-	0.33	0.22	0.11	-	0.33 (0.00)
	Modified bog	-	-	-	-	0.00	0.01	0.00	0.01

Table 9.10 Predicted Unmitigated Effects of the Consented Scheme and Proposed Varied Development to Habitats

		Consented Scheme				Proposed Varied Development			
Wind Farm Area	Phase 1 Habitat ¹	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Effects (ha)	Direct Habitat Loss (ha)	Temporary Habitat Loss (ha)	Permanent Habitat Change (ha)	Total Effects ² (ha)
Yellow Bog Track	Wet heath	-	-	-	-	0.00	0.17	0.00	0.17
	Acid grassland	-	-	-	-	0.01	0.01	0.00	0.02
	Blanket bog	-	-	-	-	0.03	0.06	0.43	0.52

Table notes:

- Habitats associated with direct habitat loss and temporary habitat loss for the Common Access and Yellow Bog track upgrades are atypical having been affected by the construction of the existing tracks and therefore are not qualifying features of the Caithness and Sutherland Peatlands SAC.
- Brackets denote increase (+) or decrease (-) in effects to habitats by the Proposed Varied Development in comparison to the Consented Scheme and the associated cumulative area. The Yellow Bog track was not included in the Consented Scheme and so a comparison is not possible.
- Common access habitat loss values are taken from the direct habitat loss for the Consented Scheme which refer to potential effects to the SAC. These are the higher of the values predicted and the range falls between this value of 0.66 and a lower value of 0.54 (please see EIAR Volume 4: Technical Appendix 9.4 for a detailed explanation). No separate values are available for direct loss or temporary disturbance from the Consented Scheme.
- Difference is only for effects to the SAC from the construction of the Common Access track.

- 9.12.5 The Proposed Varied Development would result in a total habitat loss of 103.42 ha within the main site, an increase of 17.78 ha over that of the Consented Scheme predominately caused through: increases in turbine hardstanding's and foundations size; increases in borrow pit size and number to account for the additional aggregate required for construction; and an increased size in the substation to accommodate the increased output from the Proposed Varied Development (see Table 9.7). However, 13.41 ha of this increased effect to habitats are within conifer plantation areas (see Table 9.10). Increased predicted effects to blanket bog, wet heath and wet modified bog habitats (those habitats of the highest conservation value as provided by Table 9.6) are only predicted as 1.12 ha, 2.68 ha and 0.07 ha respectively (see Table 9.10). In addition to the increased habitat loss within the main site, the inclusion of the Yellow Bog track for the Proposed Varied Development increases the overall footprint of the Proposed Varied Development by only an additional 0.72 ha.
- 9.12.6 Moreover, effects to the high conservation habitats within the main site would likely be reduced further from those provided in Table 9.10 as hydrological impacts are anticipated to be less than predicted due to the atypical nature of the habitats present. These have been affected by the presence of the conifer plantation for the past 30 years and as such are drier atypical forms of those recorded. Consequently, Permanent Habitat Change from the construction of the Proposed Varied Development would be unlikely to occur to such habitats, and the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would seek improve the quality and abundance of these habitats rather than the Proposed Varied Development having a prolonged detrimental effect in the way that the forestry is currently impacted on these habitats. As such the values provided in Table 9.10 for Permanent Habitat Change within the main site are likely to be an over-estimation of the predicted likely significant effects of the Proposed Varied Development before mitigation is taken into account.
- 9.12.7 Considerable improvement in the methods of construction for the Common Access track for the Proposed Varied Development would result in reduced effects to the qualifying habitats of the Caithness and Sutherland Peatlands SAC as detailed in Technical Appendix 9.4 (EIAR Volume 4) and summarised in Table 9.10 above. With the inclusion of the Yellow Bog track, effects to qualifying habitats total 0.69 ha for the Proposed Varied Development, in comparison to 0.66 ha predicted for the Consented Scheme; a total increase of only 0.03 ha.
- 9.12.8 The predicted effects before mitigation for both the Consented Scheme and the Proposed Varied Development to habitats within the main site were assessed as Moderate adverse (Significant). Predicted effects outwith the main site from construction and operation of the access track and the Yellow Bog track were assessed as Minor adverse (Not Significant) in the worst case scenario. The benefits from the implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and the associated commitments would deliver substantially greater benefits than the predicted adverse effects of either the Proposed Varied Development or the Consented Scheme. They would deliver landscape scale peatland restoration both within the Strathy South conifer plantation and across the wider Caithness and Sutherland Peatlands SAC. On that basis the residual predicted effects for both developments, following the ongoing implementation of the HMP through the 50-year lifespan, is assessed as Negligible / Minor Beneficial (Not Significant).

9.13 Comparison of Residual Effects between the Consented Scheme and Proposed Varied Development

- 9.13.1 Table 9.11 provides a summary of the residual effects to IEFs identified for both the Consented Scheme and Proposed Varied Development.

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Construction				
Habitats Outwith the Caithness and Sutherlands SAC	Direct and indirect impacts on non- designated habitats through installation of wind farm infrastructure (this includes all aspects of the Consented Scheme as assessed in the 2014 Further Information Report). Likely Neutral / Minor Beneficial (Not Significant)	N/A	Impact of the Proposed Varied Development assessed as Negligible / Minor Beneficial (Not Significant)	No material change. A small increase in habitat loss to blanket bog, wet heath and wet modified bog habitats has been identified. The effect of these impacts to such habitats continue to be similar to those identified for the Consented Scheme. The HMP for the Proposed Varied Development seeks to restore all current afforested peatland within the main wind farm area; consequently, the effect of any impact are assessed as Negligible / Minor Beneficial (not Significant). Residual effects assessed as Negligible / Minor Beneficial (Not Significant)
Habitats Within the Caithness and Sutherlands SAC	Direct and indirect impacts on SAC- designated habitat through upgrading of the access track and installation of cable jointing areas along the grid connection between Strathy South Wind Farm and Strathy Wood. Neutral/Minor Beneficial (Not Significant)	N/A	Impact of the Proposed Varied Development is assessed as Negligible / Minor Beneficial (Not Significant)	No material change identified. Construction methods have been updated as detailed in Technical Appendix 9.4 (EIAR Volume 4) to reduce the potential impact of any identified effect from upgrading of the access track, in particular the Common Access passing through the SAC. The Yellow Bog track is included within the assessment of the potential effects to the SAC. A comparative assessment of both the proposed methods of construction for the Consented Scheme and the Proposed Varied Development has been completed, indicating a substantial decrease in the potential effects from the updated methods of construction even with the inclusion of the Yellow Bog access track. Residual effects of the upgrade of the Common Access and Yellow Bog tracks to qualifying

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
				habitats of the SAC were assessed as Negligible/Minor Beneficial (not Significant)
Protected Species	Disruption to protected fauna from: noise, habitat fragmentation, road related mortality, decrease in prey resources, changes to water quality, and habitat loss/change and disturbance during arising from construction activities. Predicted residual effects range from Neutral to Minor Adverse (Not Significant).	N/A	Predicted residual effects of the Proposed Varied Development to protected fauna are assessed Minor Adverse (Not Significant)	No material change to the residual effect.
Aquatic Species	Effects to Aquatic Species are potentially from pollution events associated with construction of peat slides into watercourses. With mitigation predicted residual effects are Minor Adverse (Not Significant).	N/A	Predicted residual effects of the Proposed Varied Development assessed Minor Adverse (Not Significant)	No material change to the residual effect.
Bats	Effects to bat species from the construction of	N/A	Effects scoped in include disturbance to the Croft	Effects to bats were scoped out of the 2013 ES Addendum following assessments completed for the

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
	the Consented Scheme were scoped out of the 2013 ES Addendum and 2014 FIR. The 2007 ES stated there would be no Significant negative residual effects on protected species.		House bat roost, disruption, alteration and removal of foraging and commuting flight lines, and increased lighting to these flight lines during night-time working. Residual effects are assessed as Minor Adverse (Not Significant).	2007 ES which found limited activity by bat species and low habitat suitability. Updated SNH Guidance and increased knowledge of the potential effects of wind farm development to bat species required impacts and the likely significant effects to be scoped in to this 2020 EIAR. Bats were found to be present on site utilising forestry edges, rides and watercourses across the site for foraging and commuting, with a roost identified at the Croft House in the south of the main wind farm area. Mitigation was identified including the sensitive design of the Phased Felling Plan to ensure forest edges are created a suitable distance from construction works, the potential reduction in night-time working, and the use of light deflectors to reduce lighting of suitable habitats if night time working is required. These measures would reduce the level of predicted significant construction effect to a Minor adverse (not Significant). Residual effects assessed as Minor adverse (Not Significant).
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC	Predicted residual effects from construction of the Consented Scheme were assessed as Not Significant if appropriate deer management activities are implemented prior to	Residual effects would remain the same as deer populations have not altered in the intervening time period between assessments of the baseline.	With the implementation of a Deer Management Plan (DMP) the residual effects would be Negligible (Not Significant).	No material change. Effects assessed as Negligible (Not Significant) with the implementation of appropriate mitigation.

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
	and during construction operations. Adverse (Not Significant).			
Operation				
Habitats	Direct and indirect impact on both non- qualifying habitats and those associated with the SAC would be limited to ongoing operational and maintenance activities e.g. upgrading tracks & drainage works. Negligible adverse (Not Significant).	N/A	Effects assessed as Minor Beneficial (Not Significant).	Residual effects from the operation of the Proposed Varied Development would be similar in nature and magnitude as to those of the Consented Scheme and limited to small scale pollution incidents associated with maintenance activities. The residual effect for the Proposed Varied Development is assessed as Minor Beneficial (Not Significant) with the ongoing implementation of the Strathy South Outline HMP. This is not considered to be a material change.
Protected Species	Operational effects to protected species from the Consented Scheme were determined to be Not Significant.	N/A	Effects to protected species are assessed as Negligible (Not Significant).	No further surveys for protected species were completed for the Proposed Varied Development as no alterations to the protected species use of the main site have occurred since the submission of the Consented Development. Residual effects continue to be assessed as Not Significant
Bats	Operational effects to bat species were scoped out of the Consented Scheme's assessment based on the limited habitat suitability and the 2007 assessment of	N/A	Residual effects of the operation of the Proposed Varied Development following the implementation of appropriate mitigation are assessed as Minor Adverse (Not Significant).	Residual effects to bat species from the operation of the Proposed Varied Development were assessed following the latest SNH Guidance (2019) ¹ . Assessments found predicted likely significant effects for four of the five species of bats using the site. With the implementation of appropriate mitigation the residual effects to these bat species are assessed as Minor Adverse (Not Significant).

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
	their use of the site and surrounding area.			
Aquatic Species	Operational effects following the implementation of suitable mitigation were assessed as Not Significant .	N/A	Operational effects of the Proposed Varied Development are assessed as Negligible (Not Significant)	No material change.
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC	Residual indirect effects on SAC-designated habitat by displaced deer from Strathy South conifer plantation. Minor Adverse (Not Significant) .	Residual Indirect effects on SAC-designated habitat by displaced deer from Strathy South Forest based on the 2019 baseline reported on in Technical Appendix 9.3 Minor Adverse (Not Significant) .	Residual effects are assessed as Negligible (Not Significant) .	No material change.
Decommissioning				
	Decommissioning residual effects were assessed as likely to be similar in nature to those of the Construction Phase.	N/A	Decommissioning residual effects were assessed as likely to be similar in nature to those of the Construction Phase.	No material change. The residual effects between both developments were assessed to remain unchanged. However, it should be noted that habitats and the use of the main site by protected species would alter substantially during the 50-year lifespan of the Proposed Varied Development (more markedly so than for the 25-year Consented Scheme) with restored peatland habitats being substantially more established through implementation of the 50-year HMP (EIAR Volume 4: Technical Appendix 9.5). Whilst no material changes to the effects of the Proposed Varied Development and the Consented Scheme are predicted, the true baseline of either development is

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
				unknown although residual effects would likely be similar to those as for the Construction Phase of each development.
Cumulative Construction				
Habitats	Residual cumulative effects to habitats of the Caithness and Sutherland Peatlands SAC between the proposed Strathy Wood development and the grid connection for the Consented Scheme. Cumulative effects were not considered for the Consented Scheme.	N/A	Residual cumulative effects assessed as Negligible adverse (Not Significant) .	No material change. Reduced predicted effects from the different design of the grid connection and upgrading of the access track (see EIAR Volume 4: Technical Appendix 9.4), coupled with positive habitat restoration measures implemented by surrounding developments is likely to have a minor positive influence on habitats associated with the SAC. However, the management and timelines for construction of the Strathy Wood development are currently unknown, consequently residual cumulative effects remain as previously assessed for the Consented Scheme; Negligible adverse (Not Significant) .
	Cumulative direct and indirect residual effects on non-designated habitats through installation of wind farm infrastructure for those developments included in the cumulative assessment was not assessed for the Consented Scheme.	N/A	Residual cumulative effects assessed as Negligible (Not Significant) .	The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.4) would mitigate predicted effects on non-designated habitats for the Proposed Varied Development or Consented Scheme. Similarly, other developments within the 20 km cumulative assessment buffer, where effects to habitats have been predicted, would be required to implement suitable mitigation to reduce any likely significant effect. Consequently, the significance of the cumulative residual effect is likely to be Negligible (Not Significant) .

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Protected Species	Effects to protected species including wildcat, otter, water vole, and pine marten. Residual cumulative effects are assessed as Minor Adverse (Not Significant) .	N/A	Residual cumulative effects are assessed as Minor Adverse (Not Significant) .	No material change.
Aquatic Species	Effects to fish species were assessed and it was noted that the potential for cumulative effects to these species existed, however no level of effect was attributed for the Consented Scheme.	N/A	Residual cumulative effects are assessed as Not Significant .	Although there exists the potential for cumulative effects from the developments within the Strathy catchment, the likelihood of large-scale pollution events occurring at the same time from a number of developments is low. Consequently, whilst the level of effect cannot be predicted, with appropriate mitigation implemented for all developments the residual effect is assessed as Not Significant .
Bats	Effects to bat species during construction of developments included in the cumulative assessment were not assessed for the Consented Scheme	N/A	Residual effects assessed as Minor Adverse (Not Significant) .	Minor effects to bats within the local area are likely to be attributed to all developments within the cumulative assessment study area during their construction. Similarly, operational wind farms will continue to have an effect on bat species whilst the Proposed Varied Development is in construction. Although suitable mitigation would be implemented for new windfarm development where likely significant effects have been identified, there would still be effects to the local bat population; these cumulative residual effects are assessed as Minor Adverse (Not Significant) .

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC	Effects of cumulative deer dispersal on the surrounding Caithness and Sutherland Peatlands SAC were not considered for the Consented Scheme.	N/A	Residual cumulative effects have been assessed as Not Significant .	Construction and operation of all developments within the cumulative assessment study area will cause dispersal of deer to surrounding habitats. Where deer are present a DMP for each development will have been produced to identify how such effects will be reduced. As such the cumulative effects during the construction phase of the Proposed Varied Development is assessed as Not Significant .
Cumulative Operation				
Habitats	Cumulative effects to habitats during the operational phase of the Consented Scheme were not assessed.	N/A	Residual cumulative effects are assessed as Negligible (Not Significant) .	Residual operational effects to habitats from all developments within the 20 km cumulative assessment boundary are likely to be limited to small scale operation maintenance and localised pollution incidents. The effects of these would be small either alone or in combination with one another were this to occur. As such the residual effect is assessed as Negligible (Not Significant) .
Protected Species	Cumulative residual effects to protected species including wildcat, otter, water vole and pine marten were assessed as Minor Adverse (Not Significant) .	N/A	Cumulative residual effects assessed as Minor Adverse (Not Significant) .	No material change.
Aquatic Species	Effects to fish species were assessed and it was noted that the potential for cumulative effects to	N/A	Residual effects are assessed as Negligible (Not Significant) .	Cumulative operational effects are unlikely to occur between developments within the Strathy catchment. As such residual cumulative effects are assessed as Negligible (Not Significant)

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
	these species existed, however no level of effect was attributed for the Consented Scheme.			
Bats	Effects to bat species during operation of developments included in the cumulative assessment were not considered for the Consented Scheme.	N/A	Residual cumulative effects assessed as Minor Adverse (Not Significant) .	Technical Appendix 9.2 (EIAR Volume 4) details the residual effects of the Proposed Varied Development in combination with surrounding developments taking into account data from these using the Ecobat tool. Mitigation includes both the design of the Phased Felling Plan EIAR Volume 4: Technical Appendix 9.6), the implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.4), and the sensitive design of turbine layout for the Consented Scheme and now Proposed Varied Development, to ensure suitable habitats for bat species are appropriately buffered. Full details of this assessment are included within Technical Appendix 9.2 (EIAR Volume 4). It is assumed that where bats are present in proximity to developments within a cumulative effect range, these developments would implement similar mitigation measures to reduce any effect to based species. Residual effects are therefore assessed as Minor Adverse (Not Significant) .
Deer and Herbivore Impacts to the Caithness and Sutherland Peatlands SAC	Effects of cumulative deer dispersal on the surrounding Caithness and Sutherland Peatlands SAC were not considered for the Consented Scheme.	N/A	Residual effects assessed as Minor Adverse for the first two years of operation, then Negligible (Not Significant) for the remaining lifespan of the	Construction and operation of all developments within the cumulative assessment study area will cause dispersal of deer to surrounding habitats. Where deer are present a DMP for each development will have been produced to identify how such effects will be reduced. Operational cumulative effects to the SAC would be greatest during the first two years of

Table 9.11: Summary Comparison of Residual Effects and their Impacts of the Consented Scheme Compared to the Proposed Varied Development

Ecology (non-avian) Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
			Proposed Varied Development.	operation of the Proposed Varied Development as felling of the conifer plantation is completed and deer continue to disperse from the main site; effects through this period are assessed as Minor Adverse (Not Significant) . Following this initial two-year period effects are predicted to be Negligible (Not Significant) for the remainder of the Proposed Varied Development's lifespan.

9.14 Summary and Conclusions

- 9.14.1 The following Section summarises the assessment completed including: the key baseline conditions; the additional assessments of the site to update the baseline where required; the potential impacts of the Proposed Varied Development; the mitigation measures proposed to reduce the significance of effects; and, the residual effects.
- 9.14.2 The baseline collected to support the Consented Scheme was reviewed for its suitability to support the assessment of the potential effects of the Proposed Varied Development. It was identified that: habitat survey data should be ground-truthed to check its continued accuracy; deer population and herbivore impact assessments should be updated considering the change in landscape utilisation from the construction of the neighbouring Strathy North Wind Farm; and, following a change in SNH Guidance¹ bat surveys should be completed to assess the utilisation of the site by bat species. No further protected species surveys were deemed necessary as activities within the site and wider landscape have not altered sufficiently to change their utilisation of the site. This approach was agreed in consultation with SNH.
- 9.14.3 A review of the existing baseline data available for the Proposed Varied Development (collected for the Consented Scheme), coupled to ground truthing of habitat information confirmed the approach agreed with SNH was robust and provides a valid dataset against which potential effects of the Proposed Varied Development could be assessed.
- 9.14.4 Surveys found habitats recorded for the assessment of the Consented Scheme provided a true reflection of the current baseline for the Proposed Varied Development. Deer populations were found to be consistent with those previously recorded despite the low cull level completed in the years between assessments. The effects on the surrounding SAC habitats were assessed as low as in previous surveys. Utilisation of the site by five bat species generally varied from low to moderate, which did not represent a material change.
- 9.14.5 In light of the updated baseline and the changes to the infrastructure for the Proposed Varied Development the following IEFs were identified:
- Habitats within the main site;
 - Habitats outwith the main site;
 - Protected species;
 - Aquatic species;
 - Qualifying habitats of the Caithness and Sutherland Peatlands SAC.
- 9.14.6 Potential effects identified to IEFs from impacts associated with construction, operation and decommissioning of the Proposed Varied Development were:
- Direct Habitat Loss, Temporary Habitat Loss and Permanent Habitat Change habitats both within and outwith the main site during construction of the Proposed Varied Development and associated access tracks;
 - Effects to protected species through habitat loss, disturbance from Construction and Operational Phases and reduced availability of food resources;
 - Effects to aquatic species through pollution and sedimentation in both Construction and Operational Phases;
 - Effects to bat species from Construction Phase activities and through the Operational Phase of the Proposed Varied Development;

- Effects to qualifying habitats of the surrounding Caithness and Sutherland Peatlands SAC from deer dispersal caused by Construction Phase activities and ongoing phased felling in the first two years of the Operational Phase of the Proposed Varied Development;
- Effects to qualifying habitats of the surrounding Caithness and Sutherland Peatlands SAC from construction and upgrade of the Common Access and Yellow Bog tracks and their associated grid connections, and ongoing maintenance through the 50-year lifespan of the Proposed Varied Development; and
- Cumulative effects of the above in combination with surrounding developments within the 20 km buffer/study area; and a 100 km buffer/study area for cumulative effects on bat species.

9.14.7 Substantial consideration has been given to the above potential effects that could be caused by the construction and operation of the Proposed Varied Development. There has been detailed assessment of those effects that were identified as having the potential to have a significant effect on the relevant receptor in order to identify likely significant predicted effects that could occur without suitable mitigation. These are summarised in Table 9.12 below and discussed in detail in this Chapter and related Technical Appendices.

9.14.8 In accordance with the approach to mitigation taken for the Consented Scheme, careful consideration has been given to the design of mitigation measures that could avoid, reduce or offset any of the predicted effects on important receptors. The discussion on the assessment of predicted and residual effects for different non-avian ecological receptors has demonstrated that the Applicant has not focussed solely on the identified likely significant predicted effects, but has also sought to reduce some of the adverse predicted effects that are not categorised as significant but it is recognised that there are wider ecological benefits that can be delivered through the proposed mitigation strategies. This was recognised by the Reporter appointed to conduct the PLI into the Consented Scheme in 2015, concluded that there would be no significant adverse effects in relation to non-avian ecology and that it was likely that there would be beneficial effects to the peatland habitats on the main site. As demonstrated through the discussion of mitigation in this Chapter and the relevant Technical Appendices, the Applicant has carefully reviewed the mitigation proposed for the Consented Scheme and has sought to enhance the mitigation for sensitive receptors where possible.

9.14.9 The mitigation proposed for the Proposed Varied Development and appropriate mitigation which could be implemented not only to offset the likely significant effects but to provide beneficial gains for biodiversity across the wider landscape, comprises a range of different measures. The mitigation strategy involves two different types of mitigation:

- **In-design mitigation** in which consideration has been given to:
 - The methods of construction, for example the Common Access and Yellow Bog tracks;
 - The routing of tracks within the main site to avoid areas of deep peat;
 - The location of infrastructure in the main site, for example new borrow pits, substation and LiDAR locations;
 - The ability to further micro-site turbine locations away from potentially sensitive habitats, areas of deep peat, and habitats that might be used by protected species such as bats;
 - The design of the Phased Felling Plan which would remove the Strathy South conifer plantation through a carefully managed approach during both the Construction and Operational phases of the Proposed Varied Development. The Phased Felling Plan has also taken into consideration the requirements of bats, deer, and the peatland restoration objectives of the Strathy South Outline Habitat Management Plan.
- **Receptor specific mitigation** which includes:

- The implementation of the Strathy South Outline Habitat Management Plan (as further developed in consultation with relevant stakeholders) for the duration of the 50-year operational lifespan of the Proposed Varied Development to mitigate the predicted effects on habitats both within the main site and to the surrounding Caithness and Sutherland Peatlands SAC;
- Implementation of a Deer Management Plan for the Proposed Varied Development to ensure deer populations within the Strathy South conifer plantation are reduced to a suitable number prior to felling activities commencing, thereby reducing dispersal of deer to the surrounding SAC and the potential effects to qualifying habitats;
- Implementation of a Construction Environment Management Plan (CEMP) which details methods, best practice and monitoring with regards to construction, and the requirements of pollution and sedimentation prevention to protect water bodies, watercourses and the associated aquatic species; and,
- Implementation of species-specific protection plans within the CEMP to safeguard the protected species which could be using the site during the Construction Phase of the Proposed Varied Development, and the employment of an Ecological Clerk of Works (ECoW) to oversee the implementation of these plans.

9.14.10 Table 9.12 below summarises the potential and predicted significant effects of the Proposed Varied Development both prior and post the implementation of appropriate mitigation.

Table 9.12: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Construction				
Direct and Temporary Habitat Loss on non-designated protected habitats within the main site through construction of wind farm infrastructure for the Proposed Varied Development.	Moderate adverse (Significant)	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.6), which provides for the sequential removal of the Strathy South conifer plantation and restore peatland habitats across the area.	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in Technical Appendix 9.6 (EIAR Volume 4). The delivery of the HMP and Phased Felling Plan would be secured as conditions of consent.	The residual effect to habitats is assessed as Negligible / Minor Beneficial (Not Significant) , with Habitat Management Plan works ongoing through the 50-year operational lifespan of the Proposed Varied Development.
Indirect effects on SAC designated habitat by displaced deer from Strathy South Forest.	Effect assessed as Significant	Implementation of a Deer Management Plan (DMP) and phased felling to allow the slow dispersal of deer to habitats surrounding the main site.	Implementation of the Deer Management Plan (DMP) would commence prior to construction and would continue through the lifespan of the Proposed Varied Development. Phased felling would be completed over a five-year period. This method of mitigation has been successfully implemented at the neighbouring Strathy North Wind Farm. The DMP and Phased Felling Plan would be secured as conditions of consent.	The residual effects of deer dispersal to the surrounding SAC and their reduced utilisation of the main site would be Negligible (Not Significant) following the implementation of the DMP.
Protected Species – no significant effects are predicted.	Minor Adverse (Not Significant)	Implementation of Species Protection Plans with the	Pre-construction surveys to be completed prior to construction	The predicted and residual effect to protected species is assessed as

Table 9.12: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Impacts are limited to the loss of suitable foraging and resting habitat that would not cause a likely significant effect.		Construction Environment Management Plan (CEMP)	works commencing on site. Surveys should be completed a maximum of three months prior to construction commencing.	Minor Adverse (Not Significant) during the construction phase of the Proposed Varied Development.
Aquatic Species – the possibility of likely significant effects is limited to the construction period and no significant effects are predicted. Impacts are limited to pollution incidents which might affect the water quality within water courses and water bodies within and surrounding the Proposed Varied Development. The management of such potential effects is well-established and there is a high degree of confidence regarding avoidance of such impacts.	Minor Adverse (Not Significant)	Implementation of appropriate pollution prevention methods and a Water Quality Monitoring Plan (WQMP) within the Construction Environment Management Plan (CEMP)	The WQMP should commence collection of baseline data six months prior to construction commencing. Monthly data collection should take place throughout the construction phase. Suitable pollution prevention should be maintained throughout the duration of the construction phase.	The predicted and residual effect to aquatic species is assessed as Minor Adverse (Not Significant) during the construction phase of the Proposed Varied Development.
Construction related effects on the Proposed Varied Development to bat populations through disturbance to the known roost at the Croft House and to foraging and commuting flight lines.	Moderate adverse (Significant)	Use of light deflectors to limit illumination of habitats used by bats if night-time working is required. The Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.6) and Figure 9.5 (EIAR Volume 3a: Figures) has sought to provide buffers of construction works from forest edges to reduce disturbance to the species during the construction phase of the Proposed Varied Development.	Phased felling will be ongoing throughout the construction period. All other appropriate mitigation measures would be implemented during the Construction Phase of the Proposed Varied Development. The Phased Felling Plan would be secured as a condition of consent.	The residual effect from likely significant effects to bat species is assessed as Minor Adverse (Not Significant) following implementation of the appropriate mitigation.
Operation				

Table 9.12: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Habitats –Impacts are limited to small scale pollution events and maintenance during the operational phase of the Proposed Varied Development which are not considered to give rise to likely significant effects.	Minor Adverse (Not Significant)	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5).	For the 50-year lifespan of the Proposed Varied Development	The residual effects are predicted as Minor Beneficial (Not Significant) .
Protected Species.	Negligible (Not Significant).	No mitigation proposed.	N/A	The residual effects are predicted as Negligible (Not Significant) .
Aquatic Species – no significant effects are predicted. Impacts would be limited to small scale pollution event associated with ongoing operational maintenance.	Minor Adverse (Not Significant)	No mitigation proposed.	N/A	The residual effects are predicted as Minor Adverse (Not Significant) .
Effects to bat species from operation of the Proposed Varied Development from impacts including collision, displacement, disturbance, habitat alteration / loss and barotrauma.	Moderate adverse (Significant).	Sensitive design of the Proposed Varied Development to ensure a suitable buffer zone from turbine blade tips of the rotor swept areas to features which may provide suitable habitat for foraging and commuting bat species as detailed in Technical Appendix 9.2 (EIAR Volume 4). Implementation of the Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.4) to ensure forest felling do not provide suitable flight lines which could bring bat species to areas where	The Phased Felling Plan would be implemented during the first two years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year operational lifespan of the Proposed Varied Development. The DMP and Phased Felling Plan would be secured as a condition of consent.	The residual effect from potential impacts to bat species is assessed as Minor Adverse (Not Significant) following implementation of the appropriate mitigation.

Table 9.12: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
		they would be at risk of collision of barotrauma. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to restore ground surrounding turbines to habitats which would not provide suitable forage for bats during the Operational Phase of the Proposed Varied Development.		
Indirect impact on SAC-designated habitat by displaced deer from Strathy South Forest.	Effect assessed as Significant	Implementation of a DMP would seek to reduce the deer population within the main site whilst slowly reducing the habitat available to deer (conifer plantation areas) through the Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.6) to allowing the slow dispersal of deer to habitats surrounding the main site.	The DMP would continue through the Operational Phase of the Proposed Varied Development Phased. The Phased Felling would be completed over the first two years of the Operational Phase of the Proposed Varied Development. This dual method of mitigation has been successfully implemented at the neighbouring Strathy North Wind Farm.	The residual effect of deer dispersal and their reduced utilisation of the main site is assessed as Minor Adverse (Not Significant) following the implementation of the DMP and Phased Felling Plan.
Decommissioning				
No significant effects identified				
Cumulative Construction				
No significant effects identified				
Cumulative Operation				
No significant effects identified				

9.15 Glossary and Abbreviations

Term (in alphabetical order)	Definition
eDNA testing	Environmental DNA testing: taking the DNA code from an environmental sample and comparing this to known DNA sequences for potential species of interest to identify the parent of the sample.

Abbreviation (in alphabetical order)	Expanded Term
CEMP	Construction Environment Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
DMP	Deer Management Plan
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ES	Environmental Statement
EU	European Union
FIR	Further Information Report
FLS	Forestry and Land Scotland
GWDTE	Ground Water Dependent Terrestrial Ecosystem
HMP	Habitat Management Plan
HBRG	Highland Biological Record Group
IEF	Important Ecological Receptor
LBAP	Local Biodiversity Action Plan
MSS	Marine Science Scotland
NVC	National Vegetation Classification
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
UK	United Kingdom
WQMP	Water Quality Monitoring Plan

10. SOIL AND WATER

10.1 Executive Summary

- 10.1.1 The construction, operational and decommissioning phases of the Proposed Varied Development have been assessed in relation to the potential effects on soils, geology and the water environment (which comprises hydrogeology and hydrology). Effects associated with cumulative developments are also considered.
- 10.1.2 There is much previous investigation and assessment which was undertaken with regard to the Original 2007 Scheme, the Modified 2013 Scheme and the Consented T39 Layout, which has been reviewed and where applicable has informed this assessment. The scope of this assessment has also been informed by scoping responses and current best practice guidance with regard to soils, geology and the water environment.
- 10.1.3 Baseline site conditions have been verified by an additional programme of field work undertaken in 2019 and 2020.
- 10.1.4 The field investigation included additional peat depth probing which has been used to prepare an updated Peat Landslide and Hazard Risk Assessment (PLHRA) and Peat Management Plan (PMP) which are presented as Technical Appendices to this Chapter; Technical Appendices 10.1 and 10.2 respectively. A Private Water Supply Risk Assessment (PWSRA) (Technical Appendix 10.5), Watercourse Crossing Assessment (WCA) (Technical Appendix 10.6), and a Groundwater Dependent Terrestrial Ecosystems (GWDTE) Assessment (Technical Appendix 10.3) have also been prepared for the Proposed Varied Development.
- 10.1.5 As requested by The Highland Council (THC) a site-specific Flood Risk Assessment (FRA) and Drainage Impact Assessment (DIA) have been prepared, which are produced as Technical Appendix 10.4.
- 10.1.6 Review of the baseline conditions has confirmed that adjacent to the site there are highly valued and protected peat habitats associated with Caithness and Sutherlands Peatland SAC and SPA, that are water dependent. Areas of deep peat have also been recorded within the site although these have been degraded by works undertaken to establish the Strathy South conifer plantation. The geology beneath the site has no rarity value.
- 10.1.7 With the exception of the proposed watercourse crossings the Proposed Varied Development lies outside of any floodplain and is not at flood risk. Four private water supplies have been identified within 1 km of the site; however, the three PWS to the north of the site are not hydraulically linked, the PWS to the south would be upstream of any wind farm activity. Therefore, the PWSs are not at risk from the Proposed Varied Development. No designated sites, that are dependent on water have been recorded within the site.
- 10.1.8 The Proposed Varied Development is located entirely within the catchment of the River Strathy, a highly regarded fishery. A review of the underlying geology shows that there is little or no groundwater present beneath the site.
- 10.1.9 The impact assessment has been undertaken by assessing the sensitivity of receptors identified from the baseline study and considering any mitigation measures incorporated as part of the site design. Mitigation measures have been identified, either through the site design or in accordance with good practice guidance.
- 10.1.10 Sustainable Drainage Systems (SuDS) have been proposed to ensure that the rate of surface water runoff from the Proposed Varied Development during and following construction is no greater than that prior to development so as not to increase flood risk. The proposed SuDS measures allow the

quality of water to be managed at source prior to any discharge being made. Further, the proposed habitat management proposals include a programme of ditch blocking which would reduce both the rate and volume of peak water flows, providing a flood risk and water quality benefit when compared to existing conditions.

- 10.1.11 It has been shown that the peat deposits have a low bulk permeability and thus temporary dewatering associated with turbine foundations etc. would only occur when the excavations are being constructed and would not result in significant or long term dewatering of the peat.
- 10.1.12 An assessment of the potential effects of felling the Strathy South conifer plantation has been undertaken which has included considering the proposed felling phases and the potential for the felling to change water quality in the upper reaches of the River Strathy. It has been shown that the proposed felling would be unlikely to impair water quality in the river or result in an increase in flood risk downstream.
- 10.1.13 It has been shown, as a consequence of the site design and embedded mitigation, that the Proposed Varied Development would not result in any significant effects on soils, geology or the water environment.
- 10.1.14 A programme of water quality monitoring is proposed pre-construction, during construction and for a period following construction to confirm the findings of this assessment and includes monitoring of water quality in the River Strathy and key tributaries.
- 10.1.15 It is also proposed that a geotechnical risk register is maintained during the construction phase of the Proposed Varied Development as specified in the PLHRA in order to minimise the risk of peat landslide risk at site.
- 10.1.16 Following the completion of a comparative assessment of the residual effects of the Consented Scheme compared to the Proposed Varied Development, it is confirmed that the significance of effects attributable to the Proposed Varied Development would be no greater than that assessed in the Consented Scheme in relation to soil and water.

10.2 Introduction

10.2.1 This Chapter considers the likely significant effects on soils, geology and the water environment (hydrology and hydrogeology) associated with the construction, operation and decommissioning of the Proposed Varied Development. The specific objectives of the chapter are to:

- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe baseline soils, geological, hydrogeological and hydrological conditions;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects;
- assess the residual effects remaining following the implementation of mitigation; and
- provide a comparison of effects between the Consented Scheme and the Proposed Varied Development.

10.2.2 This chapter is supported by the figures and technical appendices presented in Table 10.1.

Table 10.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 10.1a-c: Local Hydrology	New information generated for the 2020 EIAR.	Updated figures to show Proposed Varied Development in relation to local hydrology.
EIAR Volume 3a: Figure 10.2: Soils Mapping	New information generated for the 2020 EIAR.	New figure to show Proposed Varied Development in relation to soils.
EIAR Volume 3a: Figure 10.3: Peatland Classification	New information generated for the 2020 EIAR.	New figure to show Proposed Varied Development in relation to peatland classification data published by Scottish Natural Heritage (SNH).
EIAR Volume 3a: Figure 10.4: Superficial Geology	New information generated for the 2020 EIAR.	Updated figure to show Proposed Varied Development in relation to superficial geology.
EIAR Volume 3a: Figure 10.5: Solid Geology	New information generated for the 2020 EIAR.	Updated figure to show Proposed Varied Development in relation to solid geology.
EIAR Volume 3a: Figure 10.6: Regional Hydrogeology	New information generated for the 2020 EIAR.	New figure to show Proposed Varied Development in relation to groundwater aquifer characteristics.
EIAR Volume 3a: Figure 10.7: Groundwater Vulnerability	New information generated for the 2020 EIAR.	New figure to show Proposed Varied Development in relation to groundwater vulnerability data published by the British Geological Survey (BGS).
EIAR Volume 4: Technical Appendix 10.1: Peat Landslide and Hazard Risk Assessment	New information generated for the 2020 EIA. Using recent site investigation data, and from the 2007 Environment	To consider peat landslide hazard risk in accordance with current best practice guidance.

Table 10.1: Supporting Figures and Technical Appendices

Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
	Statement (ES), 2013 ES Addendum and 2014 Further Information Report, peat landside hazard is assessed for the Proposed Varied Development.	
EIAR Volume 4: Technical Appendix 10.2: Draft Peat Management Plan	New information generated for the 2020 EIA. Using recent site investigation data, and from the 2007 Environment Statement, 2013 ES Addendum and 2014 Further Information Report assesses peat management for the Proposed Varied Development.	To consider peat management in accordance with current best practice guidance.
EIAR Volume 4: Technical Appendix 10.3: Groundwater Dependent Terrestrial Ecosystems Risk Assessment	New information generated for the 2020 EIA. Assesses the potential for habitat at site to be sustained by groundwater.	To comply with current best practice guidance and address a scoping response from the Scottish Environment Protection Agency (SEPA).
EIAR Volume 4: Technical Appendix 10.4: Flood Risk Assessment and Drainage Impact Assessment	New information generated for the 2020 EIA. Considers flood risk to and principals for the control and management of drainage from the Proposed Varied Development.	To address scoping response from THC.
EIAR Volume 4: Technical Appendix 10.5: Private Water Supply Risk Assessment	New information generated for the 2020 EIA. Considers risks to private water supplies near to the Proposed Varied Development. Adds to information presented in the 2013 ES Addendum and 2014 Further Information Report.	To address scoping responses for the Proposed Varied Development from the ECU and SEPA.
EIAR Volume 4: Technical Appendix 10.6: Watercourse Crossing Assessment	New information generated for the 2020 EIA. Using information from the 2013 ES Addendum and 2014 Further Information Report presents an assessment of watercourse crossings for the Proposed Varied Development.	To address scoping response from SEPA.

Competent Expert Summary

- 10.2.3 This assessment has been carried out by Gordon Robb and David Nisbet of SLR Consulting Ltd.
- 10.2.4 Gordon is a Technical Director (Hydrology and Hydrogeology) and has more than 25 years' experience assessing renewable energy and electrical infrastructure projects and specifically their potential effects on soils, geology and the water environment. He is based in Scotland and has

worked throughout Scotland, including sites in similar settings to the Proposed Varied Development. He has also prepared and given expert witness testimony for wind and electrical infrastructure projects. A table presenting relevant qualifications and experience is included in Technical Appendix 1.2 (EIAR Volume 4).

- 10.2.5 David is an Associate Geologist also based in Scotland who specialises in undertaking Engineering Geological Assessments for renewable and electrical infrastructure sector projects. His experience includes the assessment of on-site engineering constraints, mining related studies, peat landslide hazard and risk (PLHRA), peat management, carbon emissions modelling, borrow pit appraisal and input to design and layout of site infrastructure.

10.3 Summary of Effects of Consented Scheme

- 10.3.1 A detailed assessment of the effects on soils and water was presented in the 2007 ES, the 2013 ES Addendum and 2014 Further Information Report (FIR) that was the environmental impact assessment work produced for the Consented Scheme. Specifically, the previous studies considered the following potential effects on surface water, groundwater and private water supplies:

- pollution;
- erosion and sedimentation;
- impediment and modification of water flows;
- modification of surface water runoff (surface water only); and
- disruption to supply (private water supplies only).

- 10.3.2 With regard to peat and geology, the 2007 ES, the 2013 ES Addendum and 2014 FIR considered the following potential effects:

- pollution;
- modification of water flows;
- peat instability; and
- compaction and erosion.

- 10.3.3 With respect to soils and water no construction, operational or cumulative significant effects were identified in the 2007 ES, the 2013 ES Addendum and 2014 FIR. Effects arising from decommissioning were scoped out of these previous assessments because they were considered to be of a similar nature to construction issues, but of a smaller scale and shorter duration. However, in this Chapter the results of decommissioning (i.e. the removal of the wind farm) have been taken into account in assessing both the ongoing and operational effects.

- 10.3.4 A number of mitigation commitments were made for the Consented Scheme which would safeguard soils (inc. peat), geology, hydrology and hydrogeology, and which included the provision of an outline Construction Environmental Management Plan (CEMP) which would include (but not be limited to) the following measures:

- appropriate storage and handling of potential pollutants;
- storage of fuel and refuelling of construction plant in designated areas;
- restrictions on certain construction activities during periods of prolonged and/or intense wet weather;
- adoption and agreement on emergency measures should significant effects occur;
- appropriate design of watercourse crossings to maintain hydraulic connectivity;
- preparation of a Drainage Management Plan;

- a watercourse crossing assessment (detailed design prior to construction);
- a water quality monitoring programme (prior to and during construction);
- a commitment that watercourse crossings would be designed to accommodate the 1 in 200 year flood; and
- sediment management measures to attenuate and treat runoff from wind farm infrastructure.

10.3.5 In addition, regarding the safeguarding of peat the following commitments were made:

- adoption of appropriate storage and re-use of peat in line with best practice guidelines and site conditions. For example, locations of any temporary peat or soil storage areas would be carefully selected so that erosion and runoff would be limited, leachate from the stored material would be controlled and stability of the existing ground, particularly in peatland areas, would not be affected;
- prior to construction a peat stability plan would be prepared;
- micro-siting would be used to locate access tracks so that they avoid areas of potential peat slide hazard; and
- to maintain and improve hydrological connectivity, where slope stability permits floating road techniques would be used regardless of peat depth and perforated drainage pipes would be inserted beneath the track structure at defined sensitive locations where it would be necessary to maintain and improve hydrological connectivity either side of the track.

10.3.6 As part of this assessment the baseline site conditions reported in the 2007 ES, 2013 ES Addendum and 2014 Further Information Report have been reviewed and updated using recent published data and information requests in order to complete a comparative assessment of effects between the Consented Scheme and the Proposed Varied Development.

10.3.7 Changes to legislation, planning policy and best practice guidance relevant to soil and water have also been reviewed and assessed.

10.3.8 A cumulative assessment has also been prepared to account for potential developments within 5 km up/downstream of the site. The cumulative developments (existing or proposed) within the catchment of the River Strathy within 5 km of the site which have been assessed are:

- Strathy North Wind Farm (operational); and
- Strathy Wood Wind Farm (application).

10.3.9 It is noted that the cumulative sites are the same as assessed in the 2013 ES Addendum and 2014 FIR (no cumulative assessment was undertaken in the 2007 ES for soils and water).

10.3.10 In summary, it is confirmed that following these reviews and update of the baseline conditions considered in the 2007 ES, 2013 ES Addendum and 2014 FIR that there is no substantial change to the baseline conditions or legislation, policy or best practice guidance that would result in any change to the assessment completed for the Consented Scheme.

10.4 Methodology

Scope of the Assessment

Spatial Scope

10.4.1 The soils and water study area includes all of the proposed site infrastructure and a buffer of at least 1 km from the site (see EIAR Volume 3a, Figure 10.1b-c). The study area encompasses bodies of water and their catchments which could potentially be affected by the construction, operation and decommissioning of the Proposed Varied Development.

- 10.4.2 The Proposed Varied Development is drained entirely by the River Strathy surface water catchment, see Figure 10.1a (EIAR Volume 3a).
- 10.4.3 The study area for potential cumulative effects uses the catchments within the study area, with a maximum downstream distance of 5 km from the site.

Temporal Scope

- 10.4.4 The temporal scope requires consideration of the potential for climate change to impact on future baseline conditions. Climate change studies predict a decrease in summer precipitation and an increase in winter precipitation, alongside slightly higher average temperatures. These changes suggest that there could be greater pressures on water supplies and water levels in summer months in the future. In addition, summer storms are predicted to be of greater intensity. Therefore, peak fluvial flows associated with extreme storm events could also increase in volume and velocity.

Technical Scope

- 10.4.5 Any potential effects of the Proposed Varied Development on soil and water identified by the assessment have been addressed and mitigated by the site design and the application of good practice guidance implemented as standard during construction and operation to prevent, reduce or offset effects, where possible. As such a number of measures form an integral part of the design/construction process (embedded mitigation) and these have been taken into account prior to assessing the likely significant effects of the Proposed Varied Development. Where appropriate, more tailored mitigation measures have been identified prior to determining the likely significance of residual effects.

Consultation

- 10.4.6 A summary of the consultation undertaken which is relevant to this Chapter is presented in Table 10.2.

Table 10.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
Energy Consents Unit (ECU) 18 July 2019	Scoping	The Applicant should confirm whether Scottish Water Assets which may be affected by the proposed development.	In its scoping consultation response, Scottish Water confirmed that there are no public or foul water assets owned by Scottish Water in the vicinity of the site (see consultation response below).
		A peat landslide hazard risk assessment should be completed.	A PLHRA has been completed and is included in EIAR Volume 4: Technical Appendix 10.1.
		A peat management plan should be prepared.	A PMP has been completed and is included in EIAR Volume 4: Technical Appendix 10.2.
		A borrow pit assessment should be prepared.	Refer to EIAR Volume 4: Technical Appendix 2.2.
		A carbon calculator should be provided.	Refer to EIAR Volume 4: Technical Appendix 12.1.
		A watercourse crossing assessment should be prepared.	Refer to EIAR Volume 4: Technical Appendix 10.6.

Table 10.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		A flood risk and drainage impact assessment should be completed.	Refer to EIAR Volume 4: Technical Appendix 10.4.
		A private water supply assessment should be prepared.	Refer to baseline assessment and EIAR Volume 4: Technical Appendix 10.5.
The Highland Council (THC) 07 June 2019	Scoping	The location of private water supplies should be confirmed.	The location of private water supplies is presented on Figure 10.1b-c (EIAR Volume 3a), see baseline assessment and private water supply assessment presented as EIAR Volume 4: Technical Appendix 10.5 and Figure 10.5.1.
Scottish Environment Protection Agency (SEPA) 16 May 2019	Scoping	An assessment of potential effects on Groundwater Dependent Terrestrial Ecosystems (GWDTE) should be completed.	A GWDTE Assessment was completed for the 2019 Scoping Layout and SEPA was consulted on the results. An updated GWDTE Assessment has been completed for the Proposed Varied Development (refer to EIAR Volume 4: Technical Appendix 10.3: GWDTE.)
		An updated peat management plan should be prepared.	Completed, see EIAR Volume 4: Technical Appendix 10.2 (PMP).
		Welcome proposals to produce an updated Peat Management Plan.	Post-scoping consultation was undertaken with SEPA based on the Gatecheck Layout regarding peat. Additional peat probing was completed in 2020 at the proposed borrow pit north of T61 and the results are presented in this Chapter. Following the provision of this additional peat probing SEPA agreed that no further peat probing was required (refer to consultation response dated 20/03/20 summarised below).
		A CAR construction site licence will now be required for this development.	Noted. The appropriate licences would be applied for following consent of the Proposed Varied Development.
SEPA 30 May 2019	Scoping	Battery storage should be located in an area away from watercourses and avoiding deep peat and GWDTE. Risk to the environment should be assessed and details of how this will be addressed given.	Battery storage is not currently being considered further for the Proposed Varied Development and does not form part of the Section 36C Application.

Table 10.2: Consultation Summary Table

Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
SEPA 3 December 2020	Other Consultation	In response to a draft GWDTE assessment and pre application meeting with the Applicant, SEPA confirmed: (a) That GWDTE are not considered a specific constraint to layout at this site but would nonetheless expect to see the standard mitigation measures put in place to ensure that existing groundwater flow paths are maintained.	An updated GWDTE Assessment has been completed for the Proposed Varied Development (refer to EIAR Volume 4: Technical Appendix 10.3.)
		(b) Details which SEPA would expect to see included in the site-specific peat management plan.	A site-specific Peat Management Plan is presented in EIAR Volume 4: Technical Appendix 10.2.
SEPA 20 March 2020	Other Consultation	Confirmed that the additional peat probing data at the borrow pit near T61 showed shallow peat and no further peat probing information is required.	Noted. Peat data collected in this Chapter and in the PLHRA and PMP (see EIAR Volume 4: Technical Appendices 10.1 and 10.2).
Northern District Salmon Fishery Board (NDSFB) 15 May 2019	Scoping	The River Strathy falls within the Board's area and wish to see consideration given to the potential impact of development on trout and salmon.	Potential effects on aquatic species are considered in Chapter 9: Ecology (non-avian). Pollution control, peat management and water quality management are covered by the outline Construction Environmental Management Plan (Outline CEMP) (EIAR Volume 4: Technical Appendix 2.1) and discussed in this Chapter.
Royal Society for the Protection of Birds 29 th May 2019	Scoping	Request excavated peat volumes for the Consented Scheme and Proposed Varied Development are presented.	Completed, see Technical EIAR Volume 4: Appendix 10.2 (PMP).
		The volume of extracted peat should be updated in the new EIAR and what the end use of the peat will be should be stated. Clear plans should demonstrate how excavated peat will be stored and managed.	The Peat Management Plan for the Proposed Varied Development is presented in EIAR Volume 4: Technical Appendix 10.2.
		Detailed plans for significant bog and peatland restoration within the site boundary and details of how the impacts of the permanent infrastructure and	Habitat restoration is discussed in Chapter 9: Ecology and a Habitat Management Plan presented in EIAR Volume 4: Technical Appendix: 9.5.

Table 10.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
		drainage will be mitigated should be given.	
Scottish Water 07 May 2019	Scoping	Scottish Water confirmed that: - There are no public or foul water assets owned by Scottish Water in the vicinity of the site; and - there are no Drinking Water Protected Areas associated with drinking water catchments or water abstraction sources in the area that may be affected by the Proposed Varied Development.	Acknowledged.
		For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.	It is confirmed that no discharge of storm or foul water is proposed to Scottish Water infrastructure. See Flood Risk Assessment and Drainage Impact Assessment (EIAR Volume 4: Technical Appendix 10.4).
Marine Scotland 15 th May 2019	Scoping	Confirmed that the Proposed Varied Development is unlikely to alter the previously assessed predicted impacts on water quality and fish populations.	Acknowledged.

Baseline Conditions

Desk Study

10.4.7 The following sources of information, including good practice guidance and legislation have been consulted in order to characterise and assess the soils, geology, hydrogeology and hydrology of the area within and surrounding the site:

- Ordnance Survey (OS) 1:50,000, 1:25,000 and 1:10,000 scale mapping data;
- Flood Estimation Handbook (FEH) web service¹;
- British Geological Survey (BGS) 1:50,000 scale data - superficial deposits, bedrock, linear features, mass movement and artificial ground²;
- BGS Hydrogeological Map of UK, 2019;
- James Hutton Institute The National Soil Map of Scotland (1:250,000)³;

¹ Flood Estimation Handbook web service, available at <https://fehweb.ceh.ac.uk/> [date accessed 06/03/2020]

² British Geological Survey (BGS) 1:50,000 scale data available at <http://mapapps2.bgs.ac.uk/geoindex/home.html> [date accessed 06/03/2020]

³ James Hutton Institute, The National Soil Map of Scotland available at <http://soils.environment.gov.scot/maps/> [date accessed 06/03/2020]

- BGS Hydrogeological Maps of Scotland (groundwater vulnerability and aquifer productivity) 1:100,000 scale;
- The SEPA flood maps⁴;
- SEPA Water Environment Hub for water body classifications⁵;
- Scottish Natural Heritage (SNH) Sitelink Online Information Service⁶;
- Natural England Magic Map⁷;
- Data requests with SEPA regarding details of registered/licensed abstractions and discharges (November 2019); and
- Data requests with THC environmental health department regarding details of historic flooding records and private water abstractions (November 2019).

Field Study

- 10.4.8 The project hydrologists, geologists and ecologists have worked closely on this assessment to ensure that appropriate information is gathered to allow a comprehensive impact assessment to be completed.
- 10.4.9 A detailed site visit and walkover survey was undertaken by SLR Consulting Ltd on 23rd – 27th September 2019 in order to: verify the information collected during the desk and baseline studies completed for the 2007 ES, 2013 ES Addendum and 2014 FIR as well as this assessment; inspect rock exposures and establish by probing, an estimate of overburden thicknesses, peat depth and stability; and confirm underlying substrate, based on the type of refusal of a peat probe and by coring. The site visit was also used to gather an understanding of the site, determine gradients, potential borrow pit locations, access routes, ground conditions, etc., and, to assess the relative location of components of the Proposed Varied Development in relation to soil and water.
- 10.4.10 The data obtained as part of the desk study and collected as part of the field work has been processed and interpreted to complete the impact assessment and recommend mitigation measures, where appropriate.

Cumulative Baseline

- 10.4.11 A potentially significant cumulative effect is considered to be an effect on soil or water arising from the Proposed Varied Development in combination with other cumulative developments.
- 10.4.12 Cumulative developments within the same catchment as the site and within a distance of 5 km of the site have been considered and are:
- Strathy North Wind Farm (operational); and
 - Strathy Wood Wind Farm (application).
- 10.4.13 Cumulative effects are assessed using the same methodology as for effects of the Proposed Varied Development in isolation.

Identification of Potential Effects

- 10.4.14 To identify potential effects associated with the Proposed Varied Development the following key tasks have been completed:
- the 2007 ES, 2013 ES Addendum and 2014 FIR assessments have been reviewed;

⁴ SEPA flood maps available at <https://www.sepa.org.uk/environment/water/flooding/flood-maps/> and <http://map.sepa.org.uk/reservoirsfloodmap/Map.htm> [date accessed 06/03/2020]

⁵ SEPA Environmental Hub available at <https://www.sepa.org.uk/data-visualisation/water-classification-hub> [date accessed 06/03/2020]

⁶ SNH Sitelink available at <https://gateway.snh.gov.uk/sitelink/searchmap.jsp> [date accessed 06/03/2020]

⁷ Natural England Magic Map available at <http://magic.defra.gov.uk/MagicMap.aspx> [date accessed 06/03/2020]

- consultations with relevant statutory and non-statutory bodies has been undertaken to confirm the significant issues relating to soils and water related to the site;
- a detailed desk study has been completed using current data sources and responses to data and information requests;
- the findings of the desk study and consultation responses have been validated by a recent programme of field work;
- the significance of potential effects has been assessed by taking into account the sensitivity of the receiving environment, the potential magnitude of impact and the likelihood of that impact occurring;
- measures to avoid, minimise or mitigate any significant adverse impacts have been identified; and
- an assessment of the significance of residual impacts following mitigation.

10.4.15 The identification of potential effects has also considered current legislation and planning policy relevant to soils and water, best practice guidance and standards, and the professional judgement of the EIA team to identify potential receptors and the potential for these to be beneficially and adversely affected by the Proposed Varied Development.

Assessment of Residual Effects

10.4.16 The significance of potential effects of the Proposed Varied Development has been assessed by considering two factors: the sensitivity of the receiving environment and the potential magnitude of impact, should that effect occur. The assessment methodology has also been informed by the assessor's experience of carrying out such assessments for renewable energy developments, knowledge of soils and water characteristics in Scotland and cognisance of good practice.

10.4.17 This approach provides a mechanism for identifying the areas where mitigation measures are required and for identifying mitigation measures appropriate to the significance of potential effects presented by the Proposed Varied Development.

10.4.18 Criteria for determining the significance of effect are provided in Table 10.3, Table 10.4 and Table 10.5.

Criteria for Assessing Sensitivity of Receptors

10.4.19 The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment) is defined as its ability to absorb an effect without a detectable change and can be considered through a combination of professional judgement and a set of pre-defined criteria which are set out in Table 10.3. Receptors in the receiving environment only need to meet one of the defined criteria to be categorised at the associated level of sensitivity.

Table 10.3: Criteria for Assessing Sensitivity of Receptor	
Sensitivity	Definition
High	• SEPA Water Framework Directive Water Body Classification: High or Good or is close to the boundary of a classification: Moderate to Good or Good to High; • receptor is of high ecological importance or National or International value (e.g. Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), habitat for protected species) which may be dependent upon the hydrology of the development area; • receptor is at high risk from flooding above 0.5% Annual Exceedance Probability (AEP) and/or water body acts as an active floodplain or flood defence; • receptor is used for public and/or private water supply (including Drinking Water Protected Areas);

Table 10.3: Criteria for Assessing Sensitivity of Receptor	
Sensitivity	Definition
	- groundwater vulnerability is classified as high; - if a GWDTE is present and identified as being of high sensitivity; and - soil type and associated land use is highly sensitive (e.g. unmodified blanket bog peatland).
Medium	- SEPA Water Framework Directive Water Body Classification: Moderate or is close to the boundary of a classification: Low to Moderate; - receptor is at moderate risk from flooding (0.1% AEP to 0.5% AEP) but does not act as an active floodplain or flood defence; - moderate classification of groundwater aquifer vulnerability; and - soil type and associated land use moderately sensitive (e.g. arable, commercial forestry).
Low	- SEPA Water Framework Directive Water Body Classification: Poor or Bad; - receptor is at low risk from flooding (less than 0.1% AEP); - receptor not used for water supplies (public or private); and - soil type and associated land use not sensitive to change in hydrological regime and associated land use (e.g. intensive grazing of sheep and cattle).
Not sensitive	receptor would not be affected by the Proposed Varied Development e.g. lies within a different and unconnected hydrological / hydrogeological catchment.

Criteria for Assessing Magnitude of Change

10.4.20 The potential magnitude of impact would depend upon whether the potential effect would cause a fundamental, material or detectable change. In addition, the timing, scale, size and duration of the potential effect resulting from the Proposed Varied Development are also determining factors. The criteria that have been used to assess the magnitude of impact are defined in Table 10.4.

Table 10.4: Criteria for Assessing Magnitude of Impact		
Magnitude	Criteria	Definition
Substantial	Result in loss of attribute	Fundamental (long term or permanent) changes to the baseline geology, hydrology, hydrogeological and water quality such as: - permanent degradation and total loss of the soils habitat; - loss of important geological structure/features; - wholesale changes to watercourse channel, route, hydrology or hydrodynamics; - changes to the site resulting in an increase in runoff with flood potential and also significant changes to erosion and sedimentation patterns; - major changes to the water chemistry; and - major changes to groundwater levels, flow regime and risk of groundwater flooding.
Moderate	Results in impact on integrity of attribute or loss of part of attribute	Material but non-fundamental and short to medium term changes to baseline geology, hydrology, hydrogeology and water quality, such as: - loss of extensive areas of soils habitat, damage to important geological structures/features; - some fundamental changes to watercourses, hydrology or hydrodynamics;

Table 10.4: Criteria for Assessing Magnitude of Impact		
Magnitude	Criteria	Definition
		• changes to site resulting in an increase in runoff within system capacity; • moderate changes to erosion and sedimentation patterns; • moderate changes to the water chemistry of surface runoff and groundwater; and • moderate changes to groundwater levels, flow regime and risk of groundwater flooding.
Slight	Results in minor impact on attribute	Detectable but non-material and transitory changes to the baseline geology, hydrology, hydrogeology and water quality, such as: • minor or slight loss of soils or slight damage to geological structures / feature; • minor or slight changes to the watercourse, hydrology or hydrodynamics; • changes to site resulting in slight increase in runoff well within the drainage system capacity; • minor changes to erosion and sedimentation patterns; • minor changes to the water chemistry of surface runoff and groundwater; and • minor changes to groundwater levels, flow regime and risk of groundwater flooding.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use/integrity	No perceptible changes to the baseline soils, geology, hydrology, hydrogeology and water quality such as: • no impact or alteration to existing important geological environs; • no alteration or very minor changes with no impact to watercourses, hydrology, hydrodynamics, erosion and sedimentation patterns; • no pollution or change in water chemistry to either groundwater or surface water; and • no alteration to groundwater recharge or flow mechanisms.

Criteria for Assessing Significance

- 10.4.21 The sensitivity of a receptor together with the magnitude of the impact determines the significance of the effect, which can be categorised into level of significance as identified in Table 10.5. This also takes into account good practice measures implemented and embedded as part of the design of the Proposed Varied Development and use of professional judgement where appropriate.
- 10.4.22 Table 10.5 provides a guide to assist in decision making. However, it should not be considered as a substitute for professional judgment and interpretation. In some cases, the potential sensitivity of the receiving environment or the magnitude of potential impact cannot be quantified with certainty and, therefore, professional judgement remains the most robust method for identifying the predicted significance of a potential effect.

Table 10.5: Significance Matrix					
Sensitivity	Magnitude of Change				
	Substantial	Moderate	Slight	Negligible	None
High	Major	Major/moderate	Moderate	Moderate/ minor	None
Medium	Major/moderate	Moderate	Moderate/ minor	Minor	None
Low	Moderate	Moderate/ minor	Minor	Minor/ none	None

- 10.4.23 The assessment provides a statement of significance associated with the Proposed Varied Development. Effects of 'major' and 'major/moderate' significance are considered to be 'significant' in terms of the EIA Regulations.

Assumptions and Limitations

- 10.4.24 The assessment uses site investigation and survey data and publicly available data sources, including but not limited to SEPA, Met Office, THC and commercial data supply companies, as well as additional information supplied from stakeholders during the scoping and consultation stages.
- 10.4.25 The data and information collected is robust and sufficient to enable the assessment to be completed without any limitations to the assessment.

10.5 Baseline Conditions

Current Baseline

- 10.5.1 This section presents information gathered regarding the existing soils, geology, hydrogeological and hydrological conditions at the site and within the study area.

Site Setting

- 10.5.2 The Proposed Varied Development is located within the Strathy South Forest, approximately 12 km south of Strathy village and south of SSE's operational Strathy North Wind Farm. It is centred at National Grid Reference (NGR) NC 79608 51788. An extract of Ordnance Survey (OS) mapping for the site is presented in Figure 10.1 (EIA Volume 3a: Figures).
- 10.5.3 Strathy South conifer plantation is a commercial non-native plantation which occupies most of the forest between Loch nam Breac Mor and the River Strathy. The land immediately adjacent to the site principally comprises open peatlands and moorland.
- 10.5.4 Ground elevations range between 130 m Above Ordnance Datum (AOD) and 200 m AOD with the lowest elevations located towards the centre of the site.
- 10.5.5 The standard average annual rainfall (SAAR) for the River Strathy catchment (the largest surface water catchment that drains the site) recorded by the Flood Estimation Handbook (FEH) Web Service¹ confirms a wet climate and an average annual rainfall of 1,123 mm.

Statutory Designated Sites

- 10.5.6 Review of the SNH Sitelink⁶ and Magic Map⁷ webpages confirms that there are no statutory designated sites within the site. The locations of nearby statutory designated sites are shown on Figure 10.1b-c (EIA Volume 3a: Figures) and are summarised below:
- There are three internationally designated sites, the boundaries of which are overlaid and surround the site on all sides. These are the Caithness and Sutherland Peatlands Special Area of Conservation (SAC), the Caithness and Sutherland Special Protection Area (SPA) and the

RAMSAR site the boundaries of which are the same as the SPA. The total area of these international sites extends to 145,313 ha. The qualifying features include a number of upland and freshwater habitats including; wet heathland, very wet mires, blanket bog, depression on peat substrates, acid peat-stained lakes and pond and clear-water lakes or lochs, as well as Marsh saxifrage (*Saxifraga hirculus*), Otters (*Lutra lutra*), a number of European protected species and a number of breeding birds (refer to EIAR Volume 2: Chapter 9: Ecology (non-avian) and Chapter 5: Ornithology respectively);

- Strathly Bogs Site of Special Scientific Interest (SSSI), a 1,255 ha site, is located adjacent to the site and is designated for its blanket bog habitats;
- West Halladale SSSI, a 8,562 ha site, is located immediately east of the Proposed Varied Development. The qualifying features include blanket bog habitats and breeding bird assemblages;
- Skelpick Peatlands SSSI, a 2,037 ha site, is located immediately west of the site. The qualifying features include blanket bog habitats and breeding bird assemblages; and
- Lochan Buidhe Mires SSSI, a 4,123 ha site, is located immediately north-northwest of the site. The qualifying features include blanket bog habitats and breeding bird assemblages.

10.5.7 It is evident that the habitats adjacent to the site are highly regarded and protected at national and international level. Furthermore, the blanket bog and peat habitats are water dependent. The designated sites are therefore considered high sensitivity receptors.

Geology

SOILS AND SUPERFICIAL DEPOSITS

- 10.5.8 An extract of the 1:250,000 National Soil Survey of Scotland (James Hutton Institute, 2019) mapping is presented as Figure 10.2 (EIAR Volume 3a: Figures) and shows the principal soil types underlying the site are peaty gleys (on higher ground and beneath most of the turbine locations) and peat.
- 10.5.9 An extract of SNH's Peatland Classification mapping is shown as Figure 10.3 (EIAR Volume 3a: Figures), which illustrates that most of the site is underlain by peatland Class 5. Areas of Class 1 peatland are recorded in the southwest of the site (T35, T39, T41 and T42), west of the site (T49 and T50).
- 10.5.10 The presence of the commercial forestry has substantially degraded the peat as it has been disturbed by artificial drainage and track construction to establish the forest.
- 10.5.11 An extract of the 1:50,000 BGS superficial deposits data is presented as Figure 10.4 (EIAR Volume 3a: Figures). Review of this and of the BGS Onshore Geoindex 1:50,000 data² shows that most of the site is underlain by Peat deposits which lie directly on bedrock. Areas of hummocky glacial deposits comprising diamicton, sand and gravels are located in the north of the site and small localised areas of Alluvium and River Terrace deposits are located within the valley of the River Strathly and around Loch nan Clach (in the northwest of the main site).
- 10.5.12 As part of the baseline assessment, a comprehensive peat probing and characterisation exercise has been conducted and informs the site-specific PLHRA (see EIAR Volume 4: Technical Appendix 10.1) and PMP (EIAR Volume 4: Technical Appendix 10.2). In summary the PLHRA shows:
- the presence and depth of peat was assessed at more than 2,100 locations;
 - the peat was found to vary across the site in terms of thickness, surface slopes and apparent characteristics;
 - much of the peat was confirmed to have been disturbed by the commercial forestry operations;

- peat thickness varies from zero (0) to 5.0 m;
- the geomorphology of the peat areas varies between large, flat expanses of thick peat with high moisture content and smaller areas of thinner drier deposits on higher ground or where steeper slopes are witnessed; and
- there is a negligible to low risk of peat instability over most of the site although some areas of medium and high risk have been identified. For these areas, a hazard impact assessment was completed which concluded that, subject to micro-siting of the Proposed Varied Development in these areas, and the use of industry standard best practice measures, peat slide risk could be mitigated.

BEDROCK GEOLOGY AND LINEAR FEATURES

- 10.5.13 An extract of the 1:50,000 BGS bedrock and linear features data is presented as Figure 10.5 (EIAR Volume 3a: Figures). Bedrock beneath the site comprises metasediments of the Moine Supergroup. These include the Loch Coire Formation and Kirtomy Gneisses as well as several minor outcrops of the Scottish Highland Ordovician Granitic Intrusion Suite.
- 10.5.14 The Loch Coire Formation is composed of migmatitic psammite and semipelites and is located within the western extent of the site. The Kirtomy Gneisses is located within the eastern extent of the site and comprises semipelites and gneissose.
- 10.5.15 The two deposits are divided by the Swordly Thrust fault. The fault is generally orientated northwest to southeast and displaces the younger Kirtomy Gneisses over the older Loch Coire Formation. Other faults exist across the area with a north-south orientated fault recorded within the western extent of the site.

Hydrogeology

AQUIFER CHARACTERISTICS AND GROUNDWATER VULNERABILITY

- 10.5.16 An extract of BGS hydrogeological mapping of Scotland is shown as Figure 10.6 (EIAR Volume 3a: Figures) and illustrates that the bedrock deposits beneath the site are considered impermeable rocks which are generally without groundwater except at shallow depths.
- 10.5.17 A description and hydrogeological classification of the geological units at the site is presented in Table 10.6. This is based on BGS aquifer productivity and groundwater vulnerability maps (BGS, 2019) presented as Figures 10.6 and 10.7 (EIAR Volume 3a: Figures).

Table 10.6: Hydrogeological Classifications			
Geological Period	Geological Unit	Hydrogeological Characteristics	Hydrogeological Classification and Groundwater Vulnerability
Pleistocene to Recent	Peat	Where not degraded or eroded, characteristically wet underfoot and dominated by <i>Sphagnum</i> . Typically, peat consists of two layers; the upper very thin (up to 30 cm) acrotelm layer contains upright stems of <i>Sphagnum</i> mosses and allows relatively free water movement and the lower catotelm layer comprising the thicker bulk of peat where individual plant stems have collapsed. Water movement in the catotelm layer is very slow and normally the water	Not classified.

Table 10.6: Hydrogeological Classifications			
Geological Period	Geological Unit	Hydrogeological Characteristics	Hydrogeological Classification and Groundwater Vulnerability
		table in a peat never drops below the acrotelm layer.	
	Alluvium	The deposits are predominantly silt and clays with some pebbles and rocks. Groundwater storage and movement typically limited by small regional extent of this unit. Groundwater typically in hydraulic continuity with adjacent surface water and perched above the regional groundwater table.	Intergranular flow. High productivity. Considered to be vulnerable to pollution due to potential rapid groundwater movement and shallow depth to groundwater.
	Glacial Till	Regionally, groundwater flow will be limited by the variability of these deposits and consequently any groundwater yields are normally low. Clay within this unit acts as an aquitard to the more permeable gravelly lenses and will hinder/prevent large scale groundwater movement.	Intergranular flow. Low productivity. Not considered to be vulnerable to pollution.
Precambrian	Loch Coire Formation and Kirkatomy Gneisses	Generally classified as low productivity aquifers with limited groundwater flow. Weathering of the upper surface of the rock may enhance intergranular permeability but in general groundwater flow and storage is limited due to highly metamorphosed nature of the psammite.	Where not overlain by superficial deposits vulnerable to pollution due to potential rapid groundwater movement and shallow depth to groundwater.

10.5.18 BGS groundwater vulnerability data (EIAR Volume 3a: Figure 10.7) classifies the underlying aquifer (superficial and bedrock) according to the predominant groundwater flow mechanism (fracture or intergranular) and the estimated groundwater productivity. Groundwater vulnerability is divided into five classes (1 to 5) with 1 being least vulnerable and 5 being most vulnerable. The vulnerability map shows that the groundwater underlying the site is Class 4a and 4b where there are overlying superficial deposits and Class 5 where superficial deposits are absent.

GROUNDWATER LEVELS AND QUALITY

10.5.19 Factors that inhibit groundwater recharge at site include the following:

- steeper topographic gradients present in parts of the site would encourage the formation of surface water runoff; and
- the underlying bedrock (where it is not weathered or fractured) generally displays a low permeability that would limit groundwater recharge.

10.5.20 SEPA has confirmed they do not maintain any groundwater monitoring locations at or near to the site. In the absence of published information or data held by SEPA, it is inferred that groundwater will be present as perched groundwater within the peat and more permeable horizons (sand and gravels) of the Alluvium, and within weathered zones, fractures within the bedrock deposits. The direction of groundwater flow is likely to be similar to local topographical gradients.

- 10.5.21 All of Scotland's groundwater bodies have been designated as Drinking Water Protected Areas under the Water Environment (Drinking Water Protected Area) (Scotland) Order 2013 and require protection for their current use or future potential as drinking water resources.
- 10.5.22 The current status of groundwater bodies in Scotland has been classified by SEPA⁵ in accordance with the requirements of the Water Framework Directive (WFD). SEPA identify one groundwater body underlying the site, the Northern Highlands (SEPA ID 150701) groundwater body, which was classified by SEPA in 2018 with an Overall Status of Good and no pressures are identified.

GROUNDWATER DEPENDENT TERRESTRIAL ECOSYSTEMS

- 10.5.23 Habitat surveys were undertaken in 2019 by the Applicant's ecologists to update the baseline for the Proposed Varied Development. It was confirmed that the habitats recorded for the Consented Scheme's assessment continued to provide a true reflection of the current baseline for the Proposed Varied Development (refer to EIAR Volume 2: Chapter 9: Ecology (non-avian)).
- 10.5.24 A GWDTE assessment was prepared in accordance with current best practice guidance⁸ for the scoping layout of the Proposed Varied Development and this was forwarded to SEPA on 21 November 2019 for discussion. SEPA provided comments following review of the assessment on 15 January 2020.
- 10.5.25 Following review of the GWDTE assessment SEPA confirmed (15th January 2020), "*We are in agreement that the main construction area has been subject to habitat changes caused by forestry, tracks and other activities therefore any GWDTEs within this area are unlikely to be of specific value or groundwater dependent. There are some GWDTE outside the forested areas but we are content that they are unlikely to be in hydraulic connection and/or are downslope to the proposed infrastructure. We therefore do not consider that GWDTE are a specific constraint to layout at this site but would nonetheless expect to see the standard mitigation measures put in place to ensure that existing groundwater flow paths are maintained*".
- 10.5.26 A GWDTE Assessment of the design freeze layout for the Proposed Varied Development has subsequently been completed and is shown in EIAR Volume 4: Technical Appendix 10.3. It is confirmed therein that the Proposed Varied Development does not encroach on to any areas of GWDTE of specific value or which are groundwater dependent.
- 10.5.27 It is also concluded that areas of potential GWDTE at the site are not sustained by groundwater and therefore the 100 m and 250 m buffer specified in SEPA guidance need not be applied. Measures to maintain existing groundwater and surface water flow paths and quality are given later in this Chapter.

Hydrology

LOCAL HYDROLOGY

- 10.5.28 The site is located in the headwaters of the River Strathy which flows northwards before discharging into Strathy Bay. The catchment is drained by a number of tributaries of the River Strathy which rise within the site prior to joining the river (see EIAR Volume 3a: Figure 10.1a-c). These include the following watercourses:
- the Allt Badain rises east of the main site and flows generally northwest before discharging into the River Strathy;
 - the Yellowbog Burn rises within the southwestern corner of the site and flows generally northward before discharging into the Allt nan Clach immediately north of the site; and

⁸ Land Use Planning System – SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 3 Published 11th September 2017.

- the Allt nan Clach outflows from Loch nan Clach, which is located in the northwestern corner of the main site and flows northeastward before discharging into River Strathly approximately 1.2 km northeast of the main site.

RAINFALL AND SURFACE WATER FLOW

- 10.5.29 SEPA provided precipitation data for the Strathly Bridge Gauging Station and the closest stream gauge on the River Strathly at Strathly Bridge. In 2018, a total precipitation of 749 mm was recorded at Strathly Bridge, whilst the mean daily discharge was also reported as 1.89 m³/s.
- 10.5.30 The watercourses at site will exhibit a flashy response to rainfall; the low permeability soils and geology will result in a rapid response (rise) in flows in the watercourses during storm events and low flows during prolonged dry spells.

SURFACE WATER QUALITY

- 10.5.31 Water quality of the Allt nan Clach and River Strathly is monitored by SEPA and classified annually in accordance with the requirements of the Water Framework Directive (WFD). Table 10.7 provides summary details of the SEPA classifications reported in 2018⁵. It should be noted that smaller watercourses within the Proposed Varied Development are not monitored nor classified by SEPA.

Table 10.7: Surface Water Catchment Descriptors				
Watercourse (SEPA ID)	Overall Status	Overall Ecology	Physico-Chemical Status	Hydromorphology
River Strathly – u/s of Strathly Forest (20612)	Good	Good	High	High
Allt nan Clach (20611)	Good	Good	High	Good
River Strathly – the Uair to sea (20610)	Good	Pass	High	Good

- 10.5.32 No pressures are identified by SEPA for any of the monitored waterbodies or watercourses.
- 10.5.33 Technical Appendix A14.3 of the 2013 ES Addendum reported the results of a water quality monitoring programme completed at Strathly South. Monitoring data was collected over a period of a year and included a range of flow conditions (low to high flows). The monitoring record shows that pH values were typically recorded below 7 pH units and naturally high dissolved and total aluminium and zinc concentrations were recorded in the watercourses at site. The concentrations of major nutrient were very low or undetectable. Whilst this data was collected a number of years ago it is considered helpful when characterising baseline surface water quality as there has been no substantial land use change in the intervening period which might alter surface water quality.

Fisheries

- 10.5.34 Fisheries locally are managed by the Flow Country Rivers Trust (FCRT) in partnership with Northern District Salmon Fisheries Board (NDSFB). Many of the watercourses and lochs on-site including the River Strathly and Loch nan Clach are highly regarded salmon fisheries. Effects on aquatic species are addressed in EIA Volume 2: Chapter 9 Ecology (non-avian).

Flood Risk

- 10.5.35 A site-specific Flood Risk Assessment (FRA) and Drainage Impact Assessment (DIA) has been completed for the Proposed Varied Development and is presented as EIA Volume 4: Technical Appendix 10.4. Consultation with THC and SEPA has been conducted and used to inform this

assessment. THC report no flooding events within 5 km of the site and SEPA confirmed it holds no additional information over and above that presented within its online Flood Maps service.

- 10.5.36 Table 10.8 presents a summary of the potential sources of flooding at site and confirms that minor river (fluvial) and surface water (pluvial) flood extents are recorded but these are not contiguous and thus with appropriate site design do not pose a development constraint. Further details are given in Technical Appendix 10.4: Flood Risk Assessment and Drainage Impact Assessment (EIAR Volume 4).

Table 10.8: Potential Sources of Flood Risk		
Potential Source	Potential Flood Risk to Application Site	Discussion
Coastal Flooding	No	The SEPA coastal flood maps confirm that the site is distant from coastal flooding extents. The lowest elevations within the site are approximately 130 m AOD.
River (Fluvial) Flooding	Yes (minor)	SEPA mapping has identified that the main floodplain extents within the River Strathly catchment are local, never extending far from the main watercourses or waterbodies.
Surface Water (Pluvial) Flooding	Yes (minor)	SEPA has modelled small isolated surface water flood extents within the site, which largely coincide with the forestry tracks, the main watercourse channels (Allt nan Clach, Allt Badain, Yellowbog Burn and River Strathly) and waterbodies (Loch nan Clach). It is noted however, that the flood extents are minor and localised, never forming large linked areas or flow paths.
Groundwater Flooding	No	Review of the SEPA groundwater flood map confirms that the site is not at risk from predicted groundwater flooding. This concurs with the desk-based assessment which has shown that there is little potential for significant groundwater at the site.
Flooding from Infrastructure Failure	No	SEPA has produced reservoir inundation maps for those sites currently regulated under the Reservoirs Act 1975. Review of the SEPA Inundation Mapping highlights that there is no risk of reservoir inundation at site.
Historical Flooding	No	Consultation with THC and SEPA highlighted that there have been no historical flooding events within the site nor within 1 km of the site.

Private Water Supplies and Licenced Sites

- 10.5.37 Consultation with THC and Scottish Water confirmed that no public or private water supplies (PWS) exist on-site. Scottish Water has also confirmed that the site is not located in a surface water Drinking Water Protected Area associated with drinking water catchments or water abstraction sources in the area.
- 10.5.38 Four PWS were identified within 1 km of the site (see EIAR Volume 3a: Figure 10.1a-c) and a Private Water Supply Risk Assessment has been prepared to assess the risk the Proposed Varied Development poses to these PWS sources. This is presented as Technical Appendix 10.5 (EIAR Volume 4) and shows that three (PWS02, 03 and 04) of the sources are not in hydraulic continuity with the site and not at risk.
- 10.5.39 The abstraction and the property at Dallangwell Farmhouse (PWS01) is located downstream of the Proposed Varied Development. It is however owned by the Applicant and it has been confirmed the abstraction is no longer used.

10.5.40 SEPA provided details of CAR registrations/licences within 1 km of the of the site; these are shown on Figure 10.1 and summarised as follows:

- 6 discharges of sewage (private) primary (5 of which are to groundwater and 1 are to watercourses); and
- 10 discharges for engineering activities (bridging culvert, bridge and removal of river/loch crossing) to watercourse.

10.5.41 SEPA holds one record of registered or licenced groundwater abstraction associated with Strathy North Wind Farm. This is shown on EIAR Volume 3a: Figure 10.1c and is located more than 1 km from the site. This abstraction is associated with a groundwater abstraction for Strathy North Wind Farm.

Future Baseline

10.5.42 Irrespective of the Proposed Varied Development there are activities within the same surface water catchment as the site that, without appropriate control, could alter the baseline conditions characterised in this Chapter, for example:

- commercial forestry operations across the site and adjoining areas are likely to continue resulting in clear felling and potential restocking; and
- development, operation and decommissioning of Strathy Wood wind farm (in the event that this development is granted consent).

10.5.43 However, with appropriate controls, and use of best practice guidance, the impacts from these potential developments are unlikely to result in significant change to the baseline conditions described above.

Identified Sensitive Receptors

10.5.44 A summary of the receptors identified as being sensitive to the Proposed Varied Development and which have been 'scoped-in' to the assessment are as follows:

- peat soils and areas of deep peat that have been recorded within and adjacent to the site;
- groundwater which has been classified by SEPA with an overall status of Good and has been shown to support private water supplies; and
- surface water which has been classified by SEPA with an overall status of Good and has been shown to support private water supplies and highly regarded fisheries.

10.5.45 In the initial stages of the assessment work there were a number of potential effects that were identified but after further study it was concluded that they could be "scoped out" of the next stage of detailed environmental impact assessment on the basis of sufficient information upon which to conclude that they were not likely significant effects. The following potential effects fall into this category:

- potential effects on geology during construction, operation and decommissioning as there are no protected geological features within the site. Furthermore, the Proposed Varied Development would not alter the geology of the site;
- peat slide risk as it has been shown (see EIAR Volume 4: Technical Appendix: 10.1) that the Proposed Varied Development is not at risk from peat slide nor would it result in an increase in peat landslide hazard to on-site or off-site receptors;
- increased flood risk caused by blockages to flow in watercourses during construction, operation and decommissioning of the Proposed Varied Development as proposed watercourse crossings would be regulated by the Water Environment (Controlled Activities) (Scotland) Regulations

2011 (CAR) and be designed to convey a design flow of at least the 200-yr event plus an allowance for climate change (see EIAR Volume 4: Technical Appendix 10.4 FRA and DIA and Technical Appendix 10.6 Water Crossing Assessment);

- flood risk on-site as the Proposed Varied Development includes a 70 m buffer to watercourses which ensures no critical infrastructure is located near watercourses (with the exception of watercourse crossings which would be appropriately sized to accommodate the 1 in 200 plus climate change flows) (see EIAR Volume 4: Technical Appendix 10.4 FRA and DIA);
- changes to public/private water supply yield as a consequence of changes to runoff rates and volumes as no significant alterations to runoff rates/infiltration or drawdown of the water table are anticipated;
- during the construction of the Proposed Varied Development, water would be required for uses such as concrete production, dust suppression and vehicle washing. The location of the abstractions and permissible volume of water abstraction would be regulated through the CAR licensing regime; and
- GWDTE near to the Proposed Varied Development are not considered to be a sensitive receptor as it has been shown and agreed with SEPA that areas of potential GWDTE within the site are not sustained by groundwater.

10.5.46 In addition, potential effects associated with forest felling on surface water quality and runoff have also been 'scoped out' of assessment as all forest felling would be undertaken in accordance with good practice guidelines published by Scottish Forestry (formerly Forestry Commission Scotland)⁹.

10.5.47 Details of forestry felling for the construction of the Proposed Varied Development are given in Technical Appendix 9.6: Strathy South Forestry Management Plan (EIAR Volume 4). The Forestry Commission¹⁰ state that research shows that the effects on harvesting on surface water acidity are difficult to discern when 20% or less of a catchment is felled within any three year period.

10.5.48 Table 10.9 assesses the potential area of proposed felling required for the construction of the Proposed Varied Development. It is shown that the proportion of proposed felling in any three year period would be less than 20% of the upper River Strathy water catchment (downstream to its confluence of with Allt nan Clach at NGR NC82600 56378) and thus it would be expected that acidification of the watercourses as a result of felling would not occur.

Table 10.9: Felling Areas		
3-year Period of Felling	Total Area Felled (km²)	Percentage (%) of River Strathy Catchment to Confluence with Allt nan Clach (59.9km²)
0 (Site Investigation) – 2	7.51	12.5
1 – 3	8.74	14.6
2 - 4	6.51	10.9
3 - 5	3.74	6.2

10.5.49 Furthermore, a comprehensive programme of surface water monitoring was conducted at Strathy North Wind Farm between September 2011 and November 2017. The monitoring period included establishing a baseline monitoring record, monitoring water quality in the River Strathy and its tributaries during and following construction e.g. during and following a programme of forest felling.

⁹ Forestry and surface water acidification. Forestry Commission, 2014.

10.5.50 Review of the hydrochemical monitoring report prepared by PlantEcol in 2017¹⁰, which assessed the complete water quality monitoring record, confirmed that relatively few detectable impacts could be directly attributed to the development of Strathy North Wind Farm and that there were no negative impacts recorded on the ecology of the watercourses monitored.

10.6 Potential Significant Effects

10.6.1 The assessment of potential significant effects takes cognisance of changes to the groundworks of the Consented Scheme and those variations to the description of development proposed as part of the Proposed Varied Development, namely:

- an increase in the area required for each turbine foundation and hardstanding;
- the Substation (referred to in all previous environmental impact assessment work for the Consented Scheme as the 'Switching Station') has been relocated and now sits to the west of T4 (previously located to the south of the track leading to T9);
- one of the laydown areas has been relocated to the east of the track between T11 and T17 (previously this was situated east of T8), the other laydown area to the north of T43 remains unchanged from the Consented Scheme;
- the Batching Plant has been relocated and now sits adjacent to the laydown area to the east of the track between T11 and T17 (previously it was situated next to the consented laydown area at T43);
- three additional borrow pits have been identified in the northwest of the site in the vicinity of T61;
- track has been removed between T13 and T19 and also between T24 and T26 to avoid the track passing over areas of deep peat where possible and subject to other constraints; and
- minor upgrade to the Yellow Bog Road to facilitate initial construction activity (not turbine delivery) by improving the existing surface with compacted stone and installation of two cable circuits adjacent to the road.

Potential Construction Effects

10.6.2 During the construction phase of the project the Proposed Varied Development has the potential to result in the following significant effects:

- **Pollution.** A pollution event could result in a short term moderate adverse impact on surface water and groundwater which are both considered high sensitivity receptors.
- **Erosion and Sedimentation.** Site traffic has the potential to cause erosion and increase sedimentation loading during earthworks. This could result in a short term moderate adverse impact on surface water and groundwater, valuable peat soils and deep peat, which are all considered high sensitivity receptors.
- **Drainage and Dewatering.** Temporary drainage would be required to ensure construction areas are workable and not saturated. This could result in a short term moderate adverse impact on surface water and groundwater and areas of deep peat, which are all considered high sensitivity receptors.

Potential Operational Effects

10.6.3 During the operational phase of the Proposed Varied Development, it is anticipated that routine maintenance of infrastructure would be required across the site and that the site would be

¹⁰ Strathy North Wind Farm – Review of Impacts on the Hydrochemistry of Watercourses Draining the Wind Farm Development. PlantEcol, November 2017.

managed in accordance with requirements of CAR and relevant GPPs. This could include work such as maintaining access tracks and drainage and carrying out wind turbine maintenance. The scale of potential works would be much less than the construction phase but include effects resulting from localised and temporary pollution, erosion and sedimentation, and drainage and dewatering which would result in a slight adverse on impact on surface water, groundwater, peat soils and deep peat which are considered high sensitivity receptors. However, none of these operational effects are predicted to be significant based on professional judgement.

Potential Decommissioning Effects

10.6.4 Potential significant decommissioning effects would be the same as potential construction effects, namely a temporary moderate adverse impact that effects on surface water, groundwater, peat soils and deep peat, as a consequence of the following:

- the generation of pollution;
- erosion and sedimentation; and
- drainage and dewatering.

Potential Cumulative Construction Effects

10.6.5 Potential significant cumulative construction effects associated with the Proposed Varied Development are the same as the potential construction effects noted above, and include: moderate adverse impacts on surface water, groundwater, peat soils and deep peat, resulting from pollution, erosion and sedimentation, drainage and dewatering.

Potential Cumulative Operational Effects

10.6.6 The scale of potential works associated with maintenance and operation of the Proposed Varied Development would be much less than the construction phase and potential cumulative operational effects would be less but include slight adverse impacts on surface water, groundwater, peat soils and deep peat resulting from localised and temporary pollution, erosion and sedimentation, and drainage and dewatering. The cumulative developments would be required to operate under the CAR and GPPs. Therefore, none of these are effects are predicted to be significant based on professional judgement.

10.7 Mitigation

- 10.7.1 The Consented Scheme included a number of mitigation-by-design measures (i.e. embedded mitigation in the design and construction process as described in paragraph 10.4.5 above), which would be adopted for the Proposed Varied Development where still applicable. In addition, the Technical Appendices to this Chapter and the site specific Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) include mitigation by design measures which would be adopted for the Proposed Varied Development. Summary details are given in this section.
- 10.7.2 A site construction licence as required by CAR would be obtained from SEPA prior to any construction works being undertaken. The licence would detail the pollution prevention measures to be used on site, the results of further site investigation and detailed site design that would be undertaken prior to construction. The construction site licence would be regulated by SEPA.
- 10.7.3 Measures would be adhered to during the construction of the Proposed Varied Development and form part of the Outline CEMP (see EIAR Volume 4: Technical Appendix 2.1). The final CEMP would be agreed with key consultees, including THC, SEPA, SNH and NDSFB, prior to construction. The CEMP also commits to a site Ecological / Environmental Clerk of Works (ECoW) who has the authority to advise and assist the Contractor to avoid, minimise and mitigate adverse effects.

10.7.4 In addition to these mitigation measures, mitigation by design measures and commitments made for the Consented Scheme and which remain applicable, include:

Soil and Peat

- site investigation has been used to ensure the Proposed Varied Development has avoided where possible areas of deep peat and provision of a micro-siting allowance so that areas of deepest peat could be avoided during construction;
- floating tracks would be used where peat depths are >0.5 m and deemed possible;
- areas with a potential peat landslide hazard risk have been avoided or can be managed by adherence to best practice guidance (EIAR Volume 4: Technical Appendix 10.1);
- a materials balance has been prepared for the Proposed Varied Development and it has been shown that all disturbed soils and peat could be readily reused on site (EIAR Volume 4: Technical Appendix 10.2); and
- a commitment has been made that any temporary stockpiling of soils would be battered to limit slope instability.

Water Management

- with the exception of watercourse crossings (the number of which have been minimised) proposed infrastructure is located 70 m from natural watercourses;
- watercourse crossings would be regulated by CAR and have a conveyance capacity of at least the 200-yr storm plus an allowance for climate change (EIAR Volume 4: Technical Appendix 10.4 and EIAR Volume 4: Technical Appendix 10.6);
- watercourse crossing would not form a barrier to fish migration (EIAR Volume 4: Technical Appendix 10.4);
- existing forest drains would be blocked using either peat dams or plastic piling to help raise the water table to pre-forestry levels and encourage the growth of blanket bog flora;
- felled tree trunks would be stripped of their branches and laid in the forestry furrow to assist in drain blocking and promoting water retention;
- check dams, silt traps, settlement ponds and buffer strips would be used to attenuate and treat runoff generated on site prior to discharge;
- no direct discharge of water would be made to any watercourse (EIAR Volume 4: Technical Appendix 10.4);
- a programme of pre-construction, construction and post construction water quality monitoring would be undertaken, the scope of which would be agreed with THC and SEPA;
- the volume of water required to be dewatered from proposed turbine bases, turbines and excavations etc. would be low by virtue of the low permeability of the peat and the bedrock, and provision has been made to discharge any dewatering water downhill of the abstraction point to vegetation and away from any watercourse;
- surface water ditches would only be installed where required and their lengths would be minimised (EIAR Volume 4: Technical Appendix 10.4);
- a detailed drainage management plan would be prepared and form part of the final CEMP as part of the detailed site design;
- drainage from the concrete batching plant, site compound and laydown area would be collected and treated separately;
- prior to excavation, turbine locations and borrow pits would be subject to site investigation to confirm ground conditions, stability and potential for groundwater ingress and the investigations would inform the final design;

- silt fences and mats would be used to minimise sediment laden runoff from any areas of temporary soil or rock stockpiles;
- the floor of the borrow pits would be designed to gravity fall to an open water sump for treatment before discharge to vegetation, not direct to a watercourse;
- concrete batching plant would be contained within a bunded area at least 200 m from the nearest watercourse;
- wash out from the concrete batching plant would be carried out in a contained area and lined lagoons would be used to prevent infiltration of alkaline water to the peat;
- to prevent cable trenches forming preferential water flow paths they would be backfilled with excavated materials and where necessary low permeability bunds used to minimise water movement;
- restrictions on certain construction activities during periods of prolonged and/or intense wet weather; and
- provision of perforated drainage pipes beneath the track structure at defined sensitive locations where it is necessary to maintain and improve hydrological connectivity either side of the track.

Pollution Prevention

- all equipment, materials and chemicals would be stored well away from watercourses and chemicals, fuel and oil stores would be sited on an impervious base within a secured bund;
- standing machinery would have drip trays placed underneath to prevent oil and fuel leaks causing pollution;
- where practicable refuelling of vehicles and machinery would be carried out in designated areas on an impermeable surface well away from any watercourse;
- only emergency maintenance of machinery would be undertaken on site on an impermeable surface well away from any watercourse;
- welfare facilities would be adequately designed and maintained to ensure that all sewage is disposed of appropriately and as agreed with SEPA in accordance with CAR;
- the use of wet concrete in and around watercourses would be minimised and carefully controlled;
- contingency plans would be maintained and reviewed to ensure that emergency equipment would be available on site (i.e. spill kits, absorbent materials, and advice is available on action to be taken and who should be informed) in the event of a pollution incident; and
- all relevant staff would be trained in both normal operation and emergency procedures and be made aware of highly sensitive areas on the site, the training and reporting of environmental incidents which would be overseen by an Environmental Manager.

Construction Management

- construction traffic access would be restricted wherever possible and land surrounding the immediate construction areas would be fenced off or otherwise demarcated;
- a traffic management plan (inc. speed limit) would be used to minimise the potential for accidents and spillages; and
- watercourses, culverts and drainage ditches would be inspected and cleared regularly to ensure that remain fully operational and effective.

10.7.5 The Applicant is committed to implementing good practice measures and these are not considered to be mitigation measures but form an integral part of the design, construction, operation and decommissioning of the Proposed Varied Development.

Mitigation during Construction

Generation of Pollution

- 10.7.6 Pollution could occur from excavated and stockpiled materials during site preparation and excavation of borrow pits. Contamination of surface water runoff from machinery, leakage and spills of chemicals from vehicle use and the construction of hardstanding also have the potential to generate pollution. Potential pollutants include sediment, oil, fuels and cement.
- 10.7.7 The risk of a pollution incident occurring would be managed using industry standard good practice measures many of which are concerned with undertaking construction activities away from watercourses and sensitive peat habitats and identifying safe areas for stockpiling or storage of potential pollutants that could otherwise lead to the pollution.
- 10.7.8 Mitigation measures that would minimise the generation of pollution are presented in the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) and in the paragraphs above in this Section.

Erosion and Sedimentation

- 10.7.9 Excavation of borrow pits, turbine bases and pads, construction of hardstanding, diversion of existing drainage channels and construction of watercourse crossings associated with the Proposed Varied Development are the key sources of erosion and sediment generation. Adherence to good practice measures would ensure that any material generated is not transported into nearby watercourses or onto areas of peat.
- 10.7.10 Location specific good practice measures are proposed in the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) and in the paragraphs above in this section and would be used to minimise the potential for erosion and sedimentation.

Drainage and Dewatering

- 10.7.11 Excavations associated with constructions works (e.g. cut tracks, turbine bases foundations, cable trenches, borrow pits) can result in local lowering of the water table. This is important in areas of peat deposits, where the water table is characteristically near the ground surface (e.g. where the excavations are likely to intercept the groundwater table).
- 10.7.12 Dewatering associated with construction of wind turbine foundations is temporary and dewatering following construction would not be required. Cable laying, without appropriate mitigation measures, can also lower high groundwater levels and provide a preferential drainage route for groundwater movement that can lead to local and permanent drying of soils/superficial deposits and / or water supplies.
- 10.7.13 The design of the Proposed Varied Development has avoided areas of water dependent habitat, including GWDTE. Furthermore, the bedrock has little groundwater and, therefore, limited or little dewatering would be required. There remains potential, however, for local dewatering of soils near cable trenches, turbine bases and borrow pits, without incorporation of mitigation measures.
- 10.7.14 Again, location specific good practice measures are proposed in the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1), the Commitments Register (Chapter 13: Schedule of Mitigation) and in the paragraphs above in this Section, and they would be used to minimise the potential for drainage and dewatering effects.

Mitigation during Operation

- 10.7.15 The Applicant would prepare an Operations Environmental Management Plan (EMP) (as required by SSE 14001 accredited Environmental Management System (EMS) as standard practice. No specific mitigation is required (in addition to that which would be provided under the EMP, CAR

and the application of the relevant GPPs note above) as there would be no significant effects as a result of operation of the Proposed Varied Development.

Mitigation during Decommissioning

- 10.7.16 Potential decommissioning effects would be the same as potential construction effects. Mitigation specified for the construction phase of the project is applicable for the decommissioning phase.

10.8 Assessment of Residual Effects

Residual Construction Effects

Generation of Pollution

- 10.8.1 The magnitude of a pollution event on peat soils, peat, groundwater and surface water is considered Negligible adverse following adherence to the good practice measures detailed in this Chapter and implementation of the CEMP (EIAR Volume 4: Technical Appendix 2.1). The predicted effect of Negligible adverse magnitude event on these receptors of High sensitivity would be of **Moderate / Minor** significance (not significant). No mitigation measures, in addition to those outlined above, are therefore required.

Erosion and Sedimentation

- 10.8.2 After consideration of good practice measures, the magnitude of impact associated with erosion and sedimentation is assessed as Negligible and, therefore, with reference to High sensitivity receptors including surface water and groundwater, valuable peat soils and deep peat the significance of effect without mitigation is assessed as **Moderate / Minor** (not significant) and no further mitigation measures are required.
- 10.8.3 As there are no predicted significant effects in terms of the 2017 EIA Regulations, other than erosion and sedimentation good practice measures (Technical Appendix 10.6), no specific mitigation, during construction, is required. No significant residual effects on surface water or groundwater receptors are predicted during the construction period of the Proposed Varied Development.

Residual Operational Effects

Erosion and Sedimentation

- 10.8.4 The likelihood, magnitude and duration of a potential erosion and sedimentation event occurring within the surface water catchments would be Negligible following adherence to good practice measures. Therefore, the predicted significance of effect on the identified receptors is **Moderate / Minor**. No mitigation is, therefore, required.

Infrastructure and Man-made Drainage

- 10.8.5 Operation of the Proposed Varied Development requires very limited activities relative to the construction phase.
- 10.8.6 The magnitude of a predicted effect on groundwater and sub-surface flows as a result of permanent hardstanding and associated drainage would be Negligible on the overall groundwater body due to the dispersed nature of the proposed hardstanding. The significance of effect is **Moderate / Minor**. No further mitigation is required.
- 10.8.7 There are no significant effects predicted during the operational period of the Proposed Varied Development and therefore no mitigation, in addition to that outlined above in Section 10.7, is proposed.

Residual Decommissioning Effects

- 10.8.8 Predicted residual decommissioning effects would be the same as potential residual construction effects. Mitigation specified for the construction phase of the Proposed Varied Development would be also applicable for the decommissioning phase.
- 10.8.9 The magnitude of a pollution event, erosion or sedimentation, drainage and dewatering on peat soils, peat, groundwater and surface water is considered Negligible adverse following adherence to the good practice measures detailed in this Chapter and implementation of the measures summarised in the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1)¹¹. The predicted effect of Negligible adverse magnitude event on these receptors of High sensitivity would be of **Moderate / Minor** significance (not significant). No further mitigation measures are therefore required.

Residual Cumulative Construction Effects

- 10.8.10 The magnitude of cumulative pollution events, erosion or sedimentation, drainage and dewatering on peat soils, peat, groundwater and surface water is considered Negligible adverse following adherence to the good practice measures detailed in this Chapter and implementation of the measures summarised in the Outline CEMP (EIAR Volume 4: Technical Appendix 2.1). The predicted effect of Negligible adverse magnitude event on these receptors of High sensitivity would be of **Moderate / Minor** significance (not significant). Therefore, no further mitigation measures, in addition to those outlined above, are required.

Residual Cumulative Operational Effects

- 10.8.11 No mitigation is required as there would be no significant cumulative operational effects as a result of operation of the Proposed Varied Development.

10.9 Monitoring

- 10.9.1 This Chapter has demonstrated that the effects of the Proposed Varied Development would not have a significant effect on soils and water. The lack of significant effects relates primarily to the proposed 'Good Practice Measures' and the site design, which effectively act as 'embedded' mitigation.
- 10.9.2 It has been proposed in the site-specific Outline CEMP (EIAR Volume 4: Technical Appendix 2.1) that a programme of water monitoring is undertaken prior to any construction activity and during construction of the Proposed Varied Development.
- 10.9.3 It is expected that the monitoring programme would be agreed with SEPA, THC, SNH and NDSFB post-consent and would include monitoring watercourses within and downstream of the site. It is expected the scope of the monitoring programme would be secured by an appropriately worded condition of consent.
- 10.9.4 As detailed in the PLHRA (EIAR Volume 4: Chapter 4 Technical Appendix 10.1) it is proposed a geotechnical risk register is maintained during the construction and post-construction phases of the site development. It is expected that this would be maintained by the Developer, and again, secured by an appropriately worded condition of consent.
- 10.9.5 During and following construction the drainage measures deployed at site (temporary and permanent) would be subject to routine inspection by the dedicated site ECoW as specified in the

¹¹ Decommissioning would be undertaken in line with best practice measures and guidance which would be relevant at the time of decommissioning (in >50 years' time). It is assumed for the purposes of this assessment decommissioning mitigation measures would be along similar lines to those used for the construction phase of the Proposed Varied Development.

site specific CEMP (EIA Volume 4: Technical Appendix 2.1) and which would be secured by an appropriately worded condition of consent.

10.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

- 10.10.1 There is no change in the predicted significant effects of the Consented Scheme and the Proposed Varied Development; neither are predicted to have a significant effect on soil or water, see Table 10.10.

Table 10.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Soil and Water Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Construction				
Detrimental impacts on water quality onsite and downstream.	Minor Adverse (not significant)	N/A	Minor Adverse to No Significance	No material change
Detrimental impacts to fisheries onsite and downstream as a result of changes to water quality.	Minor Adverse (not significant)	N/A	Minor Adverse to No Significance	No material change
Increase to on-site and downstream flood risk as a result of poor construction practises (including poor construction of watercourse crossings).	Minor Adverse (not significant)	N/A	Minor Adverse to No Significance	No material change
Increase risk of peat slide risk as a result of poor construction and management of peat stockpiles.	Minor Adverse (not significant)	N/A	Minor Adverse to No Significance	No material change
Increase risk of peat slide as a result of desiccation or wetting of peat.	Minor Adverse (not significant)	N/A	Minor Adverse to No Significance	No material change
Long-term degradation of peat as a result of interrupting surface and sub-surface drainage pathways. Disruption of drainage patterns can cause pooling and / or desiccation of peat.	Minor Adverse (not significant)	N/A	Minor Adverse to No Significance	No material change
Peat slide hazard rating of access tracks.	Not significant	N/A	Not significant	No material change

Table 10.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Soil and Water Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Operation				
Peat slide hazard rating of access tracks.	Not significant	N/A	Not significant	No material change
Detrimental impacts to onsite and downstream water quality through degradation of site infrastructure and poor storage of materials.	Minor Adverse (not significant)	N/A	Minor Adverse (not significant)	No material change
Detrimental effects to onsite and downstream fisheries as a result of changes to water quality.	Minor Adverse (not significant)	N/A	Minor Adverse (not significant)	No material change
Increases to on-site and downstream flood risk as a result of degradation of infrastructure and / or poor maintenance / monitoring of infrastructure.	Minor Adverse (not significant)	N/A	Minor Adverse (not significant)	No material change
Decommissioning				
Detrimental impacts on water quality onsite and downstream.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant)	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Detrimental impacts to fisheries onsite and downstream as a result of changes to water quality.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant)	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.

Table 10.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Soil and Water Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Increase to on-site and downstream flood risk as a result of poor construction practises (including poor construction of watercourse crossings).	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant)	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Increase risk of peat slide risk as a result of poor construction and management of peat stockpiles.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant)	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Increase risk of peat slide as a result of desiccation or wetting of peat.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant)	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Long-term degradation of peat as a result of interrupting surface and sub-surface drainage pathways. Disruption of drainage patterns can cause pooling and / or desiccation of peat.	Previously not assessed as this was scoped out.	N/A	Minor Adverse (not significant)	Decommissioning effects were not previously assessed. However, the Proposed Varied Development would not result in significant effects.
Cumulative Construction				
Generation of pollution	Not significant	N/A	Not significant	No material change
Erosion and sedimentation	Not significant	N/A	Not significant	No material change
Drainage and dewatering	Not significant	N/A	Not significant	No material change
Cumulative Operational				

Table 10.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Soil and Water Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Generation of pollution	Not significant	N/A	Not significant	No material change
Erosion and sedimentation	Not significant	N/A	Not significant	No material change
Drainage and dewatering	Not significant	N/A	Not significant	No material change

10.11 Summary and Conclusions

- 10.11.1 This Chapter presents a detailed review of the site soils and existing (baseline) hydrology and hydrogeology. The review has updated the baseline assessment presented in the 2007 ES, 2013 ES Addendum and in the 2014 FIR. Characterisation of existing baseline conditions has included updating data and information held by THC and SEPA and as well as the findings from previous site specific assessment, consultation with stakeholders, and detailed and site specific field investigations.
- 10.11.2 The site drains to the River Strathy, which is an important fishery. It has been shown that there are no private water supplies that would be affected by the Proposed Varied Development and that the geology at site does not support important groundwater resources. No GWDTE are recorded close to the Proposed Varied Development.
- 10.11.3 There are areas of deep peat within the site and internationally important peat resources beyond the site. A comprehensive programme of peat depth probing has been completed to delineate areas of deep peat and the site design has avoided these where possible. A site specific PLHRA and PMP has been prepared to assess and show how peat landslide risk is mitigated and how peat resources on site can be managed and safeguarded.
- 10.11.4 The assessment has shown, subject to the adoption of best practice construction techniques, that the Proposed Varied Development would not result in a significant effect on soils (including peat), geology, or water (hydrology or hydrogeology).
- 10.11.5 It has been shown that the Proposed Varied Development, with regard to soils and water, presents no material change to the existing Consented Scheme and no new or additional significant effects to the approved development have been identified.
- 10.11.6 Monitoring of water quality in the River Strathy and its key tributaries during the construction phase of the project has been proposed in order to confirm the Proposed Varied Development does not have any impact on water resources. It is also proposed a geotechnical risk register is maintained during construction.
- 10.11.7 Table 10.11 presents a summary of the potential significant effects of the Proposed Varied Development.

Table 10.11: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development				
Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Construction				
Generation of Pollution	Not significant	Good practice measures of preventing pollution as outlined in the CEMP (EIAR Volume 4: Technical Appendix 2.1).	Final CEMP to be submitted for the written approval of THC, SNH, SEPA and NDSFB prior to construction commencing (see EIAR Volume 4: Technical Appendix 2.1).	Not significant
Erosion and Sedimentation	Not significant	Good practice measures of preventing increased erosion and sedimentation as outlined in the CEMP (EIAR Volume 4: Technical Appendix 2.1).	CEMP to be submitted for the written approval of THC, SNH and SEPA prior to construction commencing (see EIAR Volume 4: Technical Appendix 2.1).	Not significant

Table 10.11: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
		Technical Appendix 2.1.	Implementation of the Peat Management Plan (EIAR Volume 4: Technical Appendix 10.2). ECoW to oversee the appropriate storage and handling of peat, drainage and silt protection measures.	
Drainage and Dewatering	Not significant	Appropriate drainage design that incorporates measures to attenuate and treat runoff from access tracks, hard standing areas, construction compound and turbine areas. The outline CEMP includes measures (EIAR Volume 4: Technical Appendix 2.1).	CEMP to be submitted for the written approval of THC, SNH, SEPA and NDSFB prior to construction commencing (see EIAR Volume 4: Technical Appendix 2.1).	Not significant
Operation				
Generation of Pollution	Not significant	Appropriate storage and handling of potential pollutants in accordance with measures to be set out in the Operations Environmental Management Plan (EMP) as required by SSE 14001 accredited Environmental Management System (EMS).	Immediate post construction monitoring as detailed within the approved CEMP, thereafter all measures would be addressed through the operational phase EMP.	Not significant
Erosion and Sedimentation	Not significant	Appropriate drainage design that incorporates sediment management measures, including sediment traps, to attenuate and treat runoff from wind farm. Adoption of a long-term operational drainage and monitoring programme.	Addressed through the operational phase EMP.	Not significant

Table 10.11: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Drainage and Dewatering	Not significant	Adoption of a long-term operational drainage and monitoring programme to monitor degradation of infrastructure including the removal of blockages from watercourse crossings. Adoption of an operational drainage and monitoring plan (to be designed prior to construction).	Addressed through the operational phase EMP.	Not significant
Decommissioning				
Generation of Pollution	Not significant	Same as construction effects outlined above.	Same as construction outlined above.	Not significant
Erosion and Sedimentation	Not significant	Same as construction effects outlined above.	Same as construction outlined above.	Not significant
Drainage and Dewatering	Not significant	Same as construction effects outlined above.	Same as construction outlined above.	Not significant
Cumulative Construction				
Generation of Pollution	Not significant	Same as construction effects outlined above.	Same as construction outlined above.	Not significant
Erosion and Sedimentation	Not significant	Same as construction effects outlined above.	Same as construction outlined above.	Not significant
Drainage and Dewatering	Not significant	Same as construction effects outlined above.	Same as construction outlined above.	Not significant
Cumulative Operation				
Generation of Pollution	Not significant	Same as operation effects outlined above.	Same as construction outlined above.	Not significant
Erosion and Sedimentation	Not significant	Same as operation effects outlined above.	Same as construction outlined above.	Not significant
Drainage and Dewatering	Not significant	Same as operation effects outlined above.	Same as construction outlined above.	Not significant

10.12 Glossary and Abbreviations

Abbreviation (in alphabetical order)	Expanded Term
AoD	Above Ordnance Datum
CAR	The licensing control regime operated by SEPA under the Water Environment (Controlled Activities)(Scotland) Regulations 2011 (as amended)."
CEMP	Construction and Environmental Management Plan
DIA	Drainage Impact Assessment
GWDTE	Groundwater Dependent Terrestrial Ecosystems
ECoW	Ecological / Environmental Clerk of Works
FCRT	Flow Country Rivers Trust
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
NDSFB	Northern District Salmon Fishery Board
NGR	National Grid Reference
PLHRA	Peat Landslide Hazard Risk Assessment
PMP	Peat Management Plan
PWS	Private Water Supply
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SSSI	Site of Special Scientific Interest
THC	The Highland Council
WCA	Watercourse Crossing Assessment (WCA)
WFD	Water Framework Directive

11. SOCIO-ECONOMICS, RECREATION AND TOURISM

11.1 Executive Summary

- 11.1.1 Caithness and Sutherland is one of the more fragile economic geographies in Scotland. The decommissioning of Dounreay Nuclear Power Plant and the projected decline in population over coming decades highlight the need for new economic opportunities in the area.
- 11.1.2 Caithness and Sutherland has a relatively older population than Highland, which in turn has an older population than Scotland. Over the next two decades, the population of Highland is expected to grow but over the same time period a decrease in population is expected in Caithness and Sutherland. Economic activity is higher than the Scottish average and wages are comparable, but the working age populations in Caithness and Sutherland, as well as Highland, are relatively lower than the Scottish average.
- 11.1.3 The Proposed Varied Development would support employment and Gross Value Added (GVA) in all study areas considered. Based on an installed capacity of 218.4 MW¹, it was estimated that during the development and construction phase the Proposed Varied Development could generate up to:
- £2.4 million GVA and 38 job years of employment in Caithness and Sutherland;
 - £29.4 million GVA and 427 job years of employment in Highland (including Caithness and Sutherland); and
 - £89.9 million GVA and 1,350 job years of employment in Scotland (including Highland).
- 11.1.4 It was estimated that each year during the operation and maintenance phase the Proposed Varied Development could generate:
- £1.2 million GVA and 16 jobs in Caithness and Sutherland;
 - £3.9 million GVA and 53 jobs in Highland (including Caithness and Sutherland); and
 - £7.0 million GVA and 101 jobs in Scotland (including Highland).
- 11.1.5 It is expected that there would be community benefit funding of £546,000 annually associated with the Proposed Varied Development, which would build on the existing Strathy North Joint Community Fund.
- 11.1.6 During the construction and operation of the Proposed Varied Development there would likely be negligible effects on the recreation and tourism economy of Caithness and Sutherland.
- 11.1.7 During the decommissioning phase of the Proposed Varied Development there would be negligible effects on the Highland and Scottish economies.
- 11.1.8 Throughout its operation, the Proposed Varied Development would also contribute to local public finances and in this way support the provision of public services locally. It was estimated that the Proposed Varied Development could contribute £2.5 million each year in non-domestic rates.

¹ This is based on 39 turbines multiplied by 5.6 MW this gives an installed capacity of 218.4 MW which has been used as the basis for the socio-economic assessment.

11.2 Introduction

11.2.1 This chapter considers the likely significant effects on socio-economics, recreation and tourism associated with the construction, operation and decommissioning of the Proposed Varied Development. The specific objectives of the chapter are to:

- describe the socio-economic, recreation and tourism baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address any likely significant effects;
- assess the residual effects remaining following the implementation of mitigation; and
- provide a comparison of the socio-economic effects between the Consented Scheme and the Proposed Varied Development.

11.2.2 This chapter is supported by the figures and technical appendices presented in Table 11.1.

Table 11.1: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 11.1: Socio-economic Study Areas	New figure showing study areas.	The figure maps the study areas described at paragraph 11.5.8.
EIAR Volume 4: Technical Appendix 11.1 Socio-economic Impact of Consented Scheme	New information provided in the form of a quantitative economic assessment of Consented Scheme in line with methodology and baseline applied to the Proposed Varied Development.	The methodology applied in the 2007 Environmental Statement (ES), the 2013 ES Addendum or the 2014 Further Information Report (FIR) did not generate a like for like comparison for this assessment. An updated assessment of the Consented Scheme is presented in Technical Appendix 11.1 (EIAR Volume 4).

Competent Expert Summary

11.2.3 The assessment has been led by Graeme Blackett, Director of BiGGAR Economics. Graeme is an applied economist with more than 25 years of experience in economic consulting. Graeme has led all of BiGGAR Economics' work in the renewable energy sector, including assessing the economic and tourism impacts of more than 60 renewable energy proposals. He has also undertaken sector level studies in both the renewable energy and tourism sectors and has given evidence at several wind farm hearings and inquiries.

11.3 Summary of Effects of Consented Scheme

11.3.1 There were no significant long term socio-economic, tourism or recreation effects identified in the 2007 ES, the 2013 ES Addendum or the 2014 FIR.

11.3.2 Since the submission of the reports referred to above, the assessment methodology has changed to reflect developments in best practice and therefore the economic impacts presented in this chapter cannot be compared to the previous assessments on a like for like basis. An updated assessment of the Consented Scheme has been undertaken to enable a like for like comparison. The updated assessment focuses only on those areas where some difference might be expected

between the Consented Scheme and the Proposed Varied Development and where the assessment methodology has changed, that is, the quantitative analysis of the local and national economic impacts during the development and construction phase and during the operation and maintenance phase.

- 11.3.3 The assessment of the Consented Scheme did not include a tourism and recreation assessment. However, the tourism and recreation assessment contained in this chapter has been reviewed to determine whether the differences between the Consented Scheme and the Proposed Varied Development would change any of the conclusions of the assessment had an assessment of the Consented Scheme been undertaken. It has been concluded that there would be no material difference between the tourism and recreation assessments.
- 11.3.4 The results of the updated assessment for the Consented Scheme are presented in Technical Appendix 11.1 (EIAR Volume 4), which concludes that there would be no significant economic effects as a result of the Consented Scheme.

11.4 Methodology

Scope of the Assessment

- 11.4.1 The assessment in this chapter covers two key topics and accordingly the study area for each aspect has been defined based on the nature of the potential effects arising from the Proposed Varied Development.
- 11.4.2 The study areas for the socio-economic impact analysis are presented on Figure 11.1 (EIAR Volume 3a: Figures) and include:
- Caithness and Sutherland, comprising the electoral wards of East Sutherland and Edderton; North, West and Central Sutherland; Thurso and Northwest Caithness; and Wick and East Caithness;
 - Highland, comprising the local authority area; and
 - Scotland.
- 11.4.3 The study area for the recreational and tourism assessment is more local, focusing on a 15 km radius of the site and the effect has been assessed on the Caithness and Sutherland tourism economy. This is because the research (referenced in this assessment) shows that there is no evidence of effects on the tourism economy arising from wind farm development in the Scottish Highlands or elsewhere in Scotland. Nevertheless, the assessment considers whether there is any potential for local, significant effects.

Consultation

- 11.4.4 A summary of the consultation responses of relevance to the socio-economic assessment are presented in Table 11.2.

Table 11.2: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
ScotWays 05/06/2019	Scoping	Asked that access, including hill tracks and core path, be considered	Recreational trails including hill tracks and core paths are considered in Section 11.6.
Energy Consents Unit 18/07/19	Scoping	Asked that socio-economics, recreation and tourism be considered	Potential effects on socio-economics, recreation and tourism are considered in Section 11.6.

Baseline Conditions

Desk Study

- 11.4.5 A desk study was carried out to collate the baseline socio-economic conditions that would be relevant to this assessment. The desk study included the baseline across three areas:
- socio-economic and energy strategies;
 - socio-economic indicators; and
 - the tourism economy.
- 11.4.6 The sources used are given in more detail in the relevant sections of this chapter, however they include statistics published by the Office for National Statistics, the Scottish Government and VisitScotland.

Cumulative Baseline

- 11.4.7 The Applicant also developed and built the neighbouring Strathy North Wind Farm, which became operational in 2015. In 2020, BiGGAR Economics assessed the economic impact associated with Strathy North Wind Farm².
- 11.4.8 In addition to the Strathy North Wind Farm, the following sites are also considered as part of the cumulative assessment: Bailie Wind Farm, Bettyhill Wind Farm, Limekiln Wind Farm, Armadale Wind Farm, Strathy Wood Wind Farm and Ackron Wind Farm.

Identification of Potential Effects

- 11.4.9 Effects have been identified based on the previous assessments of Consented Scheme, including the 2007 ES, the 2013 ES Addendum, the 2014 FIR and the 2015 public inquiry, as well as consultation responses and professional judgement.
- 11.4.10 The potential effects of the Proposed Varied Development that have been identified are:
- the economic impact during the development and construction phase;
 - the economic impact during the operation and maintenance phase;
 - the effect of payment of non-domestic rates during the operation and maintenance phase;
 - the effect on Caithness and Sutherland tourism economy;
 - the economic impact during the decommissioning phase; and
 - the cumulative economic impact.

Assessment of Residual Effects

- 11.4.11 There is no specific legislation, policy or guidance available on the methods that should be used to assess the socio-economic impacts of a proposed onshore wind farm development. The proposed method has however been based on established best practice, including that used in UK Government and industry reports on the sector.
- 11.4.12 The assessment of economic effects was undertaken using a model that has been developed by BiGGAR Economics specifically to estimate the socio-economic effects of wind farm developments. This model was also the basis of an assessment of the UK onshore wind sector for the then Department of Energy and Climate Change (DECC) and RenewableUK in 2012³, which was subsequently updated in 2015⁴. These assessments were based on case studies of the local, regional and national socio-economic effects of wind farms that have been developed in the UK and have been updated to reflect changes in the industry in recent years.

² BiGGAR Economics (2020), Economic Analysis of Strathy North Wind Farm

³ Department of Energy and Climate Change, RenewableUK (2012), Onshore Wind: Direct and Wider Economic Impacts.

⁴ RenewableUK (2015), Onshore Wind: Economic Impacts in 2014.

11.4.13 This approach is considered industry best practice in the assessment of the socio-economic effects of the onshore wind sector. This model has been used by BiGGAR Economics to assess the socio-economic effects of numerous wind farms across the UK, with the results being accepted as robust at several public inquiries.

11.4.14 The assumptions made have been based on three main sources:

- the analysis undertaken in 2019 by BiGGAR Economics on behalf of the Applicant of the economic impact of the neighbouring Strathy North Wind Farm. This report considered the value and types of contracts that were awarded throughout all stages of the project and used this to estimate the economic impact in Caithness and North Sutherland, Highland and Scotland¹;
- the analysis undertaken in the 2015 report on behalf of RenewableUK³, which uses evidence from previous wind farms around the UK. This report examined the size and location of contracts for their development, construction, and operation and maintenance phases; and
- assessment of the economies of the relevant study areas undertaken, based on analysis of local, regional and national statistics.

11.4.15 The units of measurement which are used to quantify the economic impacts of the Proposed Varied Development are:

- GVA - this is a measure of the economic value added by an organisation or industry and is typically estimated by subtracting the non-staff operational costs from the revenues of an organisation;
- Job Years of employment - this is a measure of employment which is equivalent to one person being employed for an entire year and is typically used when considering short term employment impacts, such as those associated with construction; and
- Jobs - this is a measure of employment which considers the headcount employment in an organisation or industry.

11.4.16 To begin estimating the economic activity supported by the Proposed Varied Development, it is first necessary to calculate the expenditure during the development, construction and operation and maintenance phases. The total expenditure figure is then divided into its main components using calculated assumptions regarding the share that could be expected by main and sub-contractors. This provides an estimate for each main component contract that can be secured by companies in Caithness and Sutherland, Highland and Scotland.

11.4.17 There are three sources of economic activity:

- component contracts and the jobs they support;
- wider spending in the supply chain (indirect effect); and
- spending of people employed in these contracts (induced effect).

11.4.18 There are four key stages of this model:

- estimation of total capital expenditure;
- estimation of the value of component contracts that make up total expenditure;
- assessment of the capacity of businesses in the study area to perform and complete component contracts; and
- estimation of economic impact from resultant figures.

11.4.19 Similarly, there is no formal guidance on the methods that should be used to assess the effects that wind farm developments may have on tourism and leisure interests. However, the potential effects of wind farm developments on the tourism and recreation sector is well-researched, and as such, key studies have been included for reference, including:

- The Economic Impacts of Wind Farms on Scottish Tourism⁵;
- A Report on the Achievability of the Scottish Government's Renewable Energy Targets⁶; and
- Wind Farms and Tourism Trends⁷.

11.4.20 Tourist attractions and accommodation within 15 km of the site were identified, as well as a small number of regionally important tourism attractions located outside of that area.

Criteria for Assessing Sensitivity of Receptors

11.4.21 The sensitivity of receptors has been assessed through the baseline assessment. This considers the scale of each receptor and identifies properties that could be particularly sensitive to the Proposed Varied Development.

Criteria for Assessing Magnitude of Change and Significance

11.4.22 The significance of the effect of the Proposed Varied Development on each tourism and recreation asset and the economy for each study area is considered by determining the type and magnitude of change on each.

11.4.23 The impact magnitude is assessed using the economic model and professional judgement, considering socio-economic effects from the Proposed Varied Development on Highland and Scotland. The significance of effects from the Proposed Varied Development on tourism and recreation assets is assessed with reference to evidence from research and comparable wind farm developments.

11.4.24 The significance of effect on each economic, tourism and recreational asset is determined on the basis of the criteria provided below, in Table 11.3. Major and moderate effects are considered significant in relation to the 2017 EIA Regulations.

Table 11.3: Significance Criteria	
Significance	Local Area
Major	Major loss/improvement to key elements/features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed. For example, a major long-term alteration of socio-economic conditions, a major reduction/improvement of recreational assets, or a substantial change to tourism spend
Moderate	Loss/improvement to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed. For example, a moderate long-term alteration of socio-economic conditions, a moderate reduction/improvement in the recreational asset, or a moderate change to tourism spend
Minor	Changes arising from the alteration will be detectable but not material; the underlying composition of the baseline condition will be similar to the pre-development situation. For example, a small alteration of the socio-economic conditions, a small reduction/improvement in the recreational asset, or a small change in tourism spend
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a "no change" situation

⁵ Moffat Centre (2008), The Economic Impact of Wind Farms on Scottish Tourism.

⁶ Scottish Parliament Economy, Energy and Tourism Committee (2012), Report on the Achievability of Scottish Government's renewable energy targets.

⁷ BiGGAR Economics (2017), Wind Farms and Tourism Trends in Scotland.

Assumptions and Limitations

- 11.4.25 The assessment is based on the experience of comparable developments elsewhere and a review of the local socio-economic context. In order to maximise the economic effects associated with the Proposed Varied Development, it would be necessary for local contractors to engage with the opportunities that arise, which can be aided by the Applicant increasing awareness of these opportunities.

Best Practice in Supply Chain Development

- 11.4.26 Best practice is set out in a 2014 report by RenewableUK⁸, which considered how developers can increase economic impacts in the local area. There are six main recommendations:
- maximise your local presence and begin early - identify potential suppliers and increase your visibility in the local area;
 - partnerships work - work with local authorities and business groups to gain information on local expertise and spread the message to local businesses;
 - leverage primary contractors - ensure that primary contractors also consider the impact that they can make in the local area;
 - provide the right information - give information in plenty of time and in the right format so that local businesses are able to prepare;
 - communicate technical requirements early - provide opportunities for local companies to upskill and form local consortia; and
 - demonstrate local content in planning - insert local-content commitments in the planning application where applicable and undertake post-construction auditing.
- 11.4.27 The analysis presented in this section assumes that the Applicant adopts these best practices in supply chain development, as has been the case for other developments in the area, including at Strathy North wind farm.
- 11.4.28 The assessment has been undertaken against baseline information on economic conditions prior to the COVID-19 pandemic. The assessment of tourism assets was undertaken based on the existing assets prior to the pandemic, when no restrictions were in place. Since then, changes will have occurred, with no tourism activity taking place at the time of writing and tourism business having been required to close, and expectations are that the negative impacts on the tourism economy will continue for some time.
- 11.4.29 The same limitations apply to baseline economic indicators, in particular unemployment and economic activity rates, which are likely to have changed significantly since the available economic data reported in the baseline conditions section.

11.5 Baseline Conditions

Strategic Context

Scotland's Economic Action Plan 2018-2020

- 11.5.1 The Scottish Government's Economic Action Plan⁹ sets out how it plans to make Scotland a leader in technological and social innovations. It aims to deliver higher productivity and greater competitiveness, while transitioning to a carbon neutral economy through measures that support business, and encouraging investment, innovation and upskilling.
- 11.5.2 At the heart of this strategy is inclusive growth, combining increased prosperity with greater equity, which requires getting the fundamentals right. These include:

⁸ RenewableUK (2014), Local Supply Chain Opportunities in Onshore Wind: Good Practice Guide.

⁹ Scottish Government (2018), Economic Action Plan 2018-20. Retrieved from <https://economicactionplan.mygov.scot>

- Investment: boosting private and public investment and delivering world-class infrastructure;
- Enterprise: ensuring a competitive business environment;
- International: growing exports and attracting international investment;
- Innovation: supporting world-leading innovation;
- Skills: providing a highly skilled workforce;
- Place: supporting thriving places;
- People: ensuring a sustainable working population where everyone can participate in and benefit from increased prosperity; and
- Sustainability: seizing the economic opportunities in the low carbon transition.

Scottish Energy Strategy

- 11.5.3 In December 2017, the Scottish Government released the Scottish Energy Strategy¹⁰, which sets out the Government's vision for a Scotland's energy future.
- 11.5.4 In 2016, 54% of all electricity in Scotland was generated renewably, with a target of producing 100% from renewable sources by 2020. This increased to 76% in 2018¹¹. However, in 2015, electricity represented 24% of all energy consumed in Scotland, and the overall share produced by renewables was 20.9%. By 2030, the Scottish Government wants the proportion of all energy, including heat and transport, supplied from renewable sources to increase to 50%.
- 11.5.5 The Scottish Government has also highlighted that renewables present an economic opportunity as an expanding market which will continue to support Scottish growth. The Scottish Government will continue to support businesses in this sector.
- 11.5.6 Additionally, the Scottish Government has emphasised the importance of communities benefitting from renewable energy generation, including through community benefit funds and shared ownership.

Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

- 11.5.7 In September 2019, the Scottish Parliament unanimously passed the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019¹², which sets a legally binding target of achieving "net-zero" carbon emissions by 2045. This is five years earlier than the previous target. Within this legislation, interim targets were set for the reduction of emissions by 75% of the baseline by 2030.

Socio-economic Baseline

Study Areas

- 11.5.8 The study areas for the analysis are presented on Figure 11.1 (EIAR Volume 3a: Figures) include:
- Caithness and Sutherland, comprising the electoral wards of East Sutherland and Edderton; North, West and Central Sutherland; Thurso and Northwest Caithness; and Wick and East Caithness;
 - Highland, comprising the local authority area; and
 - Scotland.

Population

- 11.5.9 The population of the Caithness and Sutherland is 38,890, representing 16.5% of the population of Highland¹³. The population is older than the regional and national average, with one quarter (25.4%) of the population aged over 65, compared to 22.1% in Highland and 18.9% in Scotland.

¹⁰ Scottish Government (2017), The future of energy in Scotland: Scottish Energy Strategy.

¹¹ Scottish Government (2019), Energy Statistics for Scotland, Q3 2019 Figures.

¹² Scottish Parliament (2019), Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

¹³ National Records of Scotland (2019), Population Estimates (Current Geographic Boundaries) 2018.

Furthermore, the working age population is lower as a proportion of the total, at 59.2% in the local area, compared to Highland (61.2%) and Scotland (64.2%). If the proportion of those aged 16-64 was in line with Scotland there would be an additional working age population of 1,950.

Table 11.4: Population 2018¹²

		Caithness and Sutherland	Highland	Scotland
Population Totals		38,890	235,540	5,438,100
Age Groups (years)	0 – 15	15.4%	16.7%	16.9%
	16 – 64	59.2%	61.2%	64.2%
	65+	25.4%	22.1%	18.9%

11.5.10 The population of Highland is expected to increase by 1.4% over the period 2016-41¹⁴, compared to growth in Scotland of 5.3%. The regional population is also expected to have a higher proportion of the population aged over 65 (30.4%) compared to Scotland (25.3%). The share of the population of working age is expected to decrease to 54.4% in Highland, compared to 58.9% in Scotland.

11.5.11 THC has also undertaken projections of smaller areas based on National Records Scotland's sub-national projections¹⁵. On this basis, it projects that the combined populations of Caithness and Sutherland are expected to fall by 17.9%, with Caithness in particular expected to fall by over a fifth (21.1%). Although these projections do not include an age breakdown, given the current age structure of the population, it would be expected that working age population will continue to decline and the population aged over 65 will continue to increase.

Table 11.5: Population Projections 2016 - 2041¹³

		Caithness and Sutherland ¹⁴		Highland		Scotland	
		2016	2041	2016	2041	2016	2041
Percentage Population Change		-	-17.9%	-	1.4%	-	5.3%
Population Totals		39,466	32,399	234,770	237,988	5,404,700	5,693,201
Age Groups (years)	0 - 15	-	-	17.0%	15.2%	16.9%	15.8%
	16 - 64	-	-	61.6%	54.4%	64.6%	58.9%
	65 +	-	-	21.3%	30.4%	18.5%	25.3%

Economic Activity

11.5.12 The economic activity rate in the parliamentary constituency of Caithness, Sutherland and Easter Ross (data is unavailable at the ward level) is 84.0% and in Highland it is 83.3%, higher than the Scottish average (77.4%). The local area has an unemployment rate (3.9%) similar to the Scottish level (4.3%) and above the level of Highland (2.5%)¹⁶.

11.5.13 The median annual wage of a full-time worker in Caithness, Sutherland and Easter Ross is £27,900 (averaged over four years), which is similar to Highland (£28,000) and Scotland (£28,300)¹⁷.

¹⁴ National Records of Scotland (2017), 2016-based principal population projections for council areas, by sex, single year of age, year.

¹⁵ Highland Council (2019), Corporate Plan 2019-22.

¹⁶ ONS (2019), Annual Population Survey (Jan 2018 - Jan 2018).

¹⁷ ONS (2019), Annual Survey of Hours and Earnings - resident analysis 2018.

Table 11.6: Economic Activity and Earnings, 2018¹⁵

	Local Area*	Highland	Scotland
Economic Activity Rate	84.0%	83.3%	77.4%
Unemployment Rate	3.9%	2.5%	4.3%
Median Annual Wage ¹⁶	£27,900	£28,000	£28,300

*This is for the UK parliamentary constituency of Caithness, Sutherland and Easter Ross

Industrial Employment

11.5.14 As can be seen in Table 11.7, a higher than average proportion of employment¹⁸ in the local area is in professional, scientific and technical services (7.2%, compared to 5.2% in Highland and 7.0% in Scotland) and in water supply, sewerage and waste (8.7%, compared to 1.6% regional and 0.8% nationally). This is as a result of Dounreay, a nuclear reactor on the north coast that is now being decommissioned.

11.5.15 A study for Highlands and Islands Enterprise in 2012¹⁹ found that 900 people were directly employed on the Dounreay Nuclear Plant and the site had a significant indirect and induced impact on the local economy. As the number of staff directly employed decreases, the population of the area has also declined. Similarly, companies that have been part of the Dounreay Nuclear Plant's supply chain are less likely to be able to rely on that source of income and are diversifying into other sectors, including renewable energy.

11.5.16 The largest sector of employment is human health and social work activities, which accounts 14.4% of employment compared to 16.9% in Highland and 15.6% in Scotland. A further 7.1% are in education, which is typically in the public sector, compared to 5.6% in Highland and 7.5% in Scotland.

11.5.17 Although wholesale and retail trade accounts for a greater proportion of employment regionally (13.6%) and nationally (13.6%) it is the second largest sector of employment in the local area (13.1%). This is followed by accommodation and food services (11.4%), which is typically associated with the tourism sector and accounts for a larger share of employment than in Highland (10.8%) and Scotland (7.9%).

11.5.18 Agriculture, forestry and fishing accounts for 10.0% of employment in Highland, significantly higher than in Scotland (3.2%). However, the given level in the local area (3.9%) is likely to underestimate the full impact as it does not include local farm agriculture, though it does include fishing, which makes up the majority of the employment in the sector.

Table 11.7: Share of Employment by Industrial Sector, 2018¹⁷

	Caithness and Sutherland	Highland	Scotland
Agriculture, forestry and fishing*	3.9%	10.0%	3.2%
Mining, quarrying and utilities	0.9%	0.4%	1.1%
Manufacturing	4.7%	5.2%	6.9%
Electricity, gas, steam and air conditioning	0.3%	0.7%	0.7%
Water supply, sewerage, waste	8.7%	1.6%	0.8%
Construction	6.4%	6.4%	5.5%
Wholesale and retail trade	13.1%	13.6%	13.6%

¹⁸ ONS (2019), Business Register and Employment Survey 2018.

¹⁹ Grangeston (2012), Socio-economic impact of Dounreay Decommissioning, HIE

Table 11.7: Share of Employment by Industrial Sector, 2018¹⁷

	Caithness and Sutherland	Highland	Scotland
Transport and storage	4.1%	4.4%	4.2%
Accommodation & food services	11.4%	10.8%	7.9%
Information and communication	2.1%	1.8%	3.1%
Financial and insurance	0.8%	0.9%	3.4%
Real estate activities	1.4%	1.3%	1.5%
Professional, scientific and technical services	7.2%	5.2%	7.0%
Administration and support activities	2.9%	5.2%	7.9%
Public administration and defence	5.2%	5.2%	6.0%
Education	7.4%	6.0%	7.4%
Human health and social work activities	14.4%	16.4%	15.1%
Arts, entertainment and recreation	3.2%	3.2%	2.7%
Other service activities	2.0%	1.5%	2.1%
Total Employment	15,750	125,000	2,611,500

**Agriculture and forestry does not include farm agriculture*

Summary of Socio-economic Context

- 11.5.19 The population of Caithness and Sutherland is relatively older than both Highland and Scotland as a whole and is in the process of declining. Between 2016 and 2041 the population is projected to decline by 17.9% and of those that remain, a greater proportion will be aged 65 and over. The earnings and economic activity rate of Caithness and Sutherland are in line with the average for Highland, however the industrial breakdown is different, and this is influenced by the ongoing decommissioning of the Dounreay nuclear power plant.

Tourism Baseline

Tourism Economy

- 11.5.20 The tourism sector is relatively important in the Highland economy. In 2017, the Sustainable Tourism sector, as defined by the Scottish Government, supported 16,000 jobs and £317 million GVA in Highland²⁰. Highland accounts for 4.3% of the Scottish population and 7.8% of sustainable tourism employment (Table 11.8).

Table 11.8: Sustainable Tourism Sector, 2017¹⁹

	Highland	Scotland
Gross Value Added (£m)	317	4,127
Employment	16,000	206,000

Tourism Volume and Value

- 11.5.21 The number of visitors to Highland is shown in Table 11.9 below and compared with the total visitors to Scotland.

²⁰ Scottish Government (2019), Growth Sector Statistics 2017/18.

11.5.22 Visitor numbers are collated by VisitScotland in regional and national factsheets²¹, which include day visitors²², domestic overnight visitors²³ and overseas visitors²⁴.

11.5.23 In total, there were over 13.5 million visitors to Highland, of which 11.3 million were day visitors, 1.7 million were domestic overnight visitors and 0.5 million were from overseas.

Table 11.9: Visitors by Type (000s)		
	Highland	Scotland
Overseas ²³	521	3,538
Domestic Overnight ²²	1,690	11,803
Day Visitors ²¹	11,333	137,800
Total	13,544	153,362

11.5.24 The expenditure of visitors to Highland and Scotland is shown by type of visitor in Table 11.10²⁰. Visitors to Highland spend over £1 billion in the local economy. Most of this expenditure was associated with day visitors and domestic overnight visitors who spent £430 million and £425 million respectively. The share of domestic overnight tourism spending is higher than the rate across Scotland, reflecting the relative importance of this market.

Table 11.10: Visitor Spend by Type (£m)		
	Highland	Scotland
Overseas ²³	195	2,026
Domestic Overnight ²²	425	2,762
Day Visitors ²¹	430	5,474
Total	1,050	10,543

Tourism Assets

11.5.25 The most visited attractions in Highland by visitor numbers are displayed in Table 11.11²⁰ below, as well as their respective distances from the Proposed Varied Development. Each of the attractions is at least 100 km away.

Table 11.11: Top Visitor Attractions in Highland, 2018²⁰		
	Number of Visitors	Approximate Distance (km)
(1) Urquhart Castle	518,195	123
(2) Glenfinnan Monument	385,352	189
(3) Glenmore Forest Park	318,511	140
(4) Loch Ness by Jacobite	311,613	119
(5) Glencoe Visitor Centre	213,343	203

11.5.26 In addition to these major regional attractions, a small number of visitor attractions within 15 km of the site were identified based on VisitScotland's database of attractions²⁵. These include:

²¹ VisitScotland (2019), Insight Department: Highland Factsheet 2018.

²² VisitBritain/Kantar TNS (2019), The GB Day Visitor Survey 2018.

²³ VisitBritain/Kantar TNS (2019), The GB Tourist 2018 Annual Report.

²⁴ ONS (2019), International Passenger Survey 2018.

²⁵ VisitScotland (2020), Things to See and Do.

- the Forsinard Flows, a nature reserve with marked trails and a visitor centre, which is open from April to October, that focuses on the area's birds and bog habitat. The Forsinard Flows is located approximately 11 km southeast of the site;
- Strathnaver Museum, which is located approximately 10 km to the northwest the site, is a museum about the area's historic past, including the Highland Clearances, which is open from April to October; and
- Kirkton Farm Buggy Tours, which is located 14 km northeast from the site, where visitors are taken around a local farm on a buggy and learn about how a farm works as well as some local history.

11.5.27 An important part of the local area's tourism sector is the North Coast 500, which is a 500 mile route around six regions in Highland, which passes along the North Coast through a number of villages including Bettyhill, Armadale, Strathly and Melvich. A study in 2019 found that the route has driven an increase in tourism in the North Highlands, including increasing visits to tourism attractions, such as Strathnaver Museum, and supported 180 jobs and over £22 million GVA in 2018²⁶. At its closest, the route passes within 7 km of the site.

Tourism Accommodation

11.5.28 Similarly, a small number of commercial accommodation providers were identified within 15 km of the site²⁴, including:

- Garvaul Country House Hotel, 10 km to the south, which describes itself as the "most remote hotel on mainland Britain"²⁷;
- three providers in Bettyhill (Bettyhill Hotel, Farr Bay Inn, and Craigdhu Caravan Camping Site), 10 km to the northwest;
- the Strathly Inn, a bed and breakfast 13 km to the north;
- four accommodation providers in Melvich and Portskerra (Melvich Hotel, Croft View Self Catering, Halladale Inn and North Coast Touring Park, and Carnbren Bed and Breakfast), approximately 13 km to the northeast; and
- Cornmill Bunkhouse, 8 km to the east, sleeps up to 14 and is situated in a traditional croft.

Recreational Trails

11.5.29 A number of recreational trails were identified and are described in Chapter 4: Landscape and Visual Amenity. They include a hill track (Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathly) that passes through the site (EIAR Volume 3a: Figure 4.5c). There are no core paths that pass through the site.

Summary of Tourism Baseline

11.5.30 The Sustainable Tourism sector is an important employer in Highland as a whole. The area immediately surrounding the site is relatively distant from other population centres with a small number of visitor attractions and accommodation providers, though the North Coast 500 has driven an increase in visitor numbers in recent years.

Future Baseline

11.5.31 The socio-economic baseline, at the time of writing, is described in the section above. This includes projections for population which would describe the expected trends in population in the period to 2041. Changes to the socio-economic baseline will depend on macroeconomic conditions in the local, national and global economies.

²⁶ North Coast 500/North Highland Initiative (2019), North Coast 500 boosts the North Highland economy by £22 million.

²⁷ <http://www.garvaulthouse.uk> [22/01/2020]

Identified Sensitive Receptors

11.5.32 A summary of the receptors identified as being sensitive to the Proposed Varied Development and which have been 'scoped-in' to the assessment are as follows:

- the economy of Caithness and Sutherland;
- the economy of Highland;
- the economy of Scotland; and
- the Sustainable Tourism Sector in Caithness and Sutherland.

11.6 Potential Significant Effects

Potential Development and Construction Effects

11.6.1 In order to estimate the potential impact arising from spending in the construction and development of the Proposed Varied Development, expenditure was attributed to the following:

- development;
- turbines;
- balance of plant; and
- grid connection.

11.6.2 The estimation of costs was based on a combination of per MW and per turbine costs for each of the components, which was derived from the analysis undertaken on behalf of RenewableUK³.

11.6.3 The Proposed Varied Development is expected to consist of 39 turbines of up to 5.6 MW each, with a combined installed capacity of up to 218.4 MW. On this basis, it was estimated that the total cost of the Proposed Varied Development would be £239.3 million. Of this, it is expected that turbines would be the most significant contract, accounting for 62.3% of expenditure (£149.0 million), followed by balance of plant, with 23.6% of spend (£56.4 million), as shown in Table 11.12.

Table 11.12: Development and Construction Expenditure by Contract Type		
	% of Capex	Value (£m)
Development	8.3%	19.9
Turbines	62.3%	149.0
Balance of Plant	23.6%	56.4
Grid Connection	5.8%	13.9
Total	-	239.3

11.6.4 Assumptions were then made about how much of each component contract could be secured in each study area. This was based on the findings of the RenewableUK research³ and BiGGAR Economics' assessment of Strathy North Wind Farm¹.

11.6.5 This research suggested that Caithness and Sutherland could secure 2% of contracts, worth up to £5.8 million, Highland could secure 18% of contracts, worth up to £43.7million, and Scotland could secure 44% of contracts, worth up to £105.0 million.

11.6.6 Balance of plant would be the largest opportunity for each of the study areas, with Caithness and Sutherland securing up to 10% of contracts (£5.4 million), Highland securing 55% of contracts (£31.3 million), and Scotland securing 75% of contracts (£42.5 million). Turbine contracts would also represent an opportunity in Scotland, which could secure 19% (£28.6 million), as shown in Table 11.13.

Table 11.13: Development and Construction Expenditure by Contract Type

	Caithness and Sutherland		Highland		Scotland	
	% Capex	£m	% Capex	£m	% Capex	£m
Development	0%	-	10%	2.0	100%	19.9
Turbines	0%	-	4%	5.6	19%	28.6
Balance of Plant	10%	5.4	55%	31.3	75%	42.5
Grid Connection	3%	0.4	35%	4.8	100%	13.9
Total	2%	5.8	18%	43.7	44%	105.0

11.6.7 In order to estimate the direct GVA associated with each category of spend, each was split into its component contracts, which were then assigned a sector. The spend associated with each contract would represent an increase in turnover to businesses in the study area, and therefore the GVA impact was estimated by applying the turnover/GVA ratio for the relevant sector from the Annual Business Survey²⁸.

11.6.8 The direct impact was estimated to be £2.0 million GVA in Caithness and Sutherland, £21.7 million GVA in Highland, and £53.7 million GVA in Scotland (Table 11.14).

Table 11.14: Development and Construction Direct GVA by Contract Type (£m)

	Caithness and Sutherland	Highland	Scotland
Development	-	1.4	13.8
Turbines	-	2.6	13.0
Balance of Plant	1.9	15.8	21.3
Grid Connection	0.1	1.9	5.6
Total	2.0	21.7	53.7

11.6.9 Similarly, the direct employment impact was estimated by applying the relevant turnover/employee ratio from the Annual Business Survey. For temporary impacts, such as construction, employment is reported in terms of years of employment, with one job year representing one year of employment for an individual.

11.6.10 In this way, it was estimated that during the construction and development phase, the Proposed Varied Development would directly support 32 years of employment in Caithness and Sutherland, 323 years of employment in Highland, and 822 years of employment in Scotland (Table 11.15).

Table 11.15: Development and Construction Direct Employment by Contract Type (years of employment)

	Caithness and Sutherland	Highland	Scotland
Development	-	19	195
Turbines	-	45	231
Balance of Plant	30	230	312
Grid Connection	2	29	85
Total	32	323	822

²⁸ ONS (2019), Annual Business Survey Provisional Results 2017.

- 11.6.11 In addition to the direct economic activity supported by the Proposed Varied Development, its construction and development is expected to have an impact associated with contractors spending in their supply chain, which is known as the indirect effect.
- 11.6.12 In order to capture this effect, direct GVA and employment impacts were multiplied by Type I multipliers for the relevant sectors, which are produced by the Scottish Government and capture spending within Scotland²⁹. These were then discounted by the amount of supply spending that is expected to take place in each study area. For example, Caithness and Sutherland contractors would be expected to spend 10% of Scottish supplier spending in Caithness and Sutherland and 40% in Highland.
- 11.6.13 On this basis it was estimated that the indirect effect would support £0.1 million GVA and 2 job years of employment in Caithness and Sutherland, £3.0 million GVA and 48 years of employment in Highland, and £20.1 million GVA and 323 years of employment in Scotland (Table 11.16).

Table 11.16: Development and Construction Indirect Impact			
	Caithness and Sutherland	Highland	Scotland
GVA (£m)	0.1	3.0	20.1
Job years	2	48	323

- 11.6.14 There would also be impacts associated with workers spending their wages in the study area, which is known as the induced effect. This is captured by subtracting Type II multipliers (which combine indirect and induced effects) from Type I multipliers (the indirect effect) for the relevant sector.
- 11.6.15 This was then discounted to account for spending taking place in each study area. For example, for workers in Caithness and Sutherland, 40% of Scottish spending was assumed to take place in Caithness and Sutherland, and 70% of Scottish spending was assumed to take place in Highland.
- 11.6.16 Therefore, it was estimated that staff spending would support £0.3 million GVA and 4 years of employment in Caithness and Sutherland, £4.7 million GVA and 57 years of employment in Highland, and £16.1 million GVA and 205 years of employment in Scotland (Table 11.17).

Table 11.17: Development and Construction Induced Impact			
	Caithness and Sutherland	Highland	Scotland
GVA (£m)	0.3	4.7	16.1
Job years	4	57	205

- 11.6.17 Overall, the Proposed Varied Development was expected to support £2.4 million GVA and 38 years of employment in Caithness and Sutherland, £29.4 million GVA and 427 years of employment in Highland, and £89.9 million GVA and 1,350 years of employment in Scotland (Table 11.18).

Table 11.18: Economic Impact During Development and Construction			
	Caithness and Sutherland	Highland	Scotland
GVA (£m)	2.4	29.4	89.9
Job years	38	427	1,350

- 11.6.18 The effect on the Caithness and Sutherland economy as well as the Highland economy was assessed as **minor beneficial**, and the effect on the Scottish economy was assessed as **negligible beneficial** and so not significant in EIA terms.

²⁹ Scottish Government. (2018). Input-Output Tables 2015.

Potential Operational Effects

Economic Impact

11.6.19 The Proposed Varied Development is also expected to have a socio-economic impact throughout its operation.

11.6.20 Based on the RenewableUK study it was estimated that annual operations and maintenance spending would be £10.8 million. As an illustration, over 50 years this would amount to £538.3 million. In order to estimate the economic impact from spending in operations and maintenance, assumptions were made about the share of spending that could be secured in each study area.

11.6.21 Therefore, it was assumed that 16% of spend would be secured in Caithness and Sutherland (£1.7 million), 50% would be secured in Highland (£5.4 million), and 80% would be secured in Scotland (£8.6 million), with the remainder being secured from outside the study areas (Table 11.19).

Table 11.19: Direct Impact of Annual Operations and Maintenance Expenditure						
	Caithness and Sutherland		Highland		Scotland	
	% Opex	£m	% Opex	£m	% Opex	£m
Operation	16%	1.7	50%	5.4	80%	8.6

11.6.22 In order to estimate the GVA and employment impact associated with the annual operations and maintenance spend, the value of contracts carried out by each study areas was divided by the relevant turnover/GVA and turnover/job ratios from the Annual Business Survey¹⁷.

11.6.23 In this way, it was estimated that each year spending from operation and maintenance would generate £1.0 million GVA and 15 jobs in Caithness and Sutherland, £3.2 million GVA and 44 jobs in Highland, and £4.7 million GVA and 68 jobs in Scotland (Table 11.20).

Table 11.20: Direct Impact of Annual Operations and Maintenance Expenditure			
	Caithness and Sutherland	Highland	Scotland
GVA (£m)	1.0	3.2	4.7
Jobs	15	44	68

11.6.24 After estimating indirect and induced effects, using the same method as with construction and development, it was estimated that the total impact would be £1.2 million GVA and 16 jobs in Caithness and Sutherland, £3.9 million GVA and 53 jobs in Highland, and £7.0 million and 101 jobs (Table 11.21).

Table 11.21: Total Impact of Annual Operations and Maintenance Expenditure			
	Caithness and Sutherland	Highland	Scotland
GVA (£m)	1.2	3.9	7.0
Jobs	16	53	101

11.6.25 The effect on the Caithness and Sutherland economy was assessed as **minor beneficial** (not significant), and on the Highland and Scottish economies was assessed as **negligible beneficial** and so not significant in EIA terms.

Community Benefit

11.6.26 The Applicant is committed to sharing the benefits of the Proposed Varied Development with the community and community benefit payments are currently expected to be £2,500 per MW, or £546,000 per year.

- 11.6.27 This would build on the community's existing relationship with the Applicant through its Strathy North Joint Community Fund¹, which makes £170,000 available each year to the community council areas of:
- Bettyhill, Strathnaver and Altnaharra;
 - Melvich; and
 - Strathy and Armadale.
- 11.6.28 The focus of the fund is young people, with the goal that they are not disadvantaged by the rural location in which they live and are able to experience the same economic and social opportunities as young people living in towns and cities.
- 11.6.29 A number of projects have been funded including the new Armadale Village Hall, which will support village life as well as providing facilities for tourists on the North Coast 500, increasing opportunities for the village to benefit from the route. The fund has also supported Strathnaver Museum with funding, enabling them to harness the benefits of the area's increasing visitor numbers. It also provided funding for an enhancement of Melvich Bay, enabling commercial fishing to be brought back to the village as well as use by a number of recreational users.
- 11.6.30 Community benefit funds are not considered as part of the EIA process.

Shared Ownership

- 11.6.31 The local community, comprising the community councils of Bettyhill, Strathnaver and Altnaharra; Strathy and Armadale; and Melvich and Halladale, as well as the development group UpNorth have formed the Strathy South Community Shared Revenue Working Group. This group is exploring the possibility of acquiring up to a 10% stake in the Proposed Varied Development.
- 11.6.32 The group, which is in discussion with the Applicant, acknowledges that there could be difficulties, such as raising the required capital to invest, but is interested in developing an unrestricted income stream that could be used to support the local area. This includes reversing depopulation, increasing affordable housing, and keeping services running.

Non-Domestic Rates

- 11.6.33 The Proposed Varied Development would be liable for non-domestic rates, the payment of which would contribute directly to public sector finances. Analysis of the rateable values of several wind farms nearby suggests that the average rateable value per MW is £22,300. On this basis the total rateable value would be £4.9 million.
- 11.6.34 Applying a poundage rate of £0.516 per £1 of rateable value³⁰ it is estimated that the Proposed Varied Development could contribute £2.5 million annually to public finances. However, the actual contribution would depend on variables such as the actual load factor.
- 11.6.35 These non-domestic rates, by providing an additional revenue stream, would support the delivery of local government services. Over an illustrative 50 years, non-domestic rates contributions are expected to be £125.5 million³¹.
- 11.6.36 The effect on the Highland economy was assessed as **negligible beneficial** and so not significant in EIA terms.

Tourism

Wind Farms and Tourism Evidence

- 11.6.37 There are three main studies which are relevant to assessing the economic effects of wind farms on tourism and recreation assets. These are:

³⁰ https://www.highland.gov.uk/info/2/business_rates/404/business_rates/3 [Accessed: 22/01/2020]

³¹ Note, total may not sum to due to rounding.

- The Moffat Centre (2008), The economic impacts of Wind Farms on Scottish Tourism;
- Scottish Parliament Economy, Energy and Tourism Committee (2012), Report on the achievability of the Scottish Government's renewable energy targets; and
- BiGGAR Economics (2017), Wind Farms and Tourism trends in Scotland.

11.6.38 The most comprehensive study of the potential effects of wind farms on tourism was undertaken by the Moffat Centre at Glasgow Caledonian University in 2008³². The study found that, although there could be minor effects on tourism providers and a small number of visitors reported that they may not visit Scotland in the future, the overall effect on tourism expenditure and employment would be very limited. The study is now over a decade old and in intervening years wind farms have become a more common feature in Scotland. As such, it would be expected that any adverse effects on the tourism economy would now be apparent.

11.6.39 The Moffat Centre study was based on what could happen, rather than what has happened. In 2017, BiGGAR Economics undertook a study⁶ into the effects of already constructed wind farms on tourism at the national, regional and local level and the results of the report are summarised in the following paragraphs.

11.6.40 Tourism employment was considered over the period 2009 to 2015, a six-year period over which Scotland and almost all local authority areas increased the number of wind farms, while employment in sustainable tourism also grew significantly. The analysis found no correlation between tourism employment and the number of turbines at the national or local authority level.

11.6.41 The study also considered the impact on employment at a much smaller, more granular level, in data zones up to 15 km from developments. The sites considered were constructed between 2009 and 2015. As these sites did not exist in 2009, comparing employment in 2009 and 2015 was considered an effective measure of the effect of wind farms on local employment, while excluding construction impacts, such as wind farm related employees staying in local accommodation.

11.6.42 At the local authority level in these smaller areas, no link was found between the development of a wind farm and tourism related employment. In 21 out of the 28 areas considered employment in this sector grew. In 22 of the areas, employment either grew faster or decreased less than the rate for the relevant local authority area as a whole.

11.6.43 Overall, the conclusion of this study was that published national statistics on employment in sustainable tourism demonstrated that there was no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at the local authority level, nor in the areas immediately surrounding wind farm development.

11.6.44 The findings of this research are in accordance with those of the Scottish Parliament's Economy, Energy and Tourism Committee, when they concluded that there is no robust, empirical evidence of an adverse link between wind farm development and tourism⁵.

11.6.45 Overall, there is no research evidence that shows that fears of adverse effects on the tourism economy in Scotland as a result of wind farms have been realised.

11.6.46 Within the overall context described above, the following assessment nevertheless considers whether the Proposed Varied Development could result in changes in the behaviour of tourists that could lead to effects on the tourism economy.

Tourism Assets

11.6.47 A small number of tourism assets in the area were identified. These are either related to the heritage and history of the area (such as the Strathnaver Museum, which focuses on the Highland Clearances), the natural environment (Forsinard Flows) or local farming practices, the environment and local history (Kirkton Farm Buggy Tours). These elements of the local visitor attractions are not

³² Moffat Centre (2018), Scottish Visitor Attraction Monitor 2017.

expected to be affected by the Proposed Varied Development because it will not change the nature of the attractions.

- 11.6.48 The North Coast 500 is an important driver of tourism in the local area, increasing its profile. This stretch of the route is known for its coastal views as well as its mountainous scenery and the small, local villages. These factors would not change and so the attractiveness of the route is not expected to be affected by the Proposed Varied Development.

Accommodation Providers

- 11.6.49 The majority of accommodation providers within 15 km of the site are situated on the north coast in Bettyhill, Strathy or Melvich. They are advertised based on their coastal views, setting and history, as well as their location on the North Coast 500. These features would not be affected by the Proposed Varied Development because the coastal views are to the north and the site is located to the south.
- 11.6.50 In addition, Garvaul Country House Hotel advertises based on its relative remoteness and tranquillity, and the Cornmill Bunkhouse on its traditional crofter setting and ability to accommodate a large number of people. In both cases these propositions to visitors are not expected to be affected by the Proposed Varied Development because they will still have these advertised features.

Recreational Trails

- 11.6.51 A number of recreational trails have been identified within 15 km of the site, and with the exception of Hill Track 344, none pass through the site itself and are not expected to experience disruption during the construction phase. Furthermore, it is not expected that the Proposed Varied Development would affect the use of the trails as the features that make them attractive (such as the coastal views, relative remoteness of the area, wildlife and natural environment) would not be affected.
- 11.6.52 There is potential disruption to Hill Track 344 during construction, however the Applicant has committed to ensure that access is not affected. Further details would be provided in an Outdoor Access Management Plan which would be agreed with the relevant consultees pre-construction as a condition of consent.

Tourism Summary

- 11.6.53 Overall, the analysis has found that there are likely to be no impacts on the tourism economy of Caithness and Sutherland and therefore the effect has been assessed as **negligible** and so not significant in EIA terms.

Potential Decommissioning Effects

- 11.6.54 The Proposed Varied Development would have an economic impact during the decommissioning phase. Very few onshore wind projects to date have been fully decommissioned in the UK and as a result there is minimal data regarding the current costs of this phase. Given that decommissioning activity would take place in future decades it is difficult to predict what local economic conditions at that time will be. For these reasons the decommissioning costs and impacts have not been quantified in this assessment.
- 11.6.55 The scale of the economic activity during the decommissioning phase is likely to be less than that of the construction phase. Therefore, the effect on the economies studied would be less than that assessed in the construction phase.
- 11.6.56 The effect on the Caithness and Sutherland economy was assessed as **minor beneficial**, and the effect on the Highland economy and the Scottish economy was assessed as **negligible beneficial** and so not significant in EIA terms.

Potential Cumulative Construction Effects

- 11.6.57 The presence of the other wind farm sites does not change the socio-economic assessment of the Proposed Varied Development. The presence of continual economic opportunities from multiple wind farm sites being constructed in sequence in Caithness and Sutherland is likely to represent stability for firms in the area that are involved in this activity.
- 11.6.58 The Applicant has experience in the local area as a result of developing and operating Strathy North Wind Farm, which is located nearby. BiGGAR Economics recently undertook an assessment of Strathy North wind farm's economic impact¹, which found that 3% of development and construction contracts by value are secured in Caithness and Sutherland, and that 19% are secured in Highland, compared to the national average for local authorities of 12%.
- 11.6.59 The Applicant's experience of developing and constructing a wind farm in the local area with a higher than average share of local content suggests that it has a strong relationship with local contractors and it would be possible to achieve similarly high shares of local content for the Proposed Varied Development.
- 11.6.60 This is expected to have a **minor** beneficial effect in Caithness and Sutherland, and Highland, and a **negligible** beneficial effect in Scotland and so not significant in EIA terms.

Potential Cumulative Operational Effects

- 11.6.61 Similarly, the share of Opex contracts which are secured for Strathy North Wind Farm is expected to be 19% in Caithness and Sutherland, and 45% in Highland, compared to the national average for local authorities of 42%. This suggests that similar shares of Opex contracts would be secured for the Proposed Varied Development.
- 11.6.62 This is expected to have a **minor** beneficial effect in Caithness and Sutherland, and a **negligible** beneficial effect in Highland and Scotland and so not significant in EIA terms.

11.7 Mitigation

- 11.7.1 No mitigation is required as there would be no significant adverse effects as a result of the construction and operation of the Proposed Varied Development. The potential effects discussed in this chapter have assumed that the Applicant would continue to follow best practice as described in Section 11.4: Assumptions and Limitations.

11.8 Assessment of Residual Effects

Residual Construction Effects

- 11.8.1 Development and construction of the Proposed Varied Development is likely to result in:
- a **temporary minor beneficial** economic effect in Caithness and Sutherland, which is not significant;
 - a **temporary minor beneficial** economic effect in Highland, which is not significant; and
 - a **temporary negligible beneficial** economic effect in Scotland, which is not significant.

Residual Operational Effects

- 11.8.2 Operation and maintenance of the Proposed Varied Development is likely to result in:
- a **minor beneficial** economic effect in Caithness and Sutherland, which is not significant;
 - a **negligible beneficial** economic effect in Highland, which is not significant;
 - a **negligible beneficial** economic effect in Scotland, which is not significant;
 - a **negligible beneficial** economic effect in Highland associated with payment of non-domestic rates, which is not significant; and

- a **negligible** effect on the Caithness and Sutherland tourism economy, which is not significant.

Residual Decommissioning Effects

11.8.3 Decommissioning of the Proposed Varied Development is likely to result in:

- a **temporary minor beneficial** economic effect in Caithness and Sutherland, which is not significant;
- a **temporary negligible beneficial** economic effect in Highland, which is not significant; and
- a **temporary negligible beneficial** economic effect in Scotland, which is not significant.

Residual Cumulative Construction Effects

11.8.4 There could be beneficial cumulative effects associated with the development of an existing supply chain in the Highland, which could increase the beneficial impact associated with construction. The predicted residual cumulative construction effects are as follows:

- a **temporary minor** economic beneficial effect in Caithness and Sutherland, which is not significant;
- a **temporary minor** economic beneficial effect in Highland, which is not significant; and
- a **temporary negligible** economic beneficial effect in Scotland, which is not significant.

11.8.5 There are not likely to be any significant cumulative effects associated with the construction phase.

Residual Cumulative Operational Effects

11.8.6 There could be beneficial cumulative effects associated with the development of an existing supply chain in the Highland, which could increase the beneficial impact associated with operation. The predicted residual cumulative operation effects are as follows:

- a **minor** beneficial economic effect in Caithness and Sutherland, which is not significant.;
- a **negligible** beneficial economic effect in Highland, which is not significant.;
- a **negligible** beneficial economic effect in Scotland, which is not significant.

11.8.7 There are not likely to be any significant cumulative effects associated with the operational phase.

11.9 Monitoring

11.9.1 No monitoring is required.

11.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

11.10.1 With the exception of operational effects on the local economy, the previous assessments did not assess the effect of the Consented Scheme on the receptors identified in this EIAR. Since the previous assessments were undertaken, the methodology for assessing the economic impacts on onshore wind energy developments has changed. An updated assessment of the Consented Scheme has been undertaken to enable a like for like comparison with the Proposed Varied Development (in EIAR Volume 4: Technical Appendix 11.1).

11.10.2 The comparison found that there was no difference in sensitivity, magnitude or effects between the Consented Scheme and the Proposed Varied Development (Table 11.22).

Table 11.22: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Socio-Economic, Recreation and Tourism Chapter Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Construction				
Tourism and Recreation	Negligible (not significant)	Not Assessed	Negligible (not significant)	No Material Change
Economic Impact in Caithness and Sutherland	Temporary beneficial (not significant)	Temporary minor beneficial (not significant)	Temporary minor beneficial (not significant)	No Material Change
Economic Impact in Highland	Not Assessed	Temporary minor beneficial (not significant)	Temporary minor beneficial (not significant)	No Material Change
Economic Impact in Scotland	Not Assessed	Temporary negligible beneficial (not significant)	Temporary negligible beneficial (not significant)	No Material Change
Operation				
Tourism	Negligible (not significant)	Not Assessed	Negligible (not significant)	No Material Change
Economic Impact in Caithness and Sutherland	Negligible (not significant)	Minor beneficial (not significant)	Minor beneficial (not significant)	No Material Change
Economic Impact in Highland	Not Assessed	Negligible Beneficial (not significant)	Negligible Beneficial (not significant)	No Material Change
Economic Impact in Scotland	Not Assessed	Negligible Beneficial (not significant)	Negligible Beneficial (not significant)	No Material Change
Payment of Non-Domestic Rates	Not Assessed	Negligible Beneficial (not significant)	Negligible Beneficial (not significant)	No Material Change

Table 11.22: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Socio-Economic, Recreation and Tourism Chapter Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied Development	Conclusion / explanation of the differences between the Residual Effects presented in Columns A/B and C
Decommissioning				
Economic Impact in Caithness and Sutherland	Not Assessed	Temporary minor beneficial (not significant)	Temporary minor beneficial (not significant)	No Material Change
Economic Impact in Highland	Not Assessed	Temporary negligible beneficial (not significant)	Temporary negligible beneficial (not significant)	No Material Change
Economic Impact in Scotland	Not Assessed	Temporary negligible beneficial (not significant)	Temporary negligible beneficial (not significant)	No Material Change
Cumulative Construction				
Economic Impact in Caithness and Sutherland	Not Assessed	Temporary minor beneficial (not significant)	Temporary minor beneficial (not significant)	No Material Change
Economic Impact in Highland	Not Assessed	Temporary minor beneficial (not significant)	Temporary minor beneficial (not significant)	No Material Change
Economic Impact in Scotland	Not Assessed	Temporary negligible beneficial (not significant)	Temporary negligible beneficial (not significant)	No Material Change
Cumulative Operation				
Economic Impact in Caithness and Sutherland	Not Assessed	Minor beneficial (not significant)	Minor beneficial (not significant)	No Material Change
Economic Impact in Highland	Not Assessed	Negligible Beneficial (not significant)	Negligible Beneficial (not significant)	No Material Change
Economic Impact in Scotland	Not Assessed	Negligible Beneficial (not significant)	Negligible Beneficial (not significant)	No Material Change

11.11 Summary and Conclusions

- 11.11.1 An assessment of the baseline conditions in Caithness and Sutherland identified that it has a relatively older population than Highland, which also has an older population than Scotland, with slow population growth expected in Highland and a decrease in population expected in Caithness and Sutherland. Economic activity is higher than the Scottish average and wages are comparable, but the working age populations in Caithness and Sutherland, as well as Highland, are relatively lower than the Scottish average. An assessment of the tourism baseline found that, while tourism is important to the Highland economy, there are a limited number of tourism assets within 15 km of the site.
- 11.11.2 Based on an installed capacity of 218.4 MW, it was estimated that during the development and construction phase the Proposed Varied Development could generate up to:
- £2.4 million GVA and 38 job years of employment in Caithness and Sutherland;
 - £29.4 million GVA and 427 job years of employment in Highland; and
 - £89.9 million GVA and 1,350 job years of employment in Scotland.
- 11.11.3 It was estimated that each year during the operation and maintenance phase the Proposed Varied Development would generate:
- £1.2 million GVA and 16 jobs in Caithness and Sutherland;
 - £3.9 million GVA and 53 jobs in Highland; and
 - £7.0 million GVA and 101 jobs in Scotland.
- 11.11.4 It is expected that there would be community benefit funding of £546,000 annually associated with the Proposed Varied Development, which would build on the existing Strathy North Joint Community Fund.
- 11.11.5 During the construction and operation of the Proposed Varied Development there would likely be negligible effects on the recreation and tourism economy of Caithness and Sutherland. During the decommissioning phase of the Proposed Varied Development there would likely be negligible effects on the Highland and Scottish economies.
- 11.11.6 Throughout its operation, the Proposed Varied Development would also contribute to local public finances and in this way support the provision of public services locally. It was estimated that the Proposed Varied Development could contribute £2.5 million each year in non-domestic rates.
- 11.11.7 No significant adverse effects have been identified as part of the assessment and therefore no mitigation has been identified as being required. The Applicant could enhance its socio-economic impact through measures such as engaging with local suppliers and building on the supply chain developed for the neighbouring Strathy North Wind Farm, which it also developed and built.
- 11.11.8 Existing literature on the relationship between wind farm developments and tourism suggests that there is no evidence to suggest that there is a negative relationship. An assessment of tourism attractions, accommodation providers and recreational trails found no significant adverse effects were expected.
- 11.11.9 The residual effects are presented in Table 11.23.

Table 11.23: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Construction				
Tourism and Recreation	Not significant	N/A	N/A	Negligible (not significant)
Economic Impact in Caithness and Sutherland	Not significant	N/A	N/A	Temporary minor beneficial (not significant)
Economic Impact in Highland	Not significant	N/A	N/A	Temporary minor beneficial (not significant)
Economic Impact in Scotland	Not significant	N/A	N/A	Temporary negligible beneficial (not significant)
Operation				
Tourism and Recreation	Not significant	N/A	N/A	Negligible (not significant)
Economic Impact in Caithness and Sutherland	Not significant	N/A	N/A	Minor beneficial (not significant)
Economic Impact in Highland	Not significant	N/A	N/A	Negligible Beneficial (not significant)
Economic Impact in Scotland	Not significant	N/A	N/A	Negligible Beneficial (not significant)
Payment of Non-Domestic Rates	Not significant	N/A	N/A	Negligible Beneficial (not significant)
Decommissioning				
Economic Impact in Caithness and Sutherland	Not significant	N/A	N/A	Temporary minor beneficial (not significant)
Economic Impact in Highland	Not significant	N/A	N/A	Temporary negligible beneficial (not significant)
Economic Impact in Scotland	Not significant	N/A	N/A	Temporary negligible beneficial (not significant)
Cumulative Construction				
Economic Impact in Caithness and Sutherland	Not significant	N/A	N/A	Temporary minor beneficial (not significant)
Economic Impact in Highland	Not significant	N/A	N/A	Temporary minor beneficial (not significant)
Economic Impact in Scotland	Not significant	N/A	N/A	Temporary negligible beneficial (not significant)

Table 11.23: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Cumulative Operation				
Economic Impact in Caithness and Sutherland	Not significant	N/A	N/A	Minor beneficial (not significant)
Economic Impact in Highland	Not significant	N/A	N/A	Negligible Beneficial (not significant)
Economic Impact in Scotland	Not significant	N/A	N/A	Negligible Beneficial (not significant)

11.12 Glossary and Abbreviations

11.12.1 The terms in the report which may require definition are given in the table below:

Term (in alphabetical order)	Definition
Direct Impact	These are the economic impacts that are realised within the organisation that is initially effected, for example through being awarded a contract
Gross Value Added (GVA)	Gross Value Added is a measure of the economic value added by an organisation or industry and is typically estimated by subtracting the non-staff operational costs from the revenues of an organisation
Indirect Impact	These are the economic impacts that occur within the supply chain of the organisation that experiences direct impacts
Induced Impact	These are the economic impacts that are realised within the companies which the directly impacted staff spend their wages and salaries.
Job Years of employment	Job Years of employment is a measure of employment which is equivalent to one person being employed for an entire year and is typically used when considering short term employment impacts, such as those associated with construction.

11.12.2 The abbreviations used in this chapter are outlined in the table below.

Abbreviation	Expanded Term
GVA	Gross Value Added

12. OTHER ISSUES

12.1 Executive Summary

12.1.1 This chapter considers the likely significant effects on the following technical disciplines associated with the construction, operation and decommissioning of the Proposed Varied Development:

- Climate and Carbon Balance;
- Air Quality;
- Shadow Flicker;
- Ice throw;
- Major accidents and disasters; and
- Human health.

12.1.2 Table 12.1 below details the reasoning why the majority of the technical disciplines listed above do not require further assessment within this chapter as well as signposting to where further detail is provided elsewhere in the Environmental Impact Assessment Report (EIAR). Table 12.1 concludes that only climate change and carbon balance are required to be assessed in this chapter. Beyond inclusion of a carbon calculator, climate change was not considered in the 2007 Environmental Statement (ES), the 2013 ES Addendum and 2014 Further Information Report (FIR) as the EIA Regulations at those times did not require a climate change assessment. However, as The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 now include the requirement to consider climate change, a high level climate assessment has been prepared for the Proposed Varied Development application. The scope of this assessment includes the following:

- Climate Change Resilience (CCR) - A high level assessment of the vulnerability of the Proposed Varied Development to climate change;
- In-combination Climate Change Impacts (ICCI) - A high level assessment of where climate change could have an additive effect on impacts already identified within other assessments, where residual effects identified could become significant or increase in the future because of the effects of climate change; and
- The influence of the Proposed Varied Development on climate change - A quantification of the effect of the Proposed Varied Development on climate change via the results of the carbon calculator.

12.1.3 The CCR assessment determined that the Proposed Varied Development would be resilient to the effects of climate change and no significant effects are predicted.

12.1.4 The ICCI assessment determined that while receptors could be impacted by climate change, it would not have an additive effect on impacts already identified in the technical assessments and would not result in any residual impacts becoming significant.

12.1.5 The results of the carbon calculator estimated a carbon payback period for the Proposed Varied Development based on a fossil fuel-mix of electricity generation to be 1.5 years. The carbon payback period is considered to be a negligible, beneficial environmental effect that is not significant under the EIA Regulations.

12.1.6 All potential climate change effects are mitigated by topic-specific mitigation measures and there would be no resulting significant effects as a result of the Proposed Varied Development. Therefore, no additional mitigation measures to address the impact of climate change are proposed beyond those described in the remainder of the EIAR. The Applicant is committed to delivering the mitigation set out in the EIAR including the Construction Environmental Management Plan (CEMP) (Technical Appendix 2.1), Peat Management Plan (PMP) (Technical

Appendix 10.2), Flood Risk Assessment (FRA) and Drainage Impact Assessment (DIA) (Technical Appendix 10.4).

12.2 Introduction

12.2.1 This chapter considers the likely significant effects on the following technical disciplines associated with the construction, operation and decommissioning of the Proposed Varied Development:

- Climate and Carbon Balance;
- Air Quality;
- Shadow Flicker;
- Ice throw;
- Major accidents and disasters; and
- Human health.

Content of Chapter

12.2.2 A number of the aforementioned technical disciplines are covered in other EIAR chapters and as such do not need to be repeated here. Table 12.1 below details the reasoning why certain technical disciplines do not require further assessment within this chapter as well as signposting to where further detail is provided elsewhere in the EIAR.

Table 12.1: Scope of Chapter 12: Other Issues		
Technical Discipline	Reasoning for Inclusion / Exclusion	Location of Further Information within EIAR
Climate Change and Carbon Balance	Included ¹ .	Chapter 12: Other Issues.
Air Quality	Excluded. As per the Consented Scheme, the Proposed Varied Development is not considered likely to give rise to significant impacts on air quality. Construction activities would be managed through the implementation of the Construction Environmental Management Plan (CEMP) (EIAR: Volume 4: Technical Appendices) as set out in Condition 18 of the Consented Scheme. Air Quality would be managed through the CEMP.	Refer to Technical Appendix 2.1: CEMP (EIAR Volume 4: Technical Appendices).
Shadow Flicker	Excluded. Figure 12.1 (EIAR Volume 3a: Figures) illustrates there are no residential receptors within an 11 rotor diameter distance ² of the turbines. As such the potential effects of Shadow Flicker have been scoped out of further assessment.	Figure 12.1 (EIAR Volume 3a: Figures).
Ice Throw	Excluded. As set out in the 2019 Scoping Report ³ , standard mitigation for risk of ice throw comprises off-site monitoring to enable deactivation of the turbine upon sensing ice accumulation, as well as physical and visual warnings for both site personnel and third parties. Ice detection is performed by a software application, whereby ice build-up on the turbine blades is determined by comparing the actual	N/A

¹ The previous 2007 Environmental Statement (ES) submission included an Air and Climate chapter however this has now been separated into two separate disciplines as The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 includes the requirement to consider climate. A high level climate assessment has therefore been produced to support the Proposed Varied Development application and is presented within this Chapter.

² An 11 rotor diameter distance is the standard requirement by The Highland Council (THC). In THC's Onshore Wind Energy Supplementary Guidance, November 2016 (with addendum, December 2017) THC states that it expects "wind energy developments to be located a minimum distance of 11 times the blade diameter of the turbine(s) from any regularly occupied buildings not associated with the development." The increase in distance from the widely accepted 10 times rotor diameter to 11 is to account for the northern latitudes of THC area where the Proposed Varied Development is located - this is in line with the conclusions of the DECC Update of UK Shadow Flicker Evidence Base, 2011.

³ Ramboll (2019) Strathy South Wind Farm 2019 – Scoping Report

Table 12.1: Scope of Chapter 12: Other Issues

Technical Discipline	Reasoning for Inclusion / Exclusion	Location of Further Information within EIAR
	performance data with the nominal turbine power curve. The software makes comparisons with pre-defined threshold levels or a low power (ice detection) power curve. When the performance levels drop below the reference thresholds an alarm is generated within the SCADA system to warn the operator. In this instance the system can be configured to pause the turbine or to continue operation at reduced power whilst displaying the level of icing severity. If the turbine is shut down by an icing event, then depending on the system installed, it could be possible to carry out remote re-starting of the turbine when climatic conditions allow. Sometimes a manual start would be required. This would necessitate the operator going to the turbine, where a visual assessment of ice build-up can be made. When attempting to re-start the turbine it would be necessary to put an exclusion zone in place in case of any residual ice throw from the blades. In line with current guidance⁴, a permanent warning sign at the site's entrance is proposed to alert the public to this issue. As such, no detailed assessment is included as part of the EIAR.	
Major Accidents and Disasters	Excluded. The 2017 EIA Regulations require a consideration of the potential for effects or risks associated with major accidents or disasters. This requirement is interpreted as requiring the consideration of low likelihood/ high consequence events which would result in serious harm or damage to environmental receptors. Relevant types of accident/disaster, given the predominantly rural context of the proposed varied development include: • Severe weather events, including high winds, high rainfall leading to flooding, or extreme cold leading to heavy snow and ice loading; • Fire; • Traffic related accidents; and • Mass movement associated with ground instability. A risk assessment process was followed by the Principal Designer during the design stage as part of the requirements of the Construction (Design and Management) Regulations 2015. This ensured that all potential risks were identified at an early stage and appropriate mitigation was implemented as part of the design. Resilience in the event of severe weather and fire is a core component to the wind farm design and turbine design. The Applicant uses a remote operational control system (controller and SCADA systems), which allow both automated and remote user shutdown in order to protect assets in the event of extreme conditions including extreme high wind or ice loading. Flood risk has been considered as part of the design and a Flood Risk Assessment (FRA) has been prepared as part of the EIAR and included in Technical Appendix 10.4 (EIAR Volume 4: Technical Appendices). All watercourse crossings would be designed to convey up to the 1:200 (plus climate change) flood event. It is noted that the site is not considered to be vulnerable to flooding (EIAR Volume 4: Technical Appendix 10.4) and a 70 m buffer has been	Refer to Technical Appendix 10.4: Flood Risk Assessment and Drainage Impact Assessment and Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment (EIAR Volume 4: Technical Appendices).

⁴ Scottish Renewables, Scottish Natural Heritage, SEPA and Forestry Commission Scotland, 2015. Good Practice During Wind Farm Construction, Version 3 [pdf]. Available at: <http://www.snh.gov.uk/docs/A1168678.pdf> [Accessed 08/06/2020].

Table 12.1: Scope of Chapter 12: Other Issues

Technical Discipline	Reasoning for Inclusion / Exclusion	Location of Further Information within EIAR
	applied between site infrastructure for the Proposed Varied Development and watercourses on-site. With respect to protecting the safety of people, the Applicant operates to the highest standards for safety and health⁵, including implementing strict protocols for risk assessment which includes consideration of severe weather, and site based 'dynamic' risk assessment which requires staff to stop work in the event that weather conditions become unsafe. Wind speeds are constantly measured by the nacelle based ultrasonic anemometers, which are permanently heated. There are typically two anemometers located on the nacelle roof, with redundancy that allows continued operation should one malfunction. The outputs from the anemometers are integrated into the controller and SCADA systems to inform and warn the operator. When wind speeds in excess of the cut-out wind speed (determined from the power curve) are experienced the turbine would enter an idle state by pitching the blades out of the prevailing wind. All turbine subsystems would then run in an auto mode configuration. This means the turbine is in a state ready for production until the wind speed falls below the level to cut back in, over a 10-minute average. When this occurs, the turbine would be ready to resume generation and export power. The turbine yaw system would keep the turbine pointing upwind with the subsystems in the auto mode. In addition, rotor speed is constantly monitored to ensure that should any overspeed occur, then the turbine would automatically shut down by pitching the blades to stop position whilst the yaw remains active. Siting assessments and analysis of historic wind speed data will have determined the extreme wind speeds likely to be encountered on the site. The turbines proposed by the manufacturers will have been designed to operate within these conditions. In the event of fire, turbines are located a sufficient distance from settlements and scattered dwellings, such that there would be no significant risk to human health. Wildfire is not considered to have high consequence given the rural nature of the site (with no human population at risk). The turbines are fitted with comprehensive fire detection and warning systems that are integrated to the control and SCADA systems to generate alarms, alert the operator and control the shutdown of the turbine. Smoke and heat detectors are located in the high-risk areas; all electrical panels and controller cabinets, above the switchgear, above the generator and over the high-speed brake disk. Depending on supplier, the transformer enclosure will be monitored by smoke and heat detection or by arc flash detection for immediate shutdown and removal of electrical energy. The system would also close off air vents and stop all fans to reduce air intake to a potential fire and to prevent smoke and/or gasses from being circulated within the tower/nacelle. The weather screen and housing around the machinery in the nacelle is made of fibreglass reinforced laminated panels with fire-protecting properties. The design includes fully integrated lightning and electromagnetic compatibility protection. Both the nacelle and the steel tower act as a Faraday cage thus preventing fire induced by lightning. The blades would be fitted with multiple lightning receptors that conduct to the tower via a slipring	

⁵ SSE (April 2020) Group Safety and Health Policy (including the Major Accident Prevention, Doc Ref: PO-GRP-015. Version: 4.00
URL: <https://www.sse.com/media/hvpv1gww/ext-po-grp-015-group-safety-and-health-policy.pdf> (Accessed August 2020).

Table 12.1: Scope of Chapter 12: Other Issues		
Technical Discipline	Reasoning for Inclusion / Exclusion	Location of Further Information within EIAR
	arrangement. Any excess grease or spilled oil would be gathered in reservoirs to be emptied during scheduled maintenance. The high-speed brake system would be shielded around the moving parts to ensure that any sparks generated would not spread into the nacelle. The use of flammable materials has been eliminated wherever possible by design and halogen free (low smoke) cables are deployed. All construction traffic would be managed in accordance with a detailed traffic management plan, to be agreed with THC. The construction traffic management plan (CTMP) would aim to design out risk of accidents using mitigation measures outlines in EIAR Chapter 8: Roads and Traffic and presented in the CTMP in EIAR Volume 4: Technical Appendix 8.1. A Peat Landslide Hazard Risk Assessment (PLHRA) was completed and has been reported on as part of the EIAR – refer to Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment (EIAR Volume 4: Technical Appendices), therefore no further assessment is required. No significant effects to human health, cultural heritage or the environment more generally have been identified associated with accidents and disasters. During the operational stage, routine maintenance inspections would be completed in order to ensure compliant operation of the Proposed Varied Development. On this basis, no additional environmental information is required to address the requirements of the 2017 EIA Regulations.	
Human Health	Excluded. The following aspects of human health have been considered as part of the EIAR and are covered under the relevant technical chapters within this EIAR: - Noise and vibration; - Roads and traffic; and - Visual amenity.	Refer to Chapter 6: Noise; Chapter 8: Roads and Traffic; Chapter 4: Landscape and Visual Amenity (EIAR Volume 2: Main Report); and Technical Appendix 2.1: Outline CEMP (EIAR Volume 4: Technical Appendices).

12.2.3 Table 12.1 concludes that only climate change and carbon balance will be assessed in detail in this chapter.

12.2.4 The specific objectives of the chapter are to:

- describe the climate change and carbon balance baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including cumulative effects;
- describe the mitigation measures proposed to address likely significant effects;
- assess the residual effects remaining following the implementation of mitigation; and
- provide a comparison of effects between the Consented Scheme and the Proposed Varied Development.

- 12.2.5 This chapter reports on the likely significant effects with respect to climate change and carbon balance associated with the construction, operation and decommissioning of the Proposed Varied Development.
- 12.2.6 This chapter is supported by the figures and technical appendices presented in Table 12.2.

Table 12.2: Supporting Figures and Technical Appendices		
Document Title	Document Description and Information Source (e.g. New Information or reused from 2007 ES, 2013 ES Addendum, 2014 FIR)	Reason for use/reuse
EIAR Volume 3a: Figure 12.1: Shadow Flicker	New information.	Figure to illustrate there are no residential receptors within an 11 rotor diameter distance of the turbines and that the potential effects of Shadow Flicker can be scoped out of further assessment (see Table 12.1 above).
EIAR Volume 4: Technical Appendix 12.1: Carbon Calculator	New information.	Updated carbon calculator presented to reflect carbon balance for the Proposed Varied Development.
EIAR Volume 4: Technical Appendix 2.1: Outline CEMP	New information.	The Outline CEMP as agreed for the Consented Scheme has been updated to reflect the Proposed Varied Development.
EIAR Volume 4: Technical Appendix 10.1: Peat Landslide Hazard Risk Assessment	New information generated for the 2020 EIA. Using recent site investigation data, and from the 2007 ES, 2013 ES Addendum and 2014 FIR, peat landside hazard is assessed for the Proposed Varied Development.	To consider peat landslide hazard risk in accordance with current best practice guidance.
EIAR Volume 4: Technical Appendix 2.4: Peat Management Plan	New information generated for the 2020 EIA. Using recent site investigation data, and from the 2007 ES, 2013 ES Addendum and 2014 FIR assesses peat management for the Proposed Varied Development.	To consider peat management in accordance with current best practice guidance.
EIAR Volume 2: Chapter 5: Ornithology	New information.	An updated chapter has been produced to reflect the Proposed Varied Development. The results of this chapter were used for the ICCI assessment.
EIAR Volume 2: Chapter 9: Ecology	New information.	An updated chapter has been produced to reflect the Proposed Varied Development. The results of this chapter were used for the ICCI assessment.
EIAR Volume 2: Chapter 10: Soil and Water	New information.	An updated chapter has been produced to reflect the Proposed Varied Development. The results of this chapter were used for the ICCI assessment.

Competent Expert Summary

- 12.2.7 The assessment has been carried out by Nathan Swankie of Ramboll. Nathan is a Principal Consultant and has more than 24 years' experience of environmental consulting, with a focus on EIA within the renewable energy sector. The carbon calculator which supports this chapter was prepared by David Nisbet of SLR Consulting Ltd. David is a geologist with 10 years' experience, working within engineering geology in the renewables sector for the last 7 years. He specialises in undertaking geological services in support of onshore wind and electrical transmission projects, working on projects throughout Scotland. A table presenting their relevant qualifications and experience is included in EIAR Volume 4: Technical Appendix 1.2.

12.3 Summary of Effects of Consented Scheme

- 12.3.1 The 2007 ES, the 2013 ES Addendum and 2014 FIR considered climate change at a high level, focussing on the reduction of carbon and carbon dioxide emissions by displacement of fossil fuel fired generation; potential impact of the reduction of carbon sequestration and subsequent release of carbon dioxide due to land disturbance.
- 12.3.2 The 2014 FIR Technical Appendix 4.2: Carbon Calculator concluded that the following reductions in carbon dioxide would be expected if the estimated annual output of the Consented Scheme displaced coal fired generation, grid-mix generation and fossil fuel-mix generation:
- Expected wind farm CO₂ emission saving over coal fired electricity generation = 296,047 tonnes CO₂yr⁻¹ (tCO₂yr⁻¹);
 - Expected wind farm CO₂ emission saving over grid-mix of electricity generation = 148,187 tCO₂yr⁻¹; and
 - Expected wind farm CO₂ emission saving over fossil fuel-mix of electricity generation = 228,808 tCO₂yr⁻¹.
- 12.3.3 The results of the carbon calculator for the Consented Scheme were set out in the 2014 FIR and concluded that the carbon payback period would be expected to be 1.1 years. The 2014 FIR carbon calculator took into account that floated road construction would be used and that best practice construction techniques on-site would be used to minimise impacts on the peat environment.
- 12.3.4 A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line with the current guidance^{6 7 8} using the latest version of the carbon calculator tool (Version 2.9.0).
- 12.3.5 An updated carbon calculator assessment has been undertaken to assess the impact on carbon payback time for the Proposed Varied Development.

12.4 Methodology

Scope of the Assessment

- 12.4.1 As the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) now include the requirement to consider climate change, a high-level climate assessment has been prepared to support the Proposed Varied Development application. The scope of this assessment includes the following:

⁶ Nayak, D.R., Miller, D., Nolan, A., Smith, P. and Smith J.U. (2008). Calculating carbon budgets of wind farms on Scottish peatlands. Available at: <http://www.gov.scot/Publications/2008/06/25114657/0> [Accessed 08/06/2020].

⁷ Nayak, D.R., Miller, D., Nolan, A., Smith, P. and Smith J.U. (2010). Calculating carbon budgets of wind farms on Scottish peatlands. Available at: <http://mires-and-peat.net/pages/volumes/map04/map0409.php> [Accessed 08/06/2020].

⁸ Smith J.U., Graves P., Nayak D.R., Smith P., Perks M., Gardiner B., Miller D., Nolan A., Morrice J., Xenakis S., Waldron S., Drew S. (2011) Carbon implications of windfarms located on peatlands – update of the Scottish Government Carbon Calculator tool. Final Report, RERAD Report CR/2010/05

- Climate Change Resilience (CCR) - A high level assessment of the vulnerability of the Proposed Varied Development to climate change. The study area for the CCR assessment extends to the site boundary. The temporal scope of the CCR assessment is the operational lifetime of the Proposed Varied Development (50 years);
- In-combination Climate Change Impacts (ICCI) – A high level assessment of where climate change could have an additive effect on impacts already identified within other assessments, where residual impacts identified could become significant or increase in the future because of the effects of climate change. The study area for the ICCI assessment matches that of the relevant technical chapter. The temporal scope of the ICCI assessment is the operational lifetime of the Proposed Varied Development (50 years) and takes into consideration a future baseline applicable for specific technical disciplines; and
- The influence of the Proposed Varied Development on climate change – This assessment quantifies the effect of the Proposed Varied Development on climate change via the results of the carbon calculator. The study area extends to the site boundary. The temporal scope of this assessment is the operational lifetime of the Proposed Varied Development (50 years).

Legislation, Policy and Guidance

12.4.2 The scope of the assessment has been informed by the following legislation, policy and guidance.

International

- 12.4.3 The Kyoto Protocol⁹ to the United Nations Framework Convention on Climate Change (UNFCCC) commits state parties to reduce greenhouse gas (GHG) emissions.
- 12.4.4 The Paris Agreement¹⁰ builds upon the UNFCCC and sets out efforts for all nations to combat climate change and adapt to its effects.
- 12.4.5 The EIA Directive 2014/52/EU¹¹; transposed in Scotland through The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. The EIA Regulations introduced the need to consider climate as part of EIA.

National

- 12.4.6 The Climate Change (Scotland) Act 2009¹² amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019¹³ established the context for Scottish Government action. A target reduction of net zero (100% reduction) emissions by 2045 with an interim target of a 56% reduction in emissions by 2020 and 75% reduction in emissions by 2030 is established. The 2019 Act requires local authorities to act in a way that contributes and helps deliver these emission targets.
- 12.4.7 The Scottish Government Climate Change Plan (CCP) (2018-2032)¹⁴ sets out how Scotland will continue to improve resilience to climate change and reduce emissions over the period to 2032.

⁹ UNFCCC (2020) What is the Kyoto Protocol? Available at: https://unfccc.int/kyoto_protocol [Accessed 08/06/2020].

¹⁰ UNFCCC (2015) Paris Agreement. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> [Accessed 08/06/2020].

¹¹ Directive 2014/52/EU of the European Parliament and of the Council of 16th April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the Environment. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052> [Accessed 08/06/2020].

¹² An Act of the Scottish Parliament to amend the Climate Change (Scotland) Act 2009 to make provision about advice, plans and reports in relation to GHG and adaptation to climate change. Available at: <http://www.legislation.gov.uk/asp/2009/12/contents> [Accessed 08/06/2020].

¹³ An Act of the Scottish Parliament to amend the Climate Change (Scotland) Act 2009 to make provision setting targets for the reduction of greenhouse gases emissions and to make provision about advice, plans and reports in relation to those targets. Available at: <http://www.legislation.gov.uk/asp/2019/15/enacted> [Accessed 08/06/2020].

¹⁴ Scottish Government (2018) Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3) – summary. Available at: <https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018-9781788516488/> [Accessed 06/08/2020].

The CCP specifies the framework for Scotland's transition to a low-carbon economy and aligns with the Scottish Energy Strategy¹⁵.

- 12.4.8 UK Climate Change Risk Assessment 2017: Evidence Report - Summary for Scotland¹⁶ presents anticipated climate risks for Scotland and the Scottish Adaptation Programme addresses the risks identified. The Adaptation Programme replaced the existing adaptation framework which already contributes to building resilience and capacity to adapt to climate change.
- 12.4.9 The Scottish Government addresses climate change in the context of planning through the National Planning Framework (NPF3)¹⁷. NPF3 recognises that planning will play a key role delivering on the commitments set out in Scottish Government proposals and policies relating to climate change. While NPF3 does not set out the role of EIA in climate change mitigation and adaptation, it does state 'A Low Carbon Place' as a key planning strategy to help reduce Scotland's GHG emissions and adapt to and mitigate against climate change. 'A Low Carbon Place' is also one of the objectives of Scottish Planning Policy (SPP) 2014¹⁸ whereby an outcome of SPP is to reduce carbon emissions and adapt to climate change.
- 12.4.10 The Institute of Environmental Management and Assessment (IEMA) published provisional guidance¹⁹ in 2020 to standardise UK climate change assessments. This guidance outlines the process for the effective consideration of climate change resilience and adaptation in the EIA process. This guidance provides the framework for the assessment reported in this chapter.

Local

- 12.4.11 The Highland Council's document 'Adapting to the impacts of climate change in the Highlands'²⁰ highlights the main issues and priorities for the region.

Consultation

- 12.4.12 A summary of the consultation undertaken is presented in Table 12.3.

Table 12.3: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
Energy Consents Unit (ECU) 18 July 2019	Scoping	All air and climate elements including impacts on air quality and the vulnerability of the Proposed Varied Development to climate change to be covered by the EIAR.	EIAR Volume 2: Chapter 12: Other Issues covers the potential effects of the Proposed Varied Development to climate change. As per the Consented Scheme, the Proposed Varied Development is not considered likely to give rise to significant impacts on air quality. Construction activities and air

¹⁵ Scottish Government (2017) The future of energy in Scotland: Scottish energy strategy. Available at: <https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/> [Accessed 06/08/2020].

¹⁶ ASC (2016) UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Scotland. Available at: <https://www.adaptationscotland.org.uk/how-adapt/tools-and-resources/uk-climate-risk-assessment-2017-scotland-summary> [Accessed 08/06/2020].

¹⁷ Scottish Government (2014). National Planning Framework 3. Available at: <https://www.gov.scot/publications/national-planning-framework-3/> [Accessed 08/06/2020].

¹⁸ Scottish Government (2014). Scottish Planning Policy. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/06/scottish-planning-policy/documents/00453827-pdf/00453827-pdf/govscot%3Adocument/00453827.pdf> [Accessed 14/08/2020].

¹⁹ IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption. Available at: <https://www.iema.net/assets/newbuild/Policy%202020/IEMA%20EIA%20Climate%20Change%20Resilience%20June%202020.pdf> [Accessed 27/07/2020].

²⁰ The Highland Council (2012). Adapting to the Impacts of Climate Change in the Highlands. Available at: https://www.highland.gov.uk/downloads/file/3584/adapting_to_climate_change [Accessed 08/06/2020].

Table 12.3: Consultation Summary Table			
Consultee & Date	Scoping / Other Consultation	Issue Raised	Response / Action Taken
			quality would be managed through the implementation of the CEMP. Refer to EIAR Volume 4: Technical Appendix 2.1: CEMP.
		A carbon calculator should be provided.	Refer to EIAR Volume 4: Technical Appendix 12.1: Carbon Calculator.
RSPB Scotland 25 May 2019	Scoping	RSPB noted that it objected to the original Strathy South Wind Farm for a number of reasons including the results of the carbon calculator.	SEPA reviewed the carbon calculator information supplied for the 2014 FIR and confirmed there was sufficient confidence in the expected carbon payback figure of 1.1 years for it to be used by Scottish Ministers as a material consideration. Scottish Ministers accepted this advice. The results of the updated carbon calculator are provided for the Proposed Varied Development in EIAR Volume 4: Technical Appendix 12.1: Carbon Calculator. It should be noted that the updated carbon calculator uses the same assumptions as the 2014 FIR carbon calculator. The reference for the online version of the carbon calculator ²¹ is H823 UAJR 7P81.

Baseline Conditions

Desk Study

Climate Change Resilience and In-combination Climate Change Impacts Assessment

- 12.4.13 The CCR and ICCI assessments have been informed by historic and projected changes in climate variables.
- 12.4.14 Historic climate data published by the Met Office²² provides climate averages for the period 1981 to 2010 at various spatial scales including weather station, regional and national data.
- 12.4.15 The Met Office publishes future climate projections through the UK Climate Projections website²³. The UK Climate Projections Report 2018 (UKCP18) is the official source for UK climate projections of a range of climate variables for different time slices until the end of the century. Climate projections can be used to determine the likely future climate conditions in the locality of the Proposed Varied Development through its operational life (50 years). Refer to EIAR Volume 2: Chapter 2: Description of the Development for more information on the Proposed Varied Development.

²¹ <https://informatics.sepa.org.uk/CarbonCalculator/index.jsp>

²² Met Office (2020). UK Climate Averages. Available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gfkgdgj2j> [Accessed 08/06/2020].

²³ Met Office (2018). UKCP18 data. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/download-data> [Accessed 08/06/2020].

12.4.16 Climate projections take into account uncertainty due to natural variability and an incomplete understanding of the climate system and its imperfect representation in models. The projections do this by giving the probabilities of a range of possible outcomes, as estimated by scientific methodology. Good practice in the UK uses UKCP18 projections and published literature such as Scotland Climate Change Risk Assessment²⁴.

12.4.17 The probabilistic projections in the UKCP18 provide local low, central and high changes across the UK, corresponding to various probability levels (e.g. 10%, 50% and 90%). There are also a number of Representative Concentration Pathways (RCPs) available for UKCP18 with each pathway resulting in a different range of global mean temperature increases over the 21st century.

Influence of the Proposed Varied Development on Climate Change

12.4.18 A desk study was undertaken to ascertain the national carbon dioxide emissions statistics and Scottish Government carbon budgets.

12.4.19 National carbon dioxide emissions statistics are published by the UK Government and contain historic emissions data covering 2007 - 2017 for all local authorities and councils.

12.4.20 Under the Climate Change Act 2008 (the 2008 Act), the UK Government must set five-yearly carbon budgets, twelve years in advance, from 2008 to 2050. The Climate Change (Scotland) Act 2009 required an 80% reduction in GHG emissions in Scotland by 2050, compared to the 1990-1995 baseline. The Scottish Government has since passed the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 which has set a target of reducing domestic emissions to net zero by 2045.

12.4.21 Applications under Section 36 of the Electricity Act 1989 are required to calculate potential carbon losses and savings on Scottish peatlands. The Scottish Government's carbon calculator tool allows a consistent and comprehensive assessment of the carbon impact of wind farm developments. The associated technical guidance²⁵ on how to use the carbon calculator was reviewed as part of the desk-study.

12.4.22 Further data sources used in the carbon balance assessment are set out in EIAR Volume 4: Technical Appendix 12.1. The assessment was informed by the data from the previous peat depth surveys undertaken for the previous submissions. Three phases of peat depth surveys have been undertaken, initially by Mouchel Parkman²⁶ as part of the 2007 ES²⁷ with additional probing and sampling undertaken by SLR²⁸ as part of the 2013 ES Addendum²⁹ and 2014 FIR³⁰ for the Consented Scheme. Refer to the Peat Landslide Hazard and Risk Assessment (PLHRA) in Technical Appendix 10.1 (EIAR Volume 4) and the Draft Peat Management Plan (PMP) in Technical Appendix 10.2 (EIAR Volume 4) for further information.

²⁴ ASC (2016). UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Scotland. Available at: <https://www.adaptationscotland.org.uk/how-adapt/tools-and-resources/uk-climate-risk-assessment-2017-scotland-summary> [Accessed 08/06/2020].

²⁵ Scottish Government (no date on document). Calculating potential carbon losses and savings from wind farms on Scottish peatlands (Technical note – Version 2.10.0). Available at: <https://www.gov.scot/publications/carbon-calculator-technical-guidance/> [Accessed 08/06/2020].

²⁶ Mouchel Parkman (2007). Peat Stability Risk Assessment. Appendix 14.1 Strathly South Windfarm, EIA Volume 4: Technical Appendices, 2007 Environmental Statement.

²⁷ SSE (2007). Strathly South Wind Farm, Environmental Statement.

²⁸ SLR Consulting Ltd (2013) Strathly South Wind Farm, Peat Landslide and Hazard Risk Assessment Appendix A14.1 Strathly South Wind Farm, ES Volume 4: Technical Appendices

²⁹ SSE Renewables (2013). Strathly South Wind Farm, Environmental Statement Addendum.

³⁰ ENVIRON, on behalf of SSE Generation Ltd (2014). Strathly South Wind Farm, Further Information Report (T39 Layout) (FIR).

Modelling Methodology

- 12.4.23 The modelling methodology followed for the carbon calculator is set out in in EIAR Volume 4: Technical Appendix 12.1. The online version of the carbon calculator²¹ used was v1.6.1 and the reference number is H823 UAJR 7P81.

Field Study

- 12.4.24 As set out in EIAR Volume 2: Chapter 10: Soil and Water and EIAR Volume 4: Technical Appendix 10.2: Peat Management Plan, a detailed site visit and walkover survey was undertaken by SLR Consulting Ltd in September 2019 and RPS in February 2020 in order to: verify the information collected during the desk and baseline studies completed for the 2007 ES, 2013 ES Addendum and 2014 FIR as well as this assessment; inspect rock exposures and establish by probing, an estimate of overburden thicknesses, peat depth and stability; confirm underlying substrate, based on the type of refusal of a peat probe and by coring; and gather an understanding of the site, determine gradients, potential borrow pit locations, access routes, ground conditions, etc., and to assess the relative location of components of the Proposed Varied Development in relation to soil and water.
- 12.4.25 The data obtained as part of the desk study and collected as part of the field work has been processed and interpreted to complete the impact assessment.

Cumulative Baseline

Climate Change Resilience and In-combination Climate Change Impacts Assessment

- 12.4.26 The climate resilience risks identified are limited in their spatial extent to the site and therefore no cumulative effect with other cumulative developments is considered. For in-combination climate impacts, IEMA guidance³¹ states inter-project cumulative effects are anticipated on the basis that climate change adaptation effects and impacts are specific to the development and would not result in impacts to neighbouring development.

Influence of the Proposed Varied Development on Climate Change

- 12.4.27 Carbon dioxide emissions contribute cumulatively with all sources of carbon dioxide emissions globally to cause climate change. This assessment has considered carbon dioxide emissions in the context of carbon dioxide emissions in Scotland and no further consideration of the Proposed Varied Development's carbon dioxide emissions with other sources of carbon dioxide is considered necessary.

Identification of Potential Effects

- 12.4.28 To identify potential effects associated with the Proposed Varied Development, the following key tasks have been completed:
- the 2007 ES, 2013 ES Addendum and 2014 FIR assessments have been reviewed;
 - a detailed desk study has been completed using current data sources; and
 - the findings of the desk study have been validated by a recent programme of field work.
- 12.4.29 The identification of potential effects has also considered current legislation and planning policy relevant to climate change, best practice guidance and standards, and the professional judgement of the EIA team.

Climate Change Resilience

- 12.4.30 The Climate Change Resilience assessment identified the aspects of the Proposed Varied Development that are potentially vulnerable to the effects of climate change. Potential

³¹ IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption. Available at: <https://www.iema.net/assets/newbuild/Policy%202020/IEMA%20EIA%20Climate%20Change%20Resilience%20June%202020.pdf> [Accessed 27/07/2020].

vulnerabilities which could affect the Proposed Varied Development are identified and assessed against climate projections. A qualitative judgement, relating to the consequences of any impact of climate change on the Proposed Varied Development is presented.

12.4.31 The following climate related parameters are considered to have the potential to impact upon the Proposed Varied Development:

- Wind speed;
- Temperature; and
- Precipitation.

In-combination Climate Change Impacts Assessment

12.4.32 The ICCI assessment identifies where climate change may have an additive effect on impacts already identified within other technical assessments, where residual impacts identified could become significant or increase in the future because of the effects of climate change. Reference is made to the specific assessment chapters, where the sensitivity of receptors is discussed. Assessments are not repeated here and are discussed in more detail in Table 12.5 and Table 12.9.

12.4.33 The ICCI assessment reviews the identified residual effects for each technical discipline contained within the EIAR using the same terminology as the relevant discipline.

Influence of the Proposed Varied Development on Climate Change

12.4.34 Applications under Section 36 of the Electricity Act 1989 are required to calculate potential carbon losses and savings on Scottish peatlands. The Scottish Government's carbon calculator tool allows a consistent and comprehensive assessment of the carbon impact of wind farm developments. This is done by comparing the carbon costs of wind farm developments with the carbon savings attributable to the wind farm.

12.4.35 The carbon assessment methodology used is consistent with that published by the Rural and Environment Research and Analysis Directorate of the Scottish Government entitled 'Calculating carbon savings from wind farms on Scottish peatlands – a new approach'³² and revised equations for GHG emissions³³.

Assessment of Residual Effects

Criteria for Assessing Sensitivity of Receptors

Climate Change Resilience

12.4.36 The IEMA guidelines³⁴ state that receptor sensitivity is based on the importance or value of the receptor as well as the susceptibility of the receptor (e.g. the ability to be affected by a change) and the vulnerability of the receptor (e.g. the potential exposure to a change). High sensitivity receptors have no ability to withstand/not be substantially altered by the projected changes to the existing/prevaling climatic factors and the receptor is directly dependent on existing/prevaling climatic factors and is reliant on these specific exiting climate conditions continuing in the future or is only able to tolerate a very limited variation in climate conditions. Moderate sensitivity receptors have some limited ability to withstand/not be altered by the projected changes to the existing/prevaling climatic factors and the receptor is dependent on some climatic factors but is able to tolerate a range of conditions. Low sensitivity receptors have the ability to withstand/not

³² Nayak et al (2008, 2010) and Smith (2011). Calculating Carbon Savings from Wind Farms on Scottish Peatlands - A New Approach. Available at: <https://www.gov.scot/publications/calculating-carbon-savings-wind-farms-scottish-peat-lands-new-approach/pages/11/> [Accessed 08/06/2020].

³³ Nayak, D.R., Miller, D., Nolan, A., Smith, P. and Smith, J.U (2008 & 2010) Wind Farm and Carbon Savings – Technical Note v.2 2.10.0. Input Parameters.

³⁴ IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption. Available at: <https://www.iema.net/assets/newbuild/Policy%202020/IEMA%20EIA%20Climate%20Change%20Resilience%20June%202020.pdf> [Accessed 27/07/2020].

be altered much by the projected changes to the existing/prevaling climatic factors and climatic factors have little influence on the receptors.

12.4.37 A summary of the receptors identified as being sensitive to climate change are as follows:

- Construction workers at the site (moderate sensitivity);
- Construction activities (i.e. materials, programme, cost etc.) (moderate sensitivity);
- Operational site personnel (moderate sensitivity); and
- The Proposed Varied Development (e.g. track surfaces; turbine foundations; substation etc.) (moderate sensitivity).

In-combination Climate Change Impacts Assessment

12.4.38 The ICCI assessment reviews the receptors identified in the residual effects for each discipline contained within the EIAR using the same terminology as the relevant discipline.

Influence of the Proposed Varied Development on Climate Change

12.4.39 Construction carbon emissions associated within the Proposed Varied Development would be released to the atmosphere in Scotland. Therefore, the atmosphere is considered to be the receptor. In line with standard practice, the sensitivity of human and natural receptors is not considered within this assessment.

Criteria for Assessing Magnitude of Change

Climate Change Resilience and In-combination Climate Change Impacts Assessment

12.4.40 The magnitude of change associated with future climate projections has been determined from a comparison with the annual observed changes in climate variables recorded in UKCP18³⁵. The annual observed changes in climate variables are set out in the Baseline Conditions section below.

Influence of the Proposed Varied Development on Climate Change

12.4.41 The carbon calculator methodology calculates total carbon dioxide savings and payback time for the Proposed Varied Development. The carbon payback time is the measurement indicator to assess the influence of the Proposed Varied Development on climate change. The shorter the payback period, the greater the benefit the Proposed Varied Development would have in displacing emissions associated with electricity generated by burning fossil fuels. The payback period has been calculated by using the total carbon cost (carbon loses) of the Proposed Varied Development and dividing by the annual carbon gains from displaced fossil fuel power generation and any site improvements.

Criteria for Assessing Significance

12.4.42 The IEMA guidelines³⁶ state the following with regards to the assessment of significance in the context of climate change assessments:

"Once the sensitivity and magnitude have been determined, these should be combined to reach an overall judgement on the significance of the likely environmental effect."

"Appropriate criteria for sensitivity, magnitude and significance for the climate resilience assessment should be developed on a project-by-project basis."

³⁵ Met Office (2018). UKCP18 data. Available at: <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/download-data> [Accessed 08/06/2020].

³⁶ IEMA (2020). Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption. Available at: <https://www.iema.net/assets/newbuild/Policy%202020/IEMA%20EIA%20Climate%20Change%20Resilience%20June%202020.pdf> [Accessed 27/07/2020].

"The uncertainty of the combined effect needs to be taken into account. If uncertainty about how a receptor will adapt to a changing climate is high, then it is recommended that a conservative threshold of significance is adopted within the evaluation in terms of sensitivity and/or magnitude of the effect".

12.4.43 To determine whether effects are significant under the EIA Regulations, it is appropriate to consider the sensitivity (value and resilience) of the receptor and the magnitude of the impact, taking into account uncertainty. This is based on the professional judgement of the assessor.

12.4.44 The categories of significance which effects are assessed as:

- negligible – no detectable or material change to a location, environment, species or sensitive receptor;
- minor – a detectable but non-material change to a location, environment, species or sensitive receptor;
- moderate – a material, but non-fundamental change to a location, environment, species or sensitive receptor; or
- major – a fundamental change to a location, environment, species or sensitive receptor.

12.4.45 Effects assessed can be both beneficial or adverse as a result of the Proposed Varied Development and the impacts of climate change. Sensitivity of climate change receptors is inherently linked to the magnitude of change. Whilst receptors may be considered "high-value", a non-material magnitude of change would result in any effect being considered not significant.

Assumptions and Limitations

12.4.46 Climate projections can be used to determine likely future trends in climate conditions in the locality of the Proposed Varied Development through its lifetime. The climate trends included in this assessment are based on a range of GHG emissions scenarios which are subject to a degree of uncertainty. How the climate will react to different levels of emissions is also uncertain.

12.4.47 Data sources and assumptions used in the carbon balance assessment are detailed in EIAR Volume 4: Technical Appendix 12.1: Carbon Calculator.

12.5 Baseline Conditions

Current Baseline

12.5.1 The local climate baseline is provided by Met Office UK Climate Averages data which presents a set of 30-year averages, covering the period 1981 - 2010 for a range of parameters and locations. The nearest meteorological Met Office climate station to the site is Altnaharra.

12.5.2 Climate data available for Altnaharra³⁷ show annual maximum and minimum temperatures both being lower than the UK average (an average of 11.7°C maximum and 3.6°C minimum temperature compared to a UK average of 12.4°C and 5.3°C respectively). The data also shows more days of air frost experienced annually (an average of 77.6 annual air frost days in comparison to the UK annual average of 54.6 days). The average annual rainfall for Altnaharra is 1196.3 mm, compared to a UK average of 1154 mm.

12.5.1 Climate Ready Scotland, Scotland's Climate Change Adaptation Programme³⁸ details historic climate trends, which can inform and provide context for future projections. The following trends have been observed across Scotland:

³⁷ Met Office (no date). UK climate averages Altnaharra SAWS. Available at: <https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gfkgdgj2j> [Accessed 09/06/2020].

³⁸ Climate Ready Scotland (2019). Second Scottish Climate Change Adaptation Programme 2019-2024. Available at: <https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/> [Accessed 09/06/2020].

- Average temperature in the 2000s was 0.9°C warmer than the 1961-1990 average and warmer than any other decade since records began in 1910³⁹;
- Annual precipitation and river flow data show an increase in winter precipitation of almost 70% in northern Scotland since 1961; and
- Annual precipitation across Scotland has increased by 20% since 1961. Note: this has not been seasonally consistent across the country with northern areas of Scotland experiencing drier summertime conditions over the same period (1961 - 1990).

12.5.2 The UK Climate Projection Report: The Climate of the UK and Recent Trends⁴⁰ provides observed climate data for UK regions. Table 12.4 indicates the observed changes in climatic variables between 1961 and 2006 (reported at the 95% confidence level) for the north of Scotland where the Proposed Varied Development is located.

Table 12.4: Observed Changes in Climate Variables for the North of Scotland (1961-2006)	
Climate Variable	Annual Observed Change (1961-2006)
Daily mean temperature	+ 1.05 °C
Daily maximum temperature	+1.18 °C
Daily minimum temperature	+ 0.97 °C
Change in days of air frost	- 24.6 days
Change in cooling degree days	+ 3.4 days
Change in heating degree days	- 11.5 days
Percentage change in total precipitation	+ 23%
Change (days) in days of rain $\geq$ 1 mm	+ 7.7 days
Change in mean sea-level pressure (hectopascal (hPa))	- 0.6 hPa
Change in relative humidity	- 3.2%

12.5.3 Whilst no change was observed, the annual average 10 m wind speed between 1971 and 2000 varied between 3 – 24 knots depending on the location in northern Scotland.

12.5.4 Section 10.5 of EIAR Volume 2: Chapter 10: Soil and Water sets out the baseline for the peat conditions on-site. As the site is currently undeveloped, baseline carbon emissions to the atmosphere are considered to be minimal, however it is widely acknowledged that peatlands sequester, and store carbon and the amount sequestered by peat bog varies depending on its condition. The afforestation of the former blanket bog has caused degradation of the peatland habitats present. Draining of the site for the purposes of afforestation has caused drying, oxidation, erosion and release of particulate and dissolve organic carbon into watercourses; these effects increase carbon release rather than the site being a source of carbon capture, and carbon release to watercourses increases the potential for acidification, a lack of pH buffering and a decrease in habitat suitability for aquatic species. As the conifer plantation continues to mature (if not felled for the purposes of the proposed development), such issues will continue and potentially increase as drying of the peatlands and lowering of the associated water table continues.

Future Baseline

12.5.5 Each of the technical assessments contained within the EIAR consider the future baseline conditions at the site and surrounding areas, taking into account other activities and projects in the

³⁹ Scottish Government (2018). Climate Change Plan: The Third Report on Proposals and Policies 2018-2032. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/corporate-report/2018/02/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/documents/00532096-pdf/00532096-pdf/govscot%3Adocument/00532096.pdf> [Accessed 09/06/2020].

⁴⁰ Jenkins, G.J., Perry, M.C., & Prior, M.J. (2008) The Climate of the UK and Recent Trends. Met Office, Hadley Centre, Exeter, UK.

area (irrespective of the Proposed Varied Development) that will bring foreseeable changes to the baseline conditions. The future baseline scenarios for each of the technical environmental assessments are contained within the relevant technical chapter in Volume 2: Main Report of the EIAR.

- 12.5.6 The climate projections for the period 2060-2079 are the most appropriate given the proposed design life of 50 years for the Proposed Varied Development. Taking a precautionary approach, a central estimate (50th percentile) high emissions scenario (RCP8.5) from UKCP18 has been used and is presented below for the climate variables considered relevant to this assessment. RCP8.5 represents a pathway in which global GHG emissions continue to rise.
- 12.5.7 In general, the trends across the UK become more pronounced over time with more extreme trends arising by 2060:
- Milder, wetter winters (increase in mean winter rainfall; increase in mean temperatures; decreased frequency of cold weather events);
 - Warmer, drier summers (increased frequency of dry spells; increase in mean temperatures; decrease in mean summer rainfall); and
 - Increase in frequency of extreme weather (increase in heatwaves; increased frequency of heavy rainfall events).
- 12.5.8 The climate parameters considered most relevant to the assessments referenced within this chapter are wind speed, temperature and precipitation.

Wind speed

- 12.5.9 A small increase in the frequency of windstorms across the UK, especially in the winter months, is projected during the second half of the 21st century. However, wind speed change is dominated by natural and complex variability with other climatic systems such as the North Atlantic Oscillation⁴¹.
- 12.5.10 These projections are in line with the findings by Pryor and Barthelmie⁴² who concluded that in the near-term (i.e. until the 2050s) there will be no detectable significant change in the wind resource of northern Europe.

Temperature

- 12.5.11 In general, UKCP18 projections for the north of Scotland indicate increased likelihood of milder winters and warmer summers for the latter part of the future assessment period in comparison to the baseline.
- 12.5.12 The over land projections indicate an increase in mean winter temperatures by up to 2°C and an increase in mean summer temperature by up to 3°C. In addition to an increase in average temperatures, UKCP18 projects an increase in the frequency of extreme temperature events. However, due to natural variability, some cold winters will still occur.

Precipitation

- 12.5.13 In general, the over land projections for the north of Scotland indicate an increase in winter precipitation and a decrease in summer precipitation for the latter part of the future assessment period in comparison to the baseline.
- 12.5.14 The over land projections indicate an increase in winter precipitation by up to 30% and a decrease in summer precipitation by up to -30% (RCP8.5 - 50th percentile). In addition to the changes to

⁴¹ Rockel and Woth (2007). Extremes of near-surface wind speed over Europe and their future changes as estimated from an ensemble of RCM simulations, Climatic Change, 81(1). Available at <http://prudence.dmi.dk/public/publications/PSICC/Rockel&Woth.pdf> [Accessed 09/06/2020]

⁴² Pryor, S.C. and Barthelmie, R. J. (2010). Climate Change Impact on Wind Energy: A Review. Renewable and Sustainable Energy Review, 14(1): 430-437.

average precipitation levels, UKCP18 projects an increase in the frequency of dry spells. However, due to natural variability, some dry winters will still occur.

Greenhouse Gas Emissions and Renewable Energy

- 12.5.15 The Digest of United Kingdom Energy Statistics (DUKES) 2018⁴³ provides details of the sources used in generation of electricity throughout 2017 by major power producers. Of a total of 52.79 million tonnes of oil equivalent (mtoe) generated in 2017 within the UK, 27.9 mtoe were generated by natural gas, oil and coal, and 7.7 mtoe were generated from renewable resources. These numbers demonstrate that fuels which emit high levels of carbon emissions are currently generating the majority of electricity within the UK.
- 12.5.16 The Scottish Government has set ambitious targets for reductions in greenhouse gas emissions. Most of Scotland's electricity requirements are currently met by renewable energy, with most of this growth over the past two decades attributed to a substantial increase in onshore wind developments. With the continued development of onshore wind farms, in the planning and pre-construction phases, it is anticipated that onshore wind farms will continue to make a sizeable contribution to the energy generated from renewable energy technologies within Scotland.
- 12.5.17 In the future, it is expected the GHG/carbon intensity will continue to decline in Scotland due to a combination of factors including:
- UK and Scottish Government carbon budget;
 - Local carbon reduction targets; and
 - Decarbonisation of industry, energy supply and transportation.

Identified Sensitive Receptors

Climate Change Resilience

- 12.5.18 A summary of the receptors identified as being sensitive to climate changes are as follows:
- Construction workers at the site;
 - Construction activities i.e. materials, programme, cost etc.;
 - Operational site personnel; and
 - The Proposed Varied Development (e.g. track surfaces; turbine foundations; substation, associated infrastructure etc.) during the operational phase.

In-combination Climate Change Impacts Assessment

- 12.5.19 The ICCI assessment reviewed the receptors identified in the residual effects for each discipline contained within the EIAR using the same terminology as the relevant discipline.
- 12.5.20 The following EIAR topics have been scoped out of the ICCI assessment as potential interactions of climate change with the identified effects are considered to be negligible, therefore no in-combination climate effects are anticipated:
- Chapter 4: Landscape and Visual Amenity;
 - Chapter 6: Noise;
 - Chapter 7: Cultural Heritage;
 - Chapter 8: Roads and Traffic; and
 - Chapter 11: Socio-economics, Recreation and Tourism.
- 12.5.21 All phases of development have been included in this assessment.

⁴³ Department for Business, Energy & Industrial Strategy (2018). Digest of United Kingdom Energy Statistics 2018. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/736148/DUKES_2018.pdf (Accessed 09/06/2020)

Influence of the Proposed Varied Development on Climate Change

- 12.5.22 Construction carbon emissions associated within the Proposed Varied Development would be released to the atmosphere in Scotland. Therefore, this is considered to be the receptor. In line with standard practice, the sensitivity of human and natural receptors is not considered within this assessment.

12.6 Potential Significant Effects

Potential Construction Effects

Climate Change Resilience

- 12.6.1 The receptors that could potentially be vulnerable to the effects of climate change during the construction stage are construction workers at the site and construction activities (materials, programme, cost etc.). These have been classed as moderately sensitive receptors which are affected by changes in climate but not dependent on specific conditions. A high-level qualitative assessment has been completed to identify any potential significant effects on these receptors as a result of climate change. The vulnerability of the construction stage receptors has been assessed against the climate projections set out in the Future Baseline section of 12.5: Baseline Conditions above. Wind speed, temperature and precipitation were identified as the climate related parameters considered to have the most potential to impact upon the Proposed Varied Development.
- 12.6.2 In the near term, there will be no detectable significant change in the wind resource of northern Europe. As such there would be no impact on the Proposed Varied Development as a result of this aspect of climate change.
- 12.6.3 The projected increases in average temperatures, increase in frequency of extreme weather events and changes to precipitation levels could impact the construction phase of the Proposed Varied Development as set out below.
- Higher temperatures and heatwaves could impact construction workers e.g. heat stress and unsafe working conditions;
 - Hot and dry weather can impact the amount of dust generated during construction which could impact on the health of construction workers and could impact upon construction machinery causing damage;
 - Increases in the frequency or intensity of rainfall events could result in overland flows causing the erosion of stockpiles, borrow pits and cable trenches resulting in the silting of drainage assets and subsequent localised surface water flooding;
 - Rainfall can impact the ability to undertake certain construction activities such as pouring of concrete. This could result in delays to the construction programme;
 - Increases in the frequency or intensity of rainfall events could overwhelm drainage assets design capacity which could lead to localised surface water flooding in the vicinity of construction compounds, materials and other construction infrastructure;
 - Increases in the frequency or intensity of rainfall events and overland flows could result in peat slip which could cause damage to floating and non-floating access tracks and infrastructure; and
 - Drought conditions could result in dry and desiccated soils leading to soil erosion. This could cause sedimentation of drainage, reducing their capacity and increasing the risk of flooding.
- 12.6.4 Risks to construction workers would be managed through existing health and safety procedures which are considered to be appropriate to account for climate change.

- 12.6.5 The CEMP (see EIAR Volume 4: Technical Appendix 2.1: CEMP), contains best practice dust, pollution and materials management mitigation measures which are considered to be appropriate to account for climate change.
- 12.6.6 As set out in EIAR Volume 2: Chapter 10: Soil and Water, pollution control guidelines would be followed, and watercourse crossings would be regulated by SEPA regulations⁴⁴ and have a conveyance capacity of at least the 200-yr storm plus an allowance for climate change.
- 12.6.7 The site-specific FRA and DIA factor in the 200-yr flood event plus an allowance for climate change.
- 12.6.8 Best endeavours would be made to ensure more vulnerable construction activities such as construction of earthworks, would take place in appropriate weather conditions and would be undertaken in accordance with the CEMP.
- 12.6.9 Best practice peat management would be employed during the construction works as set out in EIAR Volume 4: Technical Appendix 2.1: CEMP, Technical Appendix 10.1: PLHRA and Technical Appendix: 10.2: PMP. As set out in the PMP, monitoring of large areas of peat storage during wet weather or snowmelt would be undertaken to identify any early signs of peat instability.
- 12.6.10 As such, it is considered that the construction phase of the Proposed Varied Development would be resilient to the effects of climate change and no significant effects are predicted.

In-combination Climate Change Impacts Assessment

- 12.6.11 Table 12.5 presents a qualitative summary of potential in-combination climate impacts of extreme weather events on the Proposed Varied Development using professional judgement.
- 12.6.12 The potential for environmental receptors to be impacted by the Proposed Varied Development is assessed in Chapters 4-10 of this EIAR (EIAR: Volume 2). Of these ecological, ornithological and hydrological receptors are the most sensitive to climate change and are discussed further below.
- 12.6.13 As outlined above, in the near-term there will be a minimal change in the regional wind resource and therefore no noticeable change to the future baseline as a result of this parameter. Projected changes to the mean winter and summer temperature in the north of Scotland are projected as up to 2°C in winter and up to 3°C in summer. Estimates of annual mean precipitation amounts show a projected increase in winter precipitation by up to 30% and a decrease in summer precipitation by up to -30%. There is also predicted to be an increase in the frequency of dry spells and extreme temperature events.
- 12.6.14 A summary of the effects of these changes on relevant receptors that are potentially sensitive to climate change (i.e. ecological, ornithological and hydrological receptors) are summarised in Table 12.5.

Table 12.5: Climate Change Effects on Environmental Receptors – Construction Phase			
Receptor	Relevant Climate Change Effect	Effect on Receptor	Significance of Effect
Chapter 5: Ornithology			
Ornithological receptors	Temperature – up to +2°C in winter and +3°C in summer. Precipitation – up to 30% increase in winter precipitation and up to - 30% decrease in summer precipitation.	A rise in temperature and changes to precipitation levels have the potential to impact on habitats which in turn may influence the composition or relative species abundance within the bird	Not significant.

⁴⁴ SPEA (2019). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Available at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf [Accessed 10/06/2020]

Table 12.5: Climate Change Effects on Environmental Receptors – Construction Phase

Receptor	Relevant Climate Change Effect	Effect on Receptor	Significance of Effect
	Negligible change in wind speeds.	community. Based on a potential transition from bog to more heathland type habitat, the type and significance of effects identified from the Proposed Varied Development are not anticipated to alter as a result.	
Chapter 9: Ecology (Non-Avian)			
Ecological receptors – habitats, protected species	Temperature – up to +2°C in winter and +3°C in summer. Precipitation – up to 30% increase in winter precipitation and up to - 30% decrease in summer precipitation. Negligible change in wind speeds.	While increases in temperatures and changes to precipitation levels could affect the composition and growth rates of plant communities and invertebrates, and hence protected species and habitats, the uncertainties are high and it is not anticipated that the effect of the Proposed Varied Development on those receptors would alter substantially as a result. The post-construction monitoring proposed as part of the Habitat Management Plan (Technical Appendix 9.5 (EIAR Volume 4: Technical Appendices)) would take account of the changes in climate at that time to ensure the peatland and habitat restoration activities are suitable for the current climate.	Not significant.
Chapter 10: Soil and Water			
Groundwater and watercourses - impacts from excavated peat associated with construction activities	Precipitation – up to 30% increase in winter precipitation and up to - 30% decrease in summer precipitation.	Increased rainfall could lead to increased overland flows which could exacerbate the effect by causing pollution from excavated peat to contaminate groundwater or watercourses.	Not significant due to design and mitigation measures specified in the CEMP (Technical Appendix 2.1) and Draft PMP (Technical Appendix 10.2 (EIAR Volume 4)).

Table 12.5: Climate Change Effects on Environmental Receptors – Construction Phase

Receptor	Relevant Climate Change Effect	Effect on Receptor	Significance of Effect
Soil, groundwater and watercourses – impacts from spills associated with construction activities such as use of fuel/oils.	Precipitation – up to 30% increase in winter precipitation and up to - 30% decrease in summer precipitation.	Increased rainfall could lead to increased overland flows which could lead to increased overland flows which could exacerbate the effects of spills from construction activities and cause contamination of the soil or groundwater over more extensive areas.	Not significant due to the design and mitigation measures specified in the CEMP (Technical Appendix 2.1: CEMP (EIAR Volume 4) which should prevent spills.

12.6.15 Given the relatively limited magnitude of change in climate parameters predicted over the construction of the Proposed Varied Development, negligible changes to the baseline for environmental receptors are anticipated during this period.

12.6.16 No additional significant effects would occur as a result of climate change during the construction phase of the Proposed Varied Development.

Influence of the Proposed Varied Development on Climate Change

12.6.17 In terms of carbon savings, every unit of electricity produced by a wind farm development displaces a unit of electricity which would otherwise have been produced by a conventional (coal or gas) power station, and therefore presents carbon savings.

12.6.18 The carbon calculator presented in EIAR Volume 4: Technical Appendix 12.1 sets out the potential annual carbon dioxide emission savings for the Proposed Varied Development. Table 12.6 summarises the potential annual carbon dioxide emission savings for the expected scenario for the Proposed Varied Development and compares them against the results for the carbon calculator prepared for the 2014 FIR for the Consented Scheme.

Table 12.6: Comparison of Expected Carbon Savings for the Proposed Varied Development and Consented Scheme (Expected Scenarios)

Fuel Source	Proposed Varied Development Estimated Expected CO ₂ saving (tCO ₂ yr ⁻¹)	Consented Scheme Estimated Expected CO ₂ saving (tCO ₂ yr ⁻¹)
Coal fired electricity generation	792,058	296,047
Grid mix electricity generation	218,315	148,187
Fossil fuel mix electricity generation	387,420	228,808

12.6.19 In terms of carbon losses, there is a carbon cost associated with the manufacturing, construction and installation of wind turbines for any wind farm development. Carbon losses also result from the need for extra capacity to back up wind power generation. The reduced carbon fixing potential and loss of organic soil matter via peat excavations during the construction phase result in carbon losses. The forest felling requirements for the Proposed Varied Development also would result in carbon losses. Removal of the conifer plantation for the construction of the Proposed Varied Development allows the opportunity to restore the peatland habitats present within the main site. Currently the conifer plantation is causing degradation to the peatland habitats through lowering of the water table. This in turn is enabling oxidation of the peat to occur and the release of carbon dioxide (a key greenhouse gas) into the atmosphere, contributing to climate change. Restoration

of the peatlands following removal of the conifer plantation through raising of the water table and re-establishment of key peatland species would change the degraded peatlands from a source of carbon dioxide release to one of capture, in turn aiding in reducing carbon dioxide emissions and tackling climate change.

12.6.20 Table 12.7 summarises the carbon losses for the expected scenario and compares against the results for the carbon calculator prepared for the 2014 FIR for the Consented Scheme.

Table 12.7: Comparison of Expected Carbon Losses for the Proposed Varied Development and Consented Scheme (Expected Scenarios)		
Losses	Proposed Varied Development Estimated Total CO₂ losses (tCO₂ eq.)	Consented Scheme Estimated Total CO₂ losses (tCO₂ eq.)
Losses due to turbine life (e.g. manufacture, construction, decommissioning)	196,584	108,359
Losses due to back-up	215,233	111,961
Losses due to reduced carbon fixing potential	5909	3324
Losses from soil organic matter	156,139	121,733
Losses due to DOC and POC leaching	658	688
Losses due to felling forestry	74,237	0
Total losses of Carbon Dioxide	648,761	346,066

12.6.21 The carbon payback time is the measurement indicator to assess the influence of the Proposed Varied Development on climate change. The shorter the payback period, the greater the benefit the Proposed Varied Development would have in displacing emissions associated with electricity generated by burning fossil fuels and with the carbon losses associated with the development. The payback period is calculated by using the total carbon cost (carbon losses) of the Proposed Varied Development and dividing by the annual carbon gains from displaced fossil fuel power generation and any site improvements.

12.6.22 Table 12.8 summarises the carbon payback period for all scenarios and compares against the results for the carbon calculator prepared for the 2014 FIR for the Consented Scheme.

Table 12.8: Comparison of Carbon Payback Period for the Proposed Varied Development and Consented Scheme (All Scenarios)			
Generation Type	Scenario	Proposed Varied Development Estimated Carbon Payback Period (years)	Consented Scheme Estimated Carbon Payback Period (years)
Coal-fired electricity generation	Expected	0.7	0.9
	Minimum	0.3	-0.4
	Maximum	1.1	3.6
Grid-mix of electricity generation	Expected	2.6	1.7
	Minimum	1.2	-0.7
	Maximum	3.9	7.1
Fossil fuel - mix of electricity generation	Expected	1.5	1.1
	Minimum	0.7	-0.5
	Maximum	2.2	4.6

- 12.6.23 The carbon payback period is considered to be a negligible, beneficial environmental effect that is not significant under the EIA Regulations.

Potential Operational Effects

Climate Change Resilience

- 12.6.24 The receptors that could potentially be vulnerable to the effects of climate change during the operational phase are operational site personnel and the Proposed Varied Development itself (e.g. track surfaces; turbine foundations; substation, associated infrastructure etc.). These have been classed as moderately sensitive receptors which are affected by changes in climate but not dependent on specific conditions. A high-level qualitative assessment has been completed to identify any potential significant effects on these receptors as a result of climate change. The vulnerability of the operational phase receptors has been assessed against the climate projections set out in the Future Baseline section above. Wind speed, temperature and precipitation were identified as the climate related parameters considered to have the most potential to impact upon the Proposed Varied Development.
- 12.6.25 In the near term, there will be no detectable significant change in the wind resource of northern Europe. As such there would be no impact on the Proposed Varied Development as a result of this aspect of climate change.
- 12.6.26 The projected increases in average temperatures, increase in frequency of extreme weather events and changes to precipitation levels could impact the operational phase of the Proposed Varied Development as set out below.
- Higher temperatures and heatwaves could impact operational site personnel e.g. heat stress and unsafe working conditions;
 - Higher temperatures and heatwaves could change the effectiveness of the peat restoration;
 - Increases in the frequency or intensity of rainfall events could overwhelm drainage assets design capacity which could lead to localised surface water flooding in the vicinity of turbines, access tracks and other infrastructure;
 - Increases in the frequency or intensity of rainfall events could cause damage to non-floating access track surfaces due to scour from surface water flood events;
 - Increases in the frequency or intensity of rainfall events could cause water ingress into electrical equipment;
 - Drought conditions could result in dry and desiccated soils leading to soil erosion. This could cause sedimentation of drainage, reducing their capacity and increasing the risk of flooding;
 - Seasonal variations in temperature (high temperatures and cold events) could result in freeze-thaw conditions and could cause damage to non-floating access track surfaces including cracking and deformation; and
 - Cold weather events could cause ice-throw where fragments of mixed ice and snow fall off the wind turbine blades.
- 12.6.27 Risks to operational personnel would be managed through existing health and safety procedures which are considered to be appropriate to account for climate change.
- 12.6.28 As set out in Chapter 10: Soil and Water (EIA Volume 2), pollution control guidelines would be followed, and watercourse crossings would be regulated by SEPA regulations⁴⁵ and have a conveyance capacity of at least the 200-yr storm plus an allowance for climate change.
- 12.6.29 The site specific FRA and DIA factor in the 200-yr flood event plus an allowance for climate change.

⁴⁵ SNH (2015). Constructed Tracks in the Scottish Uplands. Available at: <https://www.nature.scot/constructed-tracks-scottish-uplands> [Accessed 10/06/2020].

- 12.6.30 Non-floating access tracks (on peats depth < 0.5 m where possible) would be constructed in accordance with SNH guidance⁴⁶ and drainage would be designed to the 200-yr flood event plus and allowance for climate change.
- 12.6.31 Any vulnerable electrical equipment would be designed to be as watertight as required to prevent water ingress. Regular inspection of the equipment would take place and remedial action would be taken as required.
- 12.6.32 The peat restoration proposals take into account climate change projections. Re-seeding and hydro-seeding may be part of restoration works where reinstatement works have been found to be unsuccessful for establishing plant growth.
- 12.6.33 Detailed design would consider the key requirements in terms of access track design and layer thickness considering durability and suitability of materials considering likely climatic conditions and the vehicles anticipated to utilise the road. Maintenance of the access tracks would be undertaken on a regular basis to prevent a deterioration in quality e.g. periodic maintenance of tracks by way of brushing or scraping would be carried out to minimise the generation of wheel ruts.
- 12.6.34 Standard mitigation for risk of ice throw comprises off-site monitoring to enable deactivation of the turbine on sensing ice accumulation, as well as physical and visual warnings for both site personnel and third parties. In line with current guidance⁴⁷, a permanent warning sign at the site's entrance is proposed to alert the public to this issue.
- 12.6.35 As such, it is considered that the operational phase of the Proposed Varied Development would be resilient to the effects of climate change and no significant effects are predicted.

In-combination Climate Change Impacts Assessment

- 12.6.36 Table 12.9 presents a qualitative summary of potential in-combination climate impacts of extreme weather events on the Proposed Varied Development using professional judgement.
- 12.6.37 The potential for environmental receptors to be impacted by the Proposed Varied Development is assessed in Chapters 4-10 of this EIAR (EIAR: Volume 2). Of these ecological, ornithological and hydrological receptors are the most sensitive to climate change and are discussed further below.
- 12.6.38 As outlined above in the near-term there will be a minimal change in the regional wind resource and therefore no noticeable change to the future baseline as a result of this parameter. Projected changes to the mean winter and summer temperature in the north of Scotland are projected as up to 2°C in winter and up to 3°C in summer. Estimates of annual mean precipitation amounts show a projected increase in winter precipitation by up to 30% and a decrease in summer precipitation by up to -30%. There is also predicted to be an increase in the frequency of dry spells and extreme temperature events.
- 12.6.39 A summary of the effects of these changes on relevant receptors that are potentially sensitive to climate change (i.e. ecological, ornithological and hydrological receptors) are summarised in Table 12.9.

⁴⁶ SPEA (2019). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Available at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf [Accessed 10/06/2020]

⁴⁷ Scottish Renewables, Scottish Natural Heritage, SEPA and Forestry Commission Scotland, 2015. Good Practice During Wind Farm Construction, Version 3 [pdf] Available at: <http://www.snh.gov.uk/docs/A1168678.pdf> [Accessed 08/06/2020].

Table 12.9: Climate Change Effects on Environmental Receptors – Operational Phase

Receptor	Relevant Climate Change Effect	Effect on Receptor	Significance of Effect
Chapter 5: Ornithology			
Ornithological receptors	Temperature – up to +2°C in winter and +3°C in summer. Precipitation – up to 30% increase in winter precipitation and up to -30% decrease in summer precipitation. Negligible change in wind speeds.	As per Chapter 5: Ornithology (EIAR Volume 2: Main Report), due to the removal of forest as part of the future baseline, there would be a change to the ornithological species composition. The site would be progressively felled to a managed peatland habitat as per the Outline HMP in Technical Appendix 9.5 (EIAR Volume 4: Technical Appendices). A rise in temperature and changes to precipitation levels have the potential to impact on habitats which in turn may influence the composition or relative species abundance within the bird community. However, as the Applicant is committed to continuing the management of the Outline HMP in Technical Appendix 9.5 (EIAR Volume 4: Technical Appendices) for the full 50-year lifespan of the Proposed Varied Development, it means the Outline HMP can be dynamic and respond to the prevailing climate conditions at the time. The type and significance of effects identified from the Proposed Varied Development are not anticipated to alter as a result.	Not significant as the Outline HMP would be in place for the full 50-year lifespan of the Proposed Varied Development and so could respond to changing climate conditions, if required.
Chapter 9: Ecology (Non-Avian)			
Ecological receptors – habitats, protected species	Temperature – up to +2°C in winter and +3°C in summer. Precipitation – up to 30% increase in winter precipitation and up to -30% decrease in summer precipitation. Negligible change in wind speeds.	While changes in temperature could affect the composition and growth rates of plant communities and invertebrates, and hence protected species and habitats, the uncertainties are high, and it is not clear that the effect of the Proposed Varied Development on those receptors would alter substantially as a result. However, as the Applicant is committed to continuing the management of the Outline HMP in Technical Appendix 9.5 (EIAR Volume 4: Technical Appendices) for the full 50-year lifespan of the Proposed Varied Development, it means the Outline HMP can be dynamic and respond to the prevailing climate conditions at the time.	Not significant as the Outline HMP would be in place for the full 50-year lifespan of the Proposed Varied Development and so could respond to changing climate conditions, if required.
Chapter 10: Soil and Water			
Soil, groundwater and watercourses – impacts on water quality	Precipitation – up to 30% increase in winter precipitation and up to -	Increased rainfall could lead to increased overland flows which could lead to increased overland flows which could exacerbate the effects of spills	Not significant due to the adoption of appropriate

Table 12.9: Climate Change Effects on Environmental Receptors – Operational Phase

Receptor	Relevant Climate Change Effect	Effect on Receptor	Significance of Effect
from spills associated with operation activities such as use of fuel/oils	30% decrease in summer precipitation.	from operational activities and cause contamination of the soil or groundwater over more extensive areas.	storage and handling of potential pollutants in accordance with measures to be set out in the Operations Environmental Management Plan (EMP) as required by SSE 14001 accredited Environmental Management System (EMS).
Soil and watercourses – impacts on water quality from erosion and sedimentation	Precipitation – up to 30% increase in winter precipitation and up to - 30% decrease in summer precipitation.	Increased rainfall could lead to increased overland flows which could exacerbate erosion and sedimentation of watercourses.	Not significant due to the implementation of appropriate drainage design that incorporates sediment management measures, including sediment traps, to attenuate and treat runoff from the site. There would be a long-term operational drainage and monitoring programme adopted at the site delivered through the EMP.
Drainage and Dewatering	Precipitation – up to 30% increase in winter precipitation and up to - 30% decrease in summer precipitation.	Increased rainfall could lead to increased overland flows which could inundate the site drainage. However, as the Applicant is committed to the adoption of a long term drainage and monitoring programme to monitor degradation of infrastructure for the Proposed Varied Development, it means the operational drainage and monitoring plan can be dynamic and respond to the prevailing climate conditions at the time.	Not significant as there would be a long-term operational drainage and monitoring plan in place for the Proposed Varied Development and which could respond to changing

Table 12.9: Climate Change Effects on Environmental Receptors – Operational Phase

Receptor	Relevant Climate Change Effect	Effect on Receptor	Significance of Effect
			climate conditions, as required.

12.6.40 Given the relatively limited magnitude of change in climate parameters predicted over the operation phase of the Proposed Varied Development, negligible changes to the baseline for environmental receptors are anticipated during this period.

12.6.41 No additional significant effects will occur as a result of climate change during the operational phase of the Proposed Varied Development.

Influence of the Proposed Varied Development on Climate Change

12.6.42 The carbon calculator factors the operational stage effects into the calculations. Please refer to the Potential Construction Effects section above where the results of the carbon calculator are discussed.

Potential Decommissioning Effects

Climate Change Resilience

12.6.43 Decommissioning would be undertaken in line with best practice measures and guidance which would be relevant at the time of decommissioning (in >50 years' time). It is assumed for the purposes of this assessment decommissioning mitigation measures would be along similar lines to those used for the construction phase of the Proposed Varied Development.

In-combination Climate Change Impacts Assessment

12.6.44 Decommissioning would be undertaken in line with best practice measures and guidance which would be relevant at the time of decommissioning (in >50 years' time). It is assumed for the purposes of this assessment decommissioning mitigation measures would be along similar lines to those used for the construction phase of the Proposed Varied Development.

Influence of the Proposed Varied Development on Climate Change

12.6.45 The carbon calculator factors the decommissioning stage effects into the calculations; refer to the Potential Construction Effects section above where the results of the carbon calculator are discussed.

Potential Cumulative Construction Effects

Climate Change Resilience

12.6.46 The climate resilience risks identified are limited in their spatial extent to the site and therefore no cumulative effect with other cumulative developments is considered.

In-combination Climate Change Impacts Assessment

12.6.47 The in-combination climate change impacts identified are limited in their spatial extent to the site and therefore no cumulative effect with other cumulative developments is considered.

Influence of the Proposed Varied Development on Climate Change

12.6.48 Carbon dioxide emissions contribute cumulatively with all sources of carbon dioxide emissions globally to cause climate change. This assessment has considered carbon dioxide emissions in the context of carbon dioxide emissions in Scotland and no further consideration of the Proposed Varied Development's carbon dioxide emissions with other sources of carbon dioxide is considered necessary.

Potential Cumulative Operational Effects

Climate Change Resilience

- 12.6.49 The climate resilience risks identified are limited in their spatial extent to the site and therefore no cumulative effect with other cumulative developments is considered.

In-combination Climate Change Impacts Assessment

- 12.6.50 The in-combination climate change impacts identified are limited in their spatial extent to the site and therefore no cumulative effect with other cumulative developments is considered.

Influence of the Proposed Varied Development on Climate Change

- 12.6.51 Carbon dioxide emissions contribute cumulatively with all sources of carbon dioxide emissions globally to cause climate change. This assessment has considered carbon dioxide emissions in the context of carbon dioxide emissions in Scotland and no further consideration of the Proposed Varied Development's carbon dioxide emissions with other sources of carbon dioxide is considered necessary.

12.7 Mitigation

Mitigation during Construction

- 12.7.1 All potential climate change effects during construction are mitigated by topic-specific mitigation measures and there would be no resulting significant effects as a result of the construction of the Proposed Varied Development. Therefore, no additional mitigation measures to address the impact of climate change during construction are proposed beyond those described in the remainder of the EIAR. The Applicant is committed to delivering the mitigation set out in the EIAR including the CEMP (Technical Appendix 2.1), PMP (Technical Appendix 10.2), FRA and DIA (Technical Appendix 10.4).

Mitigation during Operation

- 12.7.2 All potential climate change effects during operation are mitigated by topic-specific mitigation measures and there would be no resulting significant effects as a result of the operation of the Proposed Varied Development. Therefore, no additional mitigation measures to address the impact of climate change during operation are proposed beyond those described in the remainder of the EIAR. The Applicant is committed to delivering the mitigation set out in the EIAR including delivery of the Operations Environmental Management Plan (EMP) (as required by SSE 14001 accredited Environmental Management System (EMS).

Mitigation during Decommissioning

- 12.7.3 Decommissioning would be undertaken in line with best practice measures and guidance which would be relevant at the time of decommissioning (in >50 years' time). It is assumed for the purposes of this assessment decommissioning mitigation measures would be along similar lines to those used for the construction phase of the Proposed Varied Development.

12.8 Assessment of Residual Effects

Residual Construction Effects

- 12.8.1 No significant residual environmental effects have been identified for the construction phase.

Residual Operational Effects

- 12.8.2 No significant residual environmental effects have been identified for the operational phase.

Residual Decommissioning Effects

- 12.8.3 No significant residual environmental effects have been identified for the decommissioning phase.

Residual Cumulative Construction Effects

- 12.8.4 No significant residual cumulative environmental effects have been identified.

Residual Cumulative Operational Effects

- 12.8.5 No significant residual cumulative environmental effects have been identified.

12.9 Monitoring

- 12.9.1 No monitoring is required beyond that identified in the remaining technical assessment chapters of this EIAR.

12.10 Comparison of Significant Effects between the Consented Scheme and Proposed Varied Development

- 12.10.1 There is no change in the predicted significant effects of the Consented Scheme and the Proposed Varied Development; neither are predicted to have a significant effect on climate change, nor is climate change expected to impact the Proposed Varied Development, see Table 12.10.

Table 12.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Climate Change Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Construction				
Climate Change Resilience	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate Climate Change Resilience assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
In-Combination Climate Change Impacts	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate ICCI assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
Influence of the Proposed Development on Climate Change	The results of the carbon calculator for the Consented Scheme concluded that the carbon payback period would be expected to be 1.1 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity	A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line	The results of the carbon calculator for the Proposed Varied Development concluded that the carbon payback period would be expected to be 1.5 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 387,420 tCO ₂ yr ¹ .	The main difference in the carbon payback period is due to the increase in losses of carbon dioxide associated with the Proposed Varied Development compared to the Consented Scheme. However, estimated expected carbon dioxide savings for the Proposed Varied Development are 69% more than those for the Consented Scheme.

Table 12.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Climate Change Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
	generation would be 228,808 tCO ₂ yr ⁻¹ .	with the current guidance using the latest version of the carbon calculator tool. An updated carbon calculator assessment has been undertaken to assess the impact on carbon payback time for the Proposed Varied Development.		
Operation				
Climate Change Resilience	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate Climate Change Resilience assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
In-Combination Climate Change Impacts	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate ICCI assessment of the Consented Scheme	No significant residual effects.	No material change.

Table 12.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Climate Change Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
		has not been undertaken.		
Influence of the Proposed Development on Climate Change	The results of the carbon calculator for the Consented Scheme concluded that the carbon payback period would be expected to be 1.1 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 228,808 tCO ₂ yr ⁻¹ .	A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line with the current guidance using the latest version of the carbon calculator tool. An updated carbon calculator assessment has been undertaken to assess the impact on carbon payback time for the Proposed Varied Development.	The results of the carbon calculator for the Proposed Varied Development concluded that the carbon payback period would be expected to be 1.5 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 387,420 tCO ₂ yr ⁻¹ .	The main difference in the carbon payback period is due to the increase in losses of carbon dioxide associated with the Proposed Varied Development compared to the Consented Scheme. However, estimated expected carbon dioxide savings for the Proposed Varied Development are 69% more than those for the Consented Scheme.
Decommissioning				
Climate Change Resilience	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a	No significant residual effects.	No material change.

Table 12.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Climate Change Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
		separate Climate Change Resilience assessment of the Consented Scheme has not been undertaken.		
In-Combination Climate Change Impacts	Previously not assessed.	Effects predicted to be similar to those for the Proposed Varied Development therefore a separate ICCI assessment of the Consented Scheme has not been undertaken.	No significant residual effects.	No material change.
Influence of the Proposed Development on Climate Change	The results of the carbon calculator for the Consented Scheme concluded that the carbon payback period would be expected to be 1.1 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 228,808 tCO ₂ yr ⁻¹ .	A revision of the carbon calculator for the Consented Scheme is not considered necessary in order to undertake a comparative assessment. The carbon calculator for the Consented Scheme was undertaken in line with the current guidance using the latest version of the carbon calculator tool.	The results of the carbon calculator for the Proposed Varied Development concluded that the carbon payback period would be expected to be 1.5 years. The estimated expected carbon dioxide saving from fossil fuel mix electricity generation would be 387,420 tCO ₂ yr ⁻¹ .	The main difference in the carbon payback period is due to the increase in losses of carbon dioxide associated with the Proposed Varied Development compared to the Consented Scheme. However, estimated expected carbon dioxide savings for the Proposed Varied Development are 69% more than those for the Consented Scheme.

Table 12.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development				
	A	B	C	D
Climate Change Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
		An updated carbon calculator assessment has been undertaken to assess the impact on carbon payback time for the Proposed Varied Development.		
Cumulative Construction				
Climate Change Resilience	Previously not assessed.	N/A	No significant residual effects identified.	N/A
In-Combination Climate Change Impacts	Previously not assessed.	N/A	No significant residual effects identified.	N/A
Influence of the Proposed Development on Climate Change	N/A	N/A	No significant residual effects identified.	N/A
Cumulative Operation				
Climate Change Resilience	Previously not assessed.	N/A	No significant residual effects identified.	N/A
In-Combination Climate Change Impacts	Previously not assessed.	N/A	No significant residual effects identified.	N/A

Table 12.10: Summary Comparison of Residual Effects of the Consented Scheme Compared to the Proposed Varied Development

	A	B	C	D
Climate Change Development Phase	Consented Scheme – Predicted Significant Residual Effects of the Consented Scheme	Updated Assessment of Predicted Significant Residual Effects of the Consented Scheme (if required)	Predicted Significant Residual Effects of the Proposed Varied development	Conclusion / explanation of the difference between the Residual Effects presented in Columns A/B and C
Influence of the Proposed Development on Climate Change	N/A	N/A	No significant residual effects identified.	N/A

12.11 Summary and Conclusions

12.11.1 This chapter considers the likely significant effects on the following technical disciplines associated with the construction, operation and decommissioning of the Proposed Varied Development.

- Climate and Carbon Balance;
- Air Quality;
- Shadow Flicker;
- Ice throw;
- Major accidents and disasters; and
- Human health.

12.11.2 Table 12.1 concludes that only climate change and carbon balance was required to be assessed in this chapter. Beyond inclusion of a carbon calculator, climate change was not considered in the 2007 ES, the 2013 ES Addendum or 2014 FIR as the EIA regulations at those times did not require a climate change assessment. However, as The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 now include the requirement to consider climate change, a high level climate assessment has been prepared to support the Proposed Varied Development application. The scope of this assessment includes the following:

- Climate Change Resilience (CCR) - A high level assessment of the vulnerability of the Proposed Varied Development to climate change.
- In-combination Climate Change Impacts (ICCI) - A high level assessment of where climate change may have an additive effect on impacts already identified within other assessments, where residual impacts identified may now become significant, or increase because of the effects of climate change.
- The influence of the Proposed Varied Development on climate change – A quantification of the effect of the Proposed Varied Development on climate change via the results of the carbon calculator.

12.11.3 A detailed desk study was completed using current data sources to identify the current baseline which was validated by a programme of up-to-date field work. The future baseline of climate parameters (wind speed, temperature and precipitation) was set out using future climate projections for the north of Scotland.

12.11.4 The CCR assessment determined that the Proposed Varied Development would be resilient to the effects of climate change and no significant effects are predicted.

12.11.5 The ICCI assessment determined that while receptors may be impacted by climate change, it would not have an additive effect on impacts already identified in the technical assessments and would not result in any residual impacts becoming significant.

12.11.6 The results of the carbon calculator calculated the estimated carbon payback period of the Proposed Varied Development fossil fuel-mix of electricity generation to be 1.5 years. The carbon payback period is considered to be a negligible, beneficial environmental effect that is not significant under the EIA Regulations.

12.11.7 All potential climate change effects during are mitigated by topic-specific mitigation measures and there are no resulting significant effects as a result of the Proposed Varied Development. Therefore, no additional mitigation measures to address the impact of climate change are proposed beyond those described in the remainder of the EIAR. The Applicant is committed to delivering the mitigation set out in the EIAR including the CEMP, PMP, FRA and DIA (EIAR Volume 4: Technical Appendices).

12.11.8 A summary of the potential and predicted significant effects of the Proposed Varied Development are presented in Table 12.11.

Table 12.11: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Construction				
Climate Change Resilience	Not significant	None beyond that embedded in design of Proposed Varied Development and CEMP.	N/A	Not significant
In-Combination Climate Change Impacts	Not significant	None beyond that identified in the other technical assessment chapters of this EIAR.	N/A	Not significant
Influence of the Proposed Varied Development on Climate Change	Not significant	None beyond that embedded in design of Proposed Varied Development, CEMP and other technical assessment chapters of this EIAR.	N/A	Not significant
Operation				
Climate Change Resilience	Not significant	None beyond that embedded in design of Proposed Varied Development and CEMP.	N/A	Not significant
In-Combination Climate Change Impacts	Not significant	None beyond that identified in the other technical assessment chapters of this EIAR.	N/A	Not significant
Influence of the Proposed Varied Development on Climate Change	Not significant	None beyond that embedded in design of Proposed Varied Development, CEMP and other technical assessment chapters of this EIAR.	N/A	Not significant

Table 12.11: Summary of Potential and Predicted Significant Effects of the Proposed Varied Development

Potential Significant Effect	Significance of Effect (without mitigation)	Mitigation Proposed	Means of implementation/ Timing	Outcome/ Residual Effect
Decommissioning				
Climate Change Resilience	Not significant	None beyond that embedded in design of Proposed Varied Development and CEMP.	N/A	Not significant
In-Combination Climate Change Impacts	Not significant	None beyond that identified in the other technical assessment chapters of this EIAR.	N/A	Not significant
Influence of the Proposed Varied Development on Climate Change	Not significant	None beyond that embedded in design of Proposed Varied Development, CEMP and other technical assessment chapters of this EIAR.	N/A	Not significant
Cumulative Construction				
Climate Change Resilience	Not significant	N/A	N/A	Not significant
In-Combination Climate Change Impacts	Not significant	N/A	N/A	Not significant
Influence of the Proposed Varied Development on Climate Change	Not significant	N/A	N/A	Not significant
Cumulative Operation				
Climate Change Resilience	Not significant	N/A	N/A	Not significant
In-Combination Climate Change Impacts	Not significant	N/A	N/A	Not significant
Influence of the Proposed Varied Development on Climate Change	Not significant	N/A	N/A	Not significant

12.12 Glossary and Abbreviations

Term (in alphabetical order)	Definition
Carbon Calculator	The Scottish Government's tool to compare the carbon costs of wind farm developments with the carbon savings attributable to the wind farm.

Abbreviation (in alphabetical order)	Expanded Term
CCP	Climate Change Plan
CCR	Climate Change Resilience
CEMP	Construction Environmental Management Plan
CO ₂	Carbon Dioxide
DIA	Drainage Impact Assessment
DUKES	Digest of United Kingdom Energy Statistics
ECU	Energy Consents Unit
EIA	Environmental Impact Assessment
EIA Regulations	Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
EIAR	EIA Report
ES	Environmental Statement
FIR	Further Information Report
FRA	Flood Risk Assessment
GHG	Greenhouse gas
ICCI	In-Combination Climate Change Impacts
IEMA	Institute of Environmental Management and Assessment
mtoe	million tonnes of oil equivalent
NPF3	National Planning Framework
PLHRA	Peat Landslide Hazard Risk Assessment
PMP	Peat Management Plan
RCPs	Representative Concentrations Pathways
SEPA	Scottish Environment Protection Agency
tCO ₂ yr ⁻¹	Tonnes of Carbon Dioxide per year
THC	The Highland Council
The 2008 Act	The Climate Change Act 2008
UKCP18	UK Climate Projections Report 2018
UNFCCC	United Nations Framework Convention on Climate Change

13. SCHEDULE OF MITIGATION

13.1 Introduction

- 13.1.1 The main purpose of this chapter is to summarise the mitigation measures proposed in each of the technical chapters of this EIAR to avoid, reduce or offset impacts which could otherwise give rise to significant residual environmental effects.
- 13.1.2 The chapter also presents that the main aim of the design process for the Consented Scheme was to 'design out' potential for environmental effects as far as possible. A number of the commitments and mitigation measures were proposed for the Consented Scheme and those presented in Table 13.1 remain of relevance to the Proposed Varied Development.
- 13.1.3 The mitigation measures proposed to avoid, reduce or off-set significant residual environmental effects of the Proposed Varied Development during the construction and operation phases are presented in Table 13.2 and Table 13.3 respectively. It is anticipated that the mitigation measures outlined below would be secured through appropriately worded conditions of consent. Most of the mitigation for landscape and visual receptors is embedded in the design with the exception of aviation lighting. Information on embedded design measures such as site location, turbine location and turbine selection are not presented in Table 13.2 or Table 13.3.
- 13.1.4 Most of the pre-construction and construction phase mitigation would be delivered through a Construction Environmental Management Plan (CEMP). The outline content of the proposed CEMP is provided in EIAR Volume 4: Technical Appendix 2.1: Outline CEMP. Further details on specific measures to be included in the final CEMP are contained in each of the technical chapters of the EIAR, where relevant.

13.2 Commitments and Mitigation in relation to the Consented Scheme

Table 13.1: Commitments and Mitigation in relation to the Consented Scheme		
Topic	Description of Commitment / Mitigation	Means of Implementation / Timing
Landscape and Visual	- The majority of mitigation has been achieved through design and through careful siting of the infrastructure. - A CEMP would be prepared and submitted for the written approval of the planning authority, Scottish Natural Heritage (SNH) and Scottish Environment Protection Agency (SEPA) prior to construction commencing. - The CEMP would include an Excavated Materials and Reinstatement Plan, which would set out the land reinstatement and landscaping proposals for the restoration of temporary land take areas, borrow pits and other areas of ground disturbance.	Pre-Construction/ Construction
Ecology	- Demarcation of working zones to limit the potential area of damage and disturbance. - Use of micro-siting where necessary and appropriate under advisement by ECoW. - Periodic checks of vehicles for leaks and implementation of best practice as outlined by method statements. - Timings of works to avoid periods of heavy rainfall. - Underground cable installation adjacent to the access route through between Strathy North wind farm and Strathy South wind farm would use cable ploughing technique and machinery operating from the upgraded track or bog mats to minimise disruption to peat and surface vegetation. - Reinstatement of areas of disturbance as soon as feasibly possible using existing previously removed vegetation. - Restrictions on vehicle speeds to reduce mortality risk. - Restrictions of works in/near waterbodies and riparian zones. - Watercourse crossings designed to avoid water vole habitat. - Ensure no restriction on otter/water vole movement along water features.	Construction / Operation / Ongoing
	- Habitat restoration activities will be undertaken in order to compensate for significant habitat impacts. - Specific vegetation monitoring programme will be implemented to ensure no further unforeseen degradation occurs to habitats of the Caithness and Sutherland Peatlands Special Area of Conservation (SAC) . - Monitoring of potential large herbivore impacts within the Caithness and Sutherland Peatlands SAC caused by displacement from afforested areas will be implemented. A programme of culling would be agreed, where required.	Operation/ Ongoing
Ornithology	- Pre-commencement breeding bird surveys (covering the site and standard buffers around it, for moorland breeding birds, raptors and divers). - The deployment of a suitably qualified Ecological Clerk of Works (ECoW) team to carry out pre-clearance checks ahead of forest or open habitat removal.	Construction

Table 13.1: Commitments and Mitigation in relation to the Consented Scheme		
Topic	Description of Commitment / Mitigation	Means of Implementation / Timing
	- Retention of selected forest blocks for screening, the use of additional screening bunds if required (along the access track (for red-throated divers and possibly hen harriers). - Traffic management measures (no horns sounded, no stop zones, no personnel out of vehicles etc.). - Ongoing monitoring for all breeding birds on and adjacent to the site through the construction period, and the implementation of strict activity-free buffers to prevent disturbance, where breeding birds occur. - The above measures would be incorporated into a Breeding Bird Protection Plan which would form part of the CEMP. - The CEMP would be agreed in consultation with SNH and SEPA prior to the commencement of construction works. - All works would be completed in compliance with the CEMP.	
	- In consultation with SNH, dual approach of diverting red-throated diver breeding from within identified lochan, and provision of diver rafts off-site. - The lochan within Strathy South is relatively small, and a combination of buoys, floats and flags is an example of how this could be delivered to ensure any prospecting birds were diverted from onsite lochans. - The provision and maintenance of diver rafts would be for the duration of the Consented Scheme's operational life, at locations to be agreed with SNH.	Operation
	Outline Habitat Management Plan (HMP) that has been proposed as part of the overall mitigation package, which includes measures (vegetation and bird monitoring, control of conifer regeneration, provision for mechanical vegetation control and grazing, and drain blocking) that would all combine to reduce the extent of suitable nesting habitat on-site and to reduce the risk of attracting additional breeding or foraging activity for other bird species. [Note that the Outline HMP of relevance to the Proposed Varied Development is presented in EIAR Volume 4: Technical Appendix 9.5 and supersedes the HMP for the Consented Scheme].	Operation
	Removal of conifer plantation (with restoration of underlying peatland), combined with enhancement of non-forested peatland.	Operation
Noise	No construction traffic outside pre-agreed times.	Construction
Cultural Heritage	A post-felling field survey would be undertaken in advance of construction and a targeted watching brief would be implemented.	Construction
Soils and Water	- Appropriate drainage design that incorporates measures to attenuate and treat runoff from access tracks, hard standing areas, construction compound and turbine areas. - The CEMP will include details of measures to prevent pollution and all work would be completed in compliance with the CEMP. The CEMP will include measures (but not be limited) regarding:	Pre-Construction/ Construction/ Operation

Table 13.1: Commitments and Mitigation in relation to the Consented Scheme		
Topic	Description of Commitment / Mitigation	Means of Implementation / Timing
	– Appropriate storage and handling of potential pollutants; – Refuelling of construction plan in designated areas; – Restrictions on certain construction activities during periods of prolonged and/or intense wet weather; – Adoption and agreement on emergency measures should significant effects occur; – Appropriate design of watercourse crossings to maintain hydraulic connectivity; – Drainage Management Plan; – Watercourse crossing assessment (detailed design prior to construction); – Water quality monitoring programme (prior to and during construction; and – Watercourse crossings designed to accommodate the 1 in 200 year flood.	
	• Locations of any temporary peat or soil storage areas would be carefully selected so that erosion and runoff is limited, leachate from the stored material is controlled and stability of the existing ground, particularly in peatland areas, is not affected.	
	• Adoption of appropriate storage and reuse of peat in line with best practice guidelines and site conditions. For example, locations of any temporary peat or soil storage areas would be carefully selected so that erosion and runoff is limited, leachate from the stored material is controlled and stability of the existing ground, particularly in peatland areas, is not affected.	Construction
	• Appropriate drainage design that incorporates sediment management measures to attenuate and treat runoff from wind farm infrastructure. • Turves would be stored turf side up and would be wetted to minimise risk of desiccation. • Peat stockpiles would be a minimum of 70 m from watercourses.	Construction
	• Appropriate drainage design that incorporates sediment management measures to attenuate and treat runoff from wind farm infrastructure. Drainage measures could include interceptor ditches, down slope drainage collection systems, containment berms (embedded where appropriate). • Appropriate reuse and management of waste peat in line with principles of best practice guidance and site conditions.	Construction
	Micrositing would be used to reduce the risk of peat slide to insignificant.	Construction/ Operation
	• Appropriate drainage design that incorporates sediment management measures to attenuate and treat runoff from wind farm infrastructure.	Operation

Table 13.1: Commitments and Mitigation in relation to the Consented Scheme		
Topic	Description of Commitment / Mitigation	Means of Implementation / Timing
	• Appropriate storage and handling of potential pollutants. • Adoption of a long-term operational drainage and monitoring programme to monitor degradation of infrastructure (including the removal of blockages from watercourse crossings). • Operational drainage and monitoring plan (designed prior to construction). • Plan can detail the appropriate monitoring methods, including: – Visual monitoring and completion of checklists signed off by SEPA; – Regular water quality monitoring for a period post construction to determine – potential long terms effects of wind farm on water quality.	
Roads and Traffic	• Road condition survey to be undertaken relating to the condition of the A836 from its junction with the A9(T) at Scrabster to the Site Access junction prior to the commencement of works on site and a repeat survey to be undertaken on completion of the construction period. • All work to comply with a Traffic Management Plan (TMP) which would include (but not be limited to): – establishment of a management coordination group to include The Highland Council (THC), BEAR Scotland, Northern Constabulary and the haulage contractor; – police escort for abnormal loads from the docks to the site; – timing of delivery of escorted loads to be during daylight hours for safety reasons; – regulated site working hours; driver inductions; – additional, temporary warning and speed control signs, where appropriate.	Construction
Other Issues	An aviation lighting scheme would be submitted for the written approval of the planning authority (in consultation with relevant aviation stakeholders).	Pre-construction/ Construction and Operation Phases

13.3 Mitigation Summary Tables for the Proposed Varied Development

13.3.1 Table 13.2 presents the construction mitigation and Table 13.3 presents the operational mitigation for the Proposed Varied Development.

Table 13.2: Construction Mitigation Summary Table for the Proposed Varied Development				
Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Landscape and Visual	N/A	N/A	N/A	N/A
Ornithology	Disturbance to nesting Schedule 1/Annex 1 birds or damage to nests of other birds.	Implementation of Bird Protection and Mitigation Plan which is embedded mitigation and integral to the implementation of the Proposed Varied Development.	Deployment of suitably experienced Ecological Clerk of Works and an ornithology specialist to undertake the bird protection and monitoring. To be secured through a condition of consent.	No significant residual effect for all other species. None (not significant) for all other species.
	Direct (including temporary or permanent) displacement from habitat on non-designated protected habitats through installation of wind farm infrastructure for the Proposed Varied Development.	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) which seeks to sequentially remove the Strathy South conifer plantation and restore peatland habitats across the area. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in Technical Appendix 9.6 (EIAR Volume 4). To be secured through a condition of consent.	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as Moderate (not significant) and as Moderate/Minor (not significant) for all other species.
Noise	N/A	N/A	N/A	N/A
Cultural Heritage	Direct effects on known heritage assets.	Heritage assets to be fenced prior to works commencing as presented in the outline CEMP (EIAR Volume 4: Technical Appendix 2.1).	Final CEMP to be submitted for the written approval of THC, SNH and SEPA prior to construction commencing and	Not significant.

Table 13.2: Construction Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
			delivered as condition of consent.	
	Direct effects on hitherto unknown buried heritage assets.	An archaeological contractor would undertake a walkover survey of the precise location of ground impact, will provide toolbox talks to enable the identification of archaeological remains and will remain on call in the case that archaeological remains are identified; as presented in the outline CEMP (EIAR Volume 4: Technical Appendix 2.1).	Final CEMP to be submitted for the written approval of THC, SNH and SEPA prior to construction commencing and delivered as condition of consent.	Not significant.
Roads and Traffic	Driver Delay	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects.
	Road Safety	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects.
	Community Effects	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects.
	Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure	Whilst no significant effects predicted, the Applicant would enter into a legal agreement under Section 96 of the Roads (Scotland) Act 1984 to formalise an inspection and maintenance regime with THC for agreed sections of road.	To be delivered as condition of consent during the construction phase.	No significant residual effects.
	Cumulative Driver Delay Effects	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	N/A	No significant residual effects.
	Cumulative Road Safety Effects	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	N/A	No significant residual effects.
	Cumulative Community Effects	Whilst no significant effects are predicted, a CTMP would be developed and implemented.	To be delivered as condition of consent during the construction phase.	No significant residual effects.

Table 13.2: Construction Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
	Cumulative Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure	Whilst no significant effects predicted, the Applicant would enter into a legal agreement under Section 96 of the Roads (Scotland) Act 1984 to formalise an inspection and maintenance regime with THC for agreed sections of road.	To be delivered as condition of consent during the construction phase.	No significant residual effects.
Ecology (non-avian)	Direct and Temporary Habitat Loss on non-designated protected habitats within the main site through construction of wind farm infrastructure for the Proposed Varied Development.	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.6), which provides for the sequential removal of the Strathy South conifer plantation and restore peatland habitats across the area.	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in Technical Appendix 9.6 (EIAR Volume 4). The delivery of the HMP and Phased Felling Plan would be secured as conditions of consent.	The residual effect to habitats is assessed as Negligible / Minor Beneficial (Not Significant), with Habitat Management Plan works ongoing through the 50-year operational lifespan of the Proposed Varied Development.
	Indirect effects on SAC designated habitat by displaced deer from Strathy South Forest.	Implementation of a Deer Management Plan (DMP) and phased felling to allow the slow dispersal of deer to habitats surrounding the main site.	Implementation of the Deer Management Plan (DMP) would commence prior to construction and would continue through the lifespan of the Proposed Varied Development. Phased felling would be completed over a five-year period. This method of mitigation has been successfully implemented at the neighbouring Strathy North Wind Farm.	The residual effects of deer dispersal to the surrounding SAC and their reduced utilisation of the main site would be Negligible (Not Significant) following the implementation of the DMP.

Table 13.2: Construction Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
			The DMP and Phased Felling Plan would be secured as conditions of consent.	
	Protected Species – no significant effects are predicted. Impacts are limited to the loss of suitable foraging and resting habitat that would not cause a likely significant effect.	Implementation of Species Protection Plans with the Construction Environment Management Plan (CEMP).	Pre-construction surveys to be completed prior to construction works commencing on site. Surveys should be completed a maximum of three months prior to construction commencing.	The predicted and residual effect to protected species is assessed as Minor Adverse (Not Significant) during the construction phase of the Proposed Varied Development.
	Aquatic Species – the possibility of likely significant effects is limited to the construction period and no significant effects are predicted. Impacts are limited to pollution incidents which might affect the water quality within water courses and water bodies within and surrounding the Proposed Varied Development. The management of such potential effects is well-established and there is a high degree of confidence regarding avoidance of such impacts.	Implementation of appropriate pollution prevention methods and a Water Quality Monitoring Plan (WQMP) within the Construction Environment Management Plan (CEMP).	The WQMP should commence collection of baseline data six months prior to construction commencing. Monthly data collection should take place throughout the construction phase. Suitable pollution prevention should be maintained throughout the duration of the construction phase.	The predicted and residual effect to aquatic species is assessed as Minor Adverse (Not Significant) during the construction phase of the Proposed Varied Development.
	Construction related effects on the Proposed Varied Development to bat	Use of light deflectors to limit illumination of habitats used by bats if night-time working is required. The Phased Felling Plan (EIAR Volume 4:	Phased felling will be ongoing throughout the construction period. All other appropriate	The residual effect from likely significant effects to bat species is assessed as Minor

Table 13.2: Construction Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
	populations through disturbance to the known roost at the Croft House and to foraging and commuting flight lines.	Technical Appendix 9.6) and Figure 9.5 (EIAR Volume 3a: Figures) has sought to provide buffers of construction works from forest edges to reduce disturbance to the species during the construction phase of the Proposed Varied Development.	mitigation measures would be implemented during the Construction Phase of the Proposed Varied Development. The Phased Felling Plan would be secured as a condition of consent.	Adverse (Not Significant) following implementation of the appropriate mitigation.
Soil and Water	Generation of Pollution	Good practice measures of preventing pollution as outlined in the CEMP (EIAR Volume 4: Technical Appendix 2.1).	Final CEMP to be submitted for the written approval of THC, SNH, SEPA and NDSFB prior to construction commencing (see EIAR Volume 4: Technical Appendix 2.1).	Not significant.
	Erosion and Sedimentation	Good practice measures of preventing increased erosion and sedimentation as outlined in the CEMP (EIAR Volume 4: Technical Appendix 2.1	CEMP to be submitted for the written approval of THC, SNH and SEPA prior to construction commencing (see EIAR Volume 4: Technical Appendix 2.1). Implementation of the Peat Management Plan (EIAR Volume 4: Technical Appendix 10.2). ECoW to oversee the appropriate storage and handling of peat, drainage and silt protection measures.	Not significant.
	Drainage and Dewatering	Appropriate drainage design that incorporates measures to attenuate and treat runoff from access tracks, hard standing areas, construction compound and turbine areas. The outline CEMP includes measures (EIAR Volume 4: Technical Appendix 2.1.	CEMP to be submitted for the written approval of THC, SNH, SEPA and NDSFB prior to construction commencing (see EIAR Volume 4: Technical Appendix 2.1).	Not significant.

Table 13.2: Construction Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
	Cumulative construction effects relating to Generation of Pollution	Same as construction effects outlined above.	Same as construction outlined above.	Not significant.
	Cumulative construction effects relating to Erosion and Sedimentation	Same as construction effects outlined above.	Same as construction outlined above.	Not significant.
	Cumulative construction effects relating to Drainage and Dewatering	Same as construction effects outlined above.	Same as construction outlined above.	Not significant.
Socio-Economics, Recreation and Tourism	N/A	N/A	N/A	N/A
Other Issues	Climate Change Resilience	None beyond that embedded in design of Proposed Varied Development and CEMP.	N/A	Not significant.
	In-Combination Climate Change Impacts	None beyond that identified in the other technical assessment chapters of this EIAR.	N/A	Not significant.
	Influence of the Proposed Varied Development on Climate Change	None beyond that embedded in design of Proposed Varied Development, CEMP and other technical assessment chapters of this EIAR.	N/A	Not significant.

Table 13.3: Operational Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Landscape and Visual Amenity	Predicted significant operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development.	- Potential reduction of aviation lighting intensity during good meteorological visibility; - Radar activated aviation lighting (should this be approved for use); and - Potential for cardinal or strategic aviation lighting on selected turbines.	Upon agreement with aviation stakeholders prior to construction and / or during operation.	The Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in a reduced visual effect.
	The Lone Mountains Landscape Character Type LCT (138).			
	The Rounded Hills – Caithness and Sutherland LCT (135).			
	The Sweeping Moorlands and Flows LCT (134).			
	Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA).			
Ornithology	Displacement to SPA qualifying species.	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) and Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) which seeks to sequentially remove the Strathy South conifer plantation and restore peatland habitats across the area. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	Felling of the conifer plantation would be phased to allow restoration of peatland habitats to commence during the Construction Phase of the Proposed Varied Development. The proposed felling programme is provided as Figure 9.5 (EIAR Volume 3a: Figures) and included in	Residual effect of the Proposed Varied Development on SPA species assessed as Moderate (not significant) for hen harrier and merlin, and as Moderate/ Minor (not significant) for all other species.

Table 13.3: Operational Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
			Technical Appendix 9.6 (EIAR Volume 4). To be secured through a condition of consent.	
	Collision risk of SPA qualifying species during the operation of the Proposed Varied Development.	Implementation of the Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) to ensure forest removal does not provide suitable nesting habitat (brash) for hen harrier. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to remove the conifer plantation and restore peatland, avoiding conditions that may attract hen harrier, short-eared owl or merlin to nest. Removing the forest also further reduces the habitat suitability for white-tailed eagle, by eliminating potential nesting or roosting habitat on site. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	The Strathy South Forestry Management Plan would be implemented during the first three years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) EIAR Volume 4: Technical Appendix 9.4) and Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year lifespan of the Proposed Varied Development. To be secured through a condition of consent.	The residual effect from potential impacts to bird at species is assessed as Minor Adverse (not Significant) following implementation of the appropriate mitigation.
	Collision risk of non-SPA VOR species during the operation of the Proposed Varied Development.	Implementation of the Strathy South Forestry Management Plan (EIAR Volume 4: Technical Appendix 9.6) to ensure forest removal does not provide suitable nesting habitat (brash) for hen harrier. Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to remove	The Strathy South Forestry Management Plan would be implemented during the first three years of the Operational Phase of the Proposed Varied Development whilst the conifer	Residual effect of the Proposed Varied Development on this species assessed as Moderate (not significant) .

Table 13.3: Operational Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
		the conifer plantation and restore peatland, avoiding conditions that may attract hen harrier, short-eared owl or merlin to nest. Removing the forest also further reduces the habitat suitability for white-tailed eagle, by eliminating potential nesting or roosting habitat on site. Both of these plans are embedded mitigation and integral to the implementation of the Proposed Varied Development.	plantation is removed from the main site. The Strathy South Forestry Management Plan EIAR Volume 4: Technical Appendix 9.6) and Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year lifespan of the Proposed Varied Development. To be secured through a condition of consent.	
Noise	Operational noise effects on noise sensitive receptors.	N/A	N/A	No significant residual effects.
	Cumulative operational noise effects on noise sensitive receptors.	N/A	N/A	No significant residual effects.
Cultural Heritage	Effect on setting of assets from the Proposed Varied Development.	None	N/A	Not significant.
	Cumulative operational setting effects.	None	N/A	The significance of effect on the setting of Ben Griam Beg (Site 15) is judged to be Moderate. The significance of effect is considered Significant in EIA terms.

Table 13.3: Operational Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
Roads and Traffic	N/A			
Ecology (non-avian)	Habitats –Impacts are limited to small scale pollution events and maintenance during the operational phase of the Proposed Varied Development which are not considered to give rise to likely significant effects.	Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5).	For the 50-year lifespan of the Proposed Varied Development.	The residual effects are predicted as Minor Beneficial (Not Significant) .
	Protected Species.	No mitigation proposed.	N/A	The residual effects are predicted as Negligible (Not Significant) .
	Aquatic Species – no significant effects are predicted. Impacts would be limited to small scale pollution event associated with ongoing operational maintenance.	No mitigation proposed.	N/A	The residual effects are predicted as Minor Adverse (Not Significant) .
	Effects to bat species from operation of the Proposed Varied Development from impacts including collision, displacement, disturbance, habitat alteration / loss and barotrauma.	Sensitive design of the Proposed Varied Development to ensure a suitable buffer zone from turbine blade tips of the rotor swept areas to features which may provide suitable habitat for foraging and commuting bat species as detailed in Technical Appendix 9.2 (EIAR Volume 4). Implementation of the Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.4) to ensure forest felling do not provide suitable flight lines which could bring bat species to areas where they would be at risk of collision of barotrauma.	The Phased Felling Plan would be implemented during the first two years of the Operational Phase of the Proposed Varied Development whilst the conifer plantation is removed from the main site. The Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) would be implemented and managed for the 50-year operational lifespan	The residual effect from potential impacts to bat species is assessed as Minor Adverse (Not Significant) following implementation of the appropriate mitigation.

Table 13.3: Operational Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
		Implementation of the Strathy South Outline HMP (EIAR Volume 4: Technical Appendix 9.5) to restore ground surrounding turbines to habitats which would not provide suitable forage for bats during the Operational Phase of the Proposed Varied Development.	of the Proposed Varied Development. The DMP and Phased Felling Plan would be secured as a condition of consent.	
	Indirect impact on SAC-designated habitat by displaced deer from Strathy South Forest.	Implementation of a DMP would seek to reduce the deer population within the main site whilst slowly reducing the habitat available to deer (conifer plantation areas) through the Phased Felling Plan (EIAR Volume 4: Technical Appendix 9.6) to allowing the slow dispersal of deer to habitats surrounding the main site.	The DMP would continue through the Operational Phase of the Proposed Varied Development Phased. The Phased Felling would be completed over the first two years of the Operational Phase of the Proposed Varied Development. This dual method of mitigation has been successfully implemented at the neighbouring Strathy North Wind Farm.	The residual effect of deer dispersal and their reduced utilisation of the main site is assessed as Minor Adverse (Not Significant) following the implementation of the DMP and Phased Felling Plan.
Soil and Water	Generation of Pollution.	Appropriate storage and handling of potential pollutants in accordance with measures to be set out in the Operations Environmental Management Plan (EMP) as required by SSE 14001 accredited Environmental Management System (EMS).	Immediate post construction monitoring as detailed within the approved CEMP, thereafter all measures would be addressed through the operational phase EMP.	Not significant.
	Erosion and Sedimentation.	Appropriate drainage design that incorporates sediment management measures, including sediment traps, to attenuate and treat runoff from wind farm. Adoption of a long-term operational drainage and monitoring programme.	Addressed through the operational phase EMP.	Not significant.
	Drainage and Dewatering.	Adoption of a long-term operational drainage and monitoring programme to monitor degradation of	Addressed through the operational phase EMP.	Not significant.

Table 13.3: Operational Mitigation Summary Table for the Proposed Varied Development

Topic	Potential Significant Effect	Mitigation Proposed	Means of Implementation/ Timing	Outcome/ Residual Effect
		infrastructure including the removal of blockages from watercourse crossings. Adoption of an operational drainage and monitoring plan (to be designed prior to construction).		
	Cumulative operational effects relating to the Generation of Pollution.	Same as operation effects outlined above.	Same as construction outlined above.	Not significant.
	Cumulative operational effects relating to Erosion and Sedimentation.	Same as operation effects outlined above.	Same as construction outlined above.	Not significant.
	Cumulative operational effects relating to Drainage and Dewatering.	Same as operation effects outlined above.	Same as construction outlined above.	Not significant.
Socio-Economics, Recreation and Tourism	N/A	N/A	N/A	N/A
Other Issues	Climate Change Resilience.	None beyond that embedded in design of Proposed Varied Development and CEMP.	N/A	Not significant.
	In-Combination Climate Change Impacts.	None beyond that identified in the other technical assessment chapters of this EIAR.	N/A	Not significant.
	Influence of the Proposed Varied Development on Climate Change.	None beyond that embedded in design of Proposed Varied Development, CEMP and other technical assessment chapters of this EIAR.	N/A	Not significant.

14. SUMMARY

14.1 Introduction

- 14.1.1 The purpose of this chapter is twofold; the first is to present a summary of the predicted significant residual effects of the Proposed Varied Development which are presented in Table 14.1. It is recognised that the concept of “factors” was introduced under Regulation 4(3) and paragraph 4 of Schedule 4 of the 2017 EIA Regulations, which was not previously part of environmental impact assessment process under the now revoked Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (“the 2000 EIA Regulations”). The 2000 EIA Regulations governed the information to be included in the 2007 Environmental Statement (ES), 2013 ES Addendum and 2014 Further Information Report and, as a consequence, that EIA work did not include an assessment of direct and indirect significant residual effects on the factors specified in Regulation 4(3) and the interaction between these changes. Therefore, the second purpose of this chapter is to present a summary of significant residual effects on the factors specified in Regulation 4(3) of the 2017 EIA Regulations and describes how this EIAR addresses the factors introduced by the 2017 EIA Regulations (Table 14.2).

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Chapter 4: Landscape and Visual Amenities	
Construction	
Predicted significant construction effects were identified for the following landscape receptors:	
• Bens Griam and Loch nan Clar SLA.	Moderate (significant).
• Localised parts of the Lone Mountains LCT (138).	Minor (localised Moderate (significant)).
• Localised parts of the Sweeping Moorland and Flows LCT (134).	Minor (localised Moderate (significant)).
• Localised parts of the WLA 39: East Halladale Flows Wild Land Area.	Moderate (localised Major (significant)).
Predicted significant construction effects were identified for the following visual receptors:	
• VP1: Ben Griam Beg.	Major (significant).
• VP3: Loch nan Clach Geala.	Moderate (significant).
• VP6: Bettyhill Viewpoint.	Moderate (significant).
• VP7: A836 west of B871.	Moderate (significant).
• Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1).	Negligible (localised Moderate (significant)).
• Localised parts of the A836 Tongue to Detailed Study Area.	Negligible (localised Moderate (significant)).
• Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy.	Major (significant).
Operation	
Predicted significant operational effects were identified for the following landscape receptors:	
• Bens Griam and Loch nan Clar SLA.	Moderate (significant).
• Localised parts of the Lone Mountains LCT (138).	Minor (localised Moderate (significant)).
• Sweeping Moorland and Flows LCT (134).	Minor (localised Moderate (significant)).

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Localised parts of the WLA 39: East Halladale Flows Wild Land Area.	Moderate (significant) (localised Major (significant)).
Predicted significant operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development in the absence of mitigation:	
The Lone Mountains Landscape Character Type LCT (138).	The aviation lighting assessment was undertaken on the worst case scenario assumption that all turbines would be required to be lit which would result in significant effects to these landscape receptors. However, the Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in reduced visual effects.
The Rounded Hills – Caithness and Sutherland LCT (135).	
The Sweeping Moorlands and Flows LCT (134).	
Localised parts of the WLA39: East Halladale Flows Wild Land Area (WLA).	
Predicted significant operational effects were identified for the following visual receptors:	
VP1: Ben Griam Beg.	Major (significant).
VP3: Loch nan Clach Geala.	Moderate (significant).
VP6: Bettyhill Viewpoint.	Moderate (significant).
VP7: A836 west of B871.	Moderate (significant).
Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500/ Cycle Route 1).	Negligible (localised Moderate (significant)).
Localised parts of the A836 Tongue to Detailed Study Area.	Negligible (localised Moderate (significant)).
Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy.	Moderate - Major (significant).
Predicted significant operational effects were identified for the following landscape receptors as a result of aviation lighting on the Proposed Varied Development (in the absence of mitigation).	
VP3: Loch nan Clach Geala.	The aviation lighting assessment was undertaken on the worst case scenario assumption that all turbines would be required to be lit which would result in significant effects to these visual receptors. However, the Applicant is engaging with aviation stakeholders and the CAA to agree an aviation lighting solution which could result in reduced visual effects.
VP4: East of Melvich.	
VP5: Strathy.	
VP7: A836 west of B871.	

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
VP10: Beinn Ratha.	
VP11: Forsinard.	
Scottish Hill Track 344: Strath Halladale (Trantlebeg) to Strathy.	
Localised parts of the A836 (Tongue – eastern edge of Detailed Study Area) (NC500 / Cycle Route 1).	
Localised parts of the A897.	
Localised parts of the B871 (North).	
Localised parts of Strathy (North of the A836 and east of the River Strathy).	
Localised parts of Strathy (South of the A836 and east of the River Strathy).	
Decommissioning	
Decommissioning effects were scoped out of the LVIA.	
Cumulative Construction	
Significant cumulative construction effects were identified for the following receptor: VP1: Ben Giam Beg.	Moderate (significant).
Cumulative Operation	
Significant cumulative operational effects were identified for the following receptor: VP1: Ben Giam Beg.	Moderate (significant).
Chapter 5: Ornithology	
Construction	
Disturbance to nesting Schedule 1/Annex 1 birds or damage to nests of other birds.	No significant residual effect for all other species. None (not significant) for all other species.
Direct (including temporary or permanent) displacement from habitat on non-designated protected habitats through installation of wind farm infrastructure for the Proposed Varied Development.	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as Moderate (not significant) and as Moderate/Minor (not significant) for all other species.

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Operation	
Displacement to SPA qualifying species.	Residual effect of the Proposed Varied Development on SPA species assessed as Moderate (not significant) for hen harrier and merlin, and as Moderate/ Minor (not significant) for all other species.
Collision risk of SPA qualifying species during the operation of the Proposed Varied Development.	The residual effect from potential impacts to bird at species is assessed as Minor Adverse (not Significant) following implementation of the appropriate mitigation.
Collision risk of non-SPA valued ornithological receptor (VOR) species during the operation of the Proposed Varied Development.	Residual effect of the Proposed Varied Development on non-SPA VOR species assessed as Moderate (not significant) .
Decommissioning	
The predicted effects are the same as for construction.	
Cumulative Construction	
Disturbance to nesting Schedule 1/Annex 1 birds or damage to nests of other birds.	The residual effect has been assessed as Moderate (not significant) for hen harrier and merlin, and Moderate/Minor (not significant) for all species.
Direct (including temporary or permanent) displacement from habitat on non-designated protected habitats through installation of wind farm infrastructure for the Proposed Varied Development.	Residual effect of the Proposed Varied Development assessed for hen harrier and merlin as Moderate (not significant) and as Moderate/Minor (not significant) for all other species.
Cumulative Operation	
Collision risk of SPA qualifying species during the operation of the Proposed Varied Development.	Residual cumulative effects from operation have been assessed as Moderate/Minor (not significant) or lower for all SPA qualifying species. The residual cumulative effect for operation for white-tailed eagle has been assessed against the UK population and categorised as Moderate (not significant) and lower for all SPA qualifying species.
Collision risk of non-SPA VOR species during the operation of the Proposed Varied Development.	Residual effect of the Proposed Varied Development on non-SPA VOR species assessed as Moderate (not significant) .

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Chapter 6: Noise	
Operational noise effects on noise sensitive receptors.	No significant residual effects.
Cumulative operational noise effects on noise sensitive receptors.	No significant residual effects.
Chapter 7: Cultural Heritage	
Construction	
Direct effects on known heritage assets on-site.	This assessment judged there to be no direct impacts on known heritage assets. This level of effect is not judged to be Significant in EIA terms.
Direct effects on hitherto unknown buried archaeological remains on-site.	This assessment judged there to be Low potential for hitherto unknown remains to survive on-site. The level of effect is not judged be Significant in EIA terms.
Operation	
Setting effects on designated cultural heritage assets.	This assessment considers there to be a Minor-moderate significance of effect in the setting of the Scheduled Ben Griam Beg (Site 15). This level of effect is not considered to be Significant in EIA terms.
Cumulative Operation	
Cumulative operational setting effects.	This assessment considers there to be a cumulative Moderate significance of effect on the setting of Ben Griam Beg (Site 15). This level of effect is judged to be Significant in EIA terms.
Chapter 8: Roads and Traffic	
Construction	
Driver Delay.	No significant effects predicted.
Road Safety.	No significant effects predicted.
Community Effects.	No significant effects predicted.
Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure.	No significant effects predicted.

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Cumulative Construction	
Driver Delay.	No significant effects predicted.
Road Safety.	No significant effects predicted.
Community Effects.	No significant effects predicted.
Physical Effects (wear and tear) of HGV (including abnormal load) Traffic on the Public Road Infrastructure.	No significant effects predicted.
Chapter 9: Ecology (non-avian)	
Construction	
Direct and Temporary Habitat Loss on non-designated protected habitats within the main site through construction of wind farm infrastructure for the Proposed Varied Development.	The residual effect to habitats is assessed as Negligible / Minor Beneficial (Not Significant) , with Habitat Management Plan works ongoing through the 50-year operational lifespan of the Proposed Varied Development.
Indirect effects on SAC designated habitat by displaced deer from Strathy South Forest.	The residual effects of deer dispersal to the surrounding SAC and their reduced utilisation of the main site would be Negligible (Not Significant) following the implementation of the DMP.
Protected Species – no significant effects are predicted. Impacts are limited to the loss of suitable foraging and resting habitat that would not cause a likely significant effect.	The predicted and residual effect to protected species is assessed as Minor Adverse (Not Significant) during the construction phase of the Proposed Varied Development.
Aquatic Species – the possibility of likely significant effects is limited to the construction period and no significant effects are predicted. Impacts are limited to pollution incidents which might affect the water quality within water courses and water bodies within and surrounding the Proposed Varied Development. The management of such potential effects is well-established and there is a high degree of confidence regarding avoidance of such impacts.	The predicted and residual effect to aquatic species is assessed as Minor Adverse (Not Significant) during the construction phase of the Proposed Varied Development.
Construction related effects on the Proposed Varied Development to bat populations through disturbance to the known roost at the Croft House and to foraging and commuting flight lines.	The residual effect from likely significant effects to bat species is assessed as Minor Adverse (Not Significant) following implementation of the appropriate mitigation.

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Operation	
Habitats –Impacts are limited to small scale pollution events and maintenance during the operational phase of the Proposed Varied Development which are not considered to give rise to likely significant effects.	The residual effects are predicted as Minor Beneficial (Not Significant) .
Protected Species.	The residual effects are predicted as Negligible (Not Significant) .
Aquatic Species – no significant effects are predicted. Impacts would be limited to small scale pollution event associated with ongoing operational maintenance.	The residual effects are predicted as Minor Adverse (Not Significant) .
Effects to bat species from operation of the Proposed Varied Development from impacts including collision, displacement, disturbance, habitat alteration / loss and barotrauma.	The residual effect from potential impacts to bat species is assessed as Minor Adverse (Not Significant) following implementation of the appropriate mitigation.
Indirect impact on SAC-designated habitat by displaced deer from Strathy South Forest.	The residual effect of deer dispersal and their reduced utilisation of the main site is assessed as Minor Adverse (Not Significant) following the implementation of the DMP and Phased Felling Plan.
Decommissioning	No significant effects identified.
Cumulative Construction	No significant effects identified.
Cumulative Operation	No significant effects identified.
Chapter 10: Soil and Water	
Construction	
Detrimental impacts on water quality onsite and downstream.	Minor Adverse to No Significance.
Detrimental impacts to fisheries onsite and downstream as a result of changes to water quality.	Minor Adverse to No Significance.
Increase to on-site and downstream flood risk as a result of poor construction practises (including poor construction of watercourse crossings).	Minor Adverse to No Significance.
Increase risk of peat slide risk as a result of poor construction and management of peat stockpiles.	Minor Adverse to No Significance.
Increase risk of peat slide as a result of desiccation or wetting of peat.	Minor Adverse to No Significance.

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Long-term degradation of peat as a result of interrupting surface and sub-surface drainage pathways. Disruption of drainage patterns can cause pooling and / or desiccation of peat.	Minor Adverse to No Significance.
Peat slide hazard rating of access tracks.	Not significant.
Operation	
Peat slide hazard rating of access tracks.	Not significant.
Detrimental impacts to onsite and downstream water quality through degradation of site infrastructure and poor storage of materials.	Minor Adverse (not significant).
Detrimental effects to onsite and downstream fisheries as a result of changes to water quality.	Minor Adverse (not significant).
Increases to on-site and downstream flood risk as a result of degradation of infrastructure and / or poor maintenance / monitoring of infrastructure.	Minor Adverse (not significant).
Decommissioning	
Detrimental impacts on water quality onsite and downstream.	Minor Adverse (not significant).
Detrimental impacts to fisheries onsite and downstream as a result of changes to water quality.	Minor Adverse (not significant).
Increase to on-site and downstream flood risk as a result of poor construction practises (including poor construction of watercourse crossings).	Minor Adverse (not significant).
Increase risk of peat slide risk as a result of poor construction and management of peat stockpiles.	Minor Adverse (not significant).
Increase risk of peat slide as a result of desiccation or wetting of peat.	Minor Adverse (not significant).
Long-term degradation of peat as a result of interrupting surface and sub-surface drainage pathways. Disruption of drainage patterns can cause pooling and / or desiccation of peat.	Minor Adverse (not significant).
Cumulative Construction	
Generation of pollution.	Not significant.
Erosion and sedimentation.	Not significant.

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Drainage and dewatering .	Not significant.
Cumulative Operation	
Generation of pollution.	Not significant.
Erosion and sedimentation.	Not significant.
Drainage and dewatering.	Not significant.
Chapter 11: Socioeconomics, Recreation and Tourism	
Construction	
Tourism and Recreation.	Negligible (not significant).
Economic Impact in Caithness and Sutherland.	Temporary minor beneficial (not significant).
Economic Impact in Highland.	Temporary minor beneficial (not significant).
Economic Impact in Scotland.	Temporary negligible beneficial (not significant).
Operation	
Tourism.	Negligible (not significant).
Economic Impact in Caithness and Sutherland.	Minor beneficial (not significant).
Economic Impact in Highland.	Negligible Beneficial (not significant).
Economic Impact in Scotland.	Negligible Beneficial (not significant).
Payment of Non-Domestic Rates.	Negligible Beneficial (not significant).
Decommissioning	
Economic Impact in Caithness and Sutherland.	Temporary minor beneficial (not significant).
Economic Impact in Highland.	Temporary negligible beneficial (not significant).
Economic Impact in Scotland.	Temporary negligible beneficial (not significant).

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Cumulative Construction	
Economic Impact in Caithness and Sutherland.	Temporary minor beneficial (not significant).
Economic Impact in Highland.	Temporary minor beneficial (not significant).
Economic Impact in Scotland.	Temporary negligible beneficial (not significant).
Cumulative Operation	
Economic Impact in Caithness and Sutherland.	Minor beneficial (not significant).
Economic Impact in Highland.	Negligible Beneficial (not significant).
Economic Impact in Scotland.	Negligible Beneficial (not significant).
Chapter 12: Other Issues (This chapter covers: Air, Climate, Human Health, Major Accidents and/or Disasters, Shadow Flicker)	
Construction	
Climate Change Resilience.	Not significant.
In-Combination Climate Change Impacts.	Not significant.
Influence of the Proposed Varied Development on Climate Change.	Not significant.
Operation	
Climate Change Resilience.	Not significant.
In-Combination Climate Change Impacts.	Not significant.
Influence of the Proposed Varied Development on Climate Change.	Not significant.
Decommissioning	
Climate Change Resilience.	Not significant.
In-Combination Climate Change Impacts.	Not significant.
Influence of the Proposed Varied Development on Climate Change.	Not significant.

Table 14.1: Predicted Significant Residual Effects of the Proposed Varied Development	
Technical Chapter and Development Phase	Predicted Significant Residual Effects of the Proposed Varied Development
Cumulative Construction	
Climate Change Resilience.	Not significant.
In-Combination Climate Change Impacts.	Not significant.
Influence of the Proposed Varied Development on Climate Change.	Not significant.
Cumulative Operation	
Climate Change Resilience.	Not significant.
In-Combination Climate Change Impacts.	Not significant.
Influence of the Proposed Varied Development on Climate Change.	Not significant.

Table 14.2: Factors identified in the 2017 EIA Regulations 4(3) and paragraph 4 of Schedule 4 and where these have been assessed in EIAR

Topic	Potential for Significant Effects
Population and Human Health	Potential impacts on population and human health of relevance to the Proposed Varied Development include: - Health and amenity impact associated with construction and operational noise, traffic and transport related effects and visual amenity; and - Potential for impacts on recreational amenity and/or socioeconomic activity. Visual amenity effects are assessed in Chapter 4: Landscape and Visual Amenity (EIAR Volume 2: Main Report), noise effects are assessed in Chapter 6: Noise (EIAR Volume 2: Main Report) and socioeconomic effects are addressed in Chapter 11: Socioeconomic, Recreation and Tourism (EIAR Volume 2: Main Report). No significant source-pathway-receptor linkages have been identified for vibration, heat, light, radiation (including electromagnetic radiation) or waste disposal, therefore there is no potential for nuisance or health effects related to these factors. On this basis, no additional environmental information is required to address the requirements of the 2017 EIA Regulations.
Biodiversity (in Particular Species and Habitats Protected under Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora)	The requirement to consider impacts on biodiversity is addressed in this EIAR in Chapter 5: Ornithology and Chapter 9: Ecology (non-avian). On this basis, no additional environmental information is required to address the requirements of the 2017 EIA Regulations.
Land and Soil (and Natural Resources Availability)	The potential impacts on geological receptors, peat and groundwater resources are considered in Chapter 10: Soil and Water (EIAR Volume 2: Main Report). The EIA Report also includes a borrow pit assessment (EIAR Volume 4: Technical Appendix 2.2), the peat landslide hazard and risk assessment (EIAR Volume 4: Technical Appendix 10.1) and a draft peat management plan (EIAR Volume 4: Technical Appendix 10.2). On this basis, no additional environmental information is required to address the requirement of the 2017 EIA Regulations.
Water (and Natural Resource Availability)	The potential impacts on the water environment are considered in Chapter 10: Soil and Water (EIAR Volume 2: Main Report). In addition, technical appendices have been prepared in relation to flood risk and drainage (EIAR Volume 4: Technical Appendix 10.4), private water supplies (EIAR Volume 4: Technical Appendix 10.5) and watercourse crossings (EIAR Volume 4: Technical Appendix 10.6). On this basis, no additional environmental information is required to address the requirement of the 2017 EIA Regulations.
Air and Climate	The 2017 EIA Regulations require a consideration of climate change effects, both considering the greenhouse gas emissions, and the climate change vulnerability. Chapter 12: Other Issues (EIAR Volume 2: Main Report) confirms the enhanced benefits for reducing greenhouse gas emissions associated with the proposed variations by increasing the potential energy yield compared to the Consented Scheme. The carbon calculator results (see EIAR Volume 4: Technical Appendix 12.1) confirm that the Proposed Varied Development would result in CO₂ emissions savings of 387,420 tCO₂yr⁻¹, resulting in a payback of 1.5 years (relative to a fossil fuel mix of electricity generation).

Table 14.2: Factors identified in the 2017 EIA Regulations 4(3) and paragraph 4 of Schedule 4 and where these have been assessed in EIAR

Topic	Potential for Significant Effects
	The Proposed Varied Development is not considered vulnerable to climate change induced changes to the future baseline (for example, the Proposed Varied Development has been designed to be resilient to extreme weather). The EIAR confirms that drainage design incorporates consideration of climate change scenarios for conveyance of surface water (EIAR Volume 4: Technical Appendix 10.4). On this basis, no additional environmental information is required to address the requirements of the 2017 EIA Regulations.
Material Assets, Cultural Heritage	Chapter 7: Cultural Heritage (EIAR Volume 2: Main Report) includes an assessment of the potential for significant effects (both direct and effects on setting) on material assets and cultural heritage including architectural and archaeological assets and historic landscape. On this basis, no additional environmental information is required to address the requirements of the 2017 EIA Regulations.
Landscape	Chapter 4: Landscape and Visual Amenity (EIAR Volume 2: Main Report) considers the potential impacts and potential cumulative impacts on landscape and visual, including landscape character types (LCT) and visual receptors. On this basis, no additional environmental information is required to address the requirements of the 2017 EIA Regulations.
Interaction Between Factors (Cumulative Effects)	The potential for cumulative effects and the potential for interaction between factors is addressed in each of the technical environmental chapters (EIAR Volume 2: Main Report: Chapters 4 – 12). Based on the information provided, no additional environmental information is required to address the requirement of the 2017 EIA Regulations.

