

CHAPTER 4: DESCRIPTION OF DEVELOPMENT

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4. DESCRIPTION OF DEVELOPMENT

4.1 Introduction

4.1.1 This Chapter describes the elements that constitute the Gordonbush Extension Wind Farm s.36C proposal (the Proposed Varied Development). It provides a description of the key development components and information regarding the construction, operation and decommissioning phases. The Proposed Varied Development is located on Gordonbush Estate, adjacent to the operational Gordonbush Wind Farm and approximately 9.5 kilometres (km) to the north-west of Brora (see Figure 1.1: Site Location).

4.1.2 The layout of the Proposed Varied Development is shown on Figure 4.1: Site Layout. The approximate central grid reference is 285000, 913700.

4.1.3 As discussed in Chapter 1: Introduction, the Consented Development gained consent in September 2017. A decision has since been made by the Applicant to reduce the number of turbines from fifteen to eleven, and increase the tip height of the remaining turbines from 130m up to a maximum tip height of 149.9m (and a maximum rotor diameter of up to 136m). Figure 1.3: Proposed Variation illustrates these proposed changes. The turbine layout for the Proposed Varied Development represents no change to the Consented Development turbine layout other than the deletion of turbines.

4.1.4 The Proposed Varied Development would include the following key components, which are described in further detail in this Chapter and shown on Figure 4.1: Site Layout:

- Eleven no. wind turbines of up to 149.9m tip height with internal transformers. This is a reduction in four no. turbines from the Consented Development, and an increase in tip height (from 115m / 130m up to 149.9m) and rotor diameter (from 93m / 105m to 136m);
- crane hardstanding area at each wind turbine location with a maximum area of 1900m², as per the Consented Development;
- one LiDAR and associated hardstand with a maximum area of 100m². This is to replace one permanent and one temporary meteorological mast, as proposed for the Consented Development;
- Retention of the existing operational Gordonbush Wind Farm meteorological mast (southern). This was proposed to be removed as part of the Consented Development, but will now be required as part of the Proposed Varied Development given the proposed switch to LiDAR;
- on site access tracks (of which approximately 5.33km are new access tracks and approximately 11.3km are existing tracks where upgrades may be undertaken to facilitate delivery of the wind turbine components). This is a reduction in overall new track length of 2.63km, compared to the Consented Development;
- a network of underground cabling to connect each wind turbine to the existing onsite substation, as per the Consented Development;
- modifications to the existing on site control building and grid substation to accommodate additional cables and equipment, as per the Consented Development; and
- any associated ancillary works required.

4.1.5 The additional operations building proposed as part of the Consented Development is no longer proposed.

4.1.6 In addition to the above components of the operational wind farm, the construction phase would comprise the following:

- a temporary concrete batching plant;
- temporary telecommunications infrastructure;

- a temporary construction compound and storage area; and
- reopening and extension of two of the original borrow pits developed as part of the Gordonbush Wind Farm (see Appendix 9.1: Borrow Pit Report).

4.1.7 As per the Consented Development the Proposed Varied Development will utilise existing infrastructure from the operational Gordonbush Wind Farm for the extension where possible and is therefore included within the site boundary. This includes the use of the existing operations building and grid substation for the grid connection; existing access tracks and two of the original borrow pits.

4.1.8 It is estimated that the maximum permanent development footprint of the wind farm would be approximately 8.06ha. During the construction period it is estimated that a further 13.03ha would be temporarily required which would be reinstated following completion of the construction works. The anticipated land-take requirements are set out in Table 4.1.

Table 4.1: Land Use

Wind Farm Component	Temporary Land Use (m2) ES 2015	Permanent Land Use (m2) ES 2015	Temporary Land Use (m2) Proposed Varied Development	Permanent Land Use (m2) Proposed Varied Development
Turbines	9,600	30,400	3,456	25,080
New Cut Track	0	39,023	0	32,364
New Float Track	0	9,378	0	7,535
Existing track (to be upgraded)	0	11,000	0	11,000
Passing Places (4x4 vehicles)	0	2,700	0	1,200
Borrow Pits	114,369	0	114,369	0
Turbine Vehicle Turning Heads	0	3,240	0	3,346
Temporary Construction Compound	7,500	0	7,500	0
Concrete Batching Plant	5,000	0	5,000	0
Operations Building and Compound	0	2,500	0	0
Substation	0	0	0	0
Permanent Meteorological Mast (now LIDAR)	0	840	0	29
Total (m2)	136,469	99,081	130,325	80,554
Total (ha)	13.65	9.9	13.03	8.06

4.2 Site Access

4.2.1 The principal construction and operations access to the site would utilise the same delivery route used for Gordonbush Wind Farm and as per the Consented Development, including routes taken for abnormal loads. Two port of entries are considered in the Route Survey Report (see Appendix 12.1); Invergordon and Nigg. From the A9 trunk road at Brora, the route would turn west along an unclassified road past the Clynelish Distillery to meet the C6 Strath Brora road. The route would continue along this road to Ascoile. Dependent on the wind turbine selected

for use on the Proposed Varied Development, additional works to accommodate abnormal loads are provided in Appendix 12.1: Route Survey Report.

- 4.2.2 The full extent of any required improvement works would be determined following selection of the wind turbine for the site.
- 4.2.3 Full details of the assessment of effects on the local road network are provided in Chapter 12: Traffic and Transport of this EIA Report.

4.3 Core Development Components

Wind Turbines

Turbine Specification

- 4.3.1 The Proposed Varied Development comprises eleven three-bladed horizontal axis wind turbines. The turbines are automatically controlled to ensure each turbine faces directly into the wind. As a result of this, the orientation of the wind farm would alter with changes in wind direction.
- 4.3.2 The final choice of turbine would be dependent on economics and available technology at the time of construction, but would have a maximum blade tip height of 149.9m. Figure 4.2: Indicative Turbine Dimensions shows dimensions and elevations for the candidate turbines. For the purposes of assessment within this EIA Report, where it has been necessary to identify a candidate turbine for assessment of a particular environmental topic (e.g. noise), this is specified within the relevant chapter and summarised in Table 1.3 of Chapter 1: Introduction. Each chapter assessment is based on the worst case scenario for that particular discipline.
- 4.3.3 Turbine grid references and maximum dimensions for each turbine are as listed in Table 4.2. These are consistent with the consented turbine locations. Table 4.2 also highlights those turbines that have been removed from the Consented Development.

Table 4.2: Turbine grid references and maximum / nominal turbine dimensions

Turbine Number	Grid Reference	Maximum Height to Blade Tip (m)	Nominal Hub Height (m)	Nominal Rotor Diameter (m)
1	284738 914846	149.9	81.9	136
2	284766 914339	149.9	81.9	136
3	285454 913704	149.9	81.9	136
4	285841 913380	149.9	81.9	136
5	285315 913037	149.9	81.9	136
6	285015 913928	149.9	81.9	136
7	284410 914122	149.9	81.9	136
8	284221 913677	149.9	81.9	136
9	284669 913649	149.9	81.9	136
10	285111 913393	149.9	81.9	136
11	284020 913260	Turbine removed from Proposed Varied Development layout		
12 11*	284692 913100	149.9	81.9	136
13	284992 912698	Turbine removed from Proposed Varied Development layout		
14	283820 912873	Turbine removed from Proposed Varied Development layout		
16**	284659 912370	Turbine removed from Proposed Varied Development layout		

* Note that the consented Turbine Number 12 has been renumbered in the table above as Turbine Number 11.

** Turbine Number 15 was included in the 2015 ES, but removed from the 2016 FEI Report (for the Consented Development) and was voluntarily withdrawn from the application.

- 4.3.4 The turbines would generate electricity in wind speeds between approximately 4 and 25m/s (9 to 56mph). At wind speeds greater than this the turbines would shut down for self-protection.
- 4.3.5 The turbine towers would be of tapering tubular steel construction. The blades would be made from fibre-reinforced epoxy. The finish of the turbines is proposed to be semi-matt pale grey colour.
- 4.3.6 A transformer would be required for each turbine. This would be located internally to each turbine, as per the Consented Development.
- 4.3.7 Full details of the proposed turbines would be provided to the Local Authority prior to the commencement of development under Condition 7 of the Conditions of Consent.

Turbine Installation

- 4.3.8 Turbine components including towers, blades, drivetrains, hubs and nacelles are likely to be transported from the Port of Entry to the Proposed Varied Development using suitable abnormal load vehicles.
- 4.3.9 On arrival onto the site, the wind turbine components would be delivered and offloaded at the hardstanding of the wind turbine to be erected.

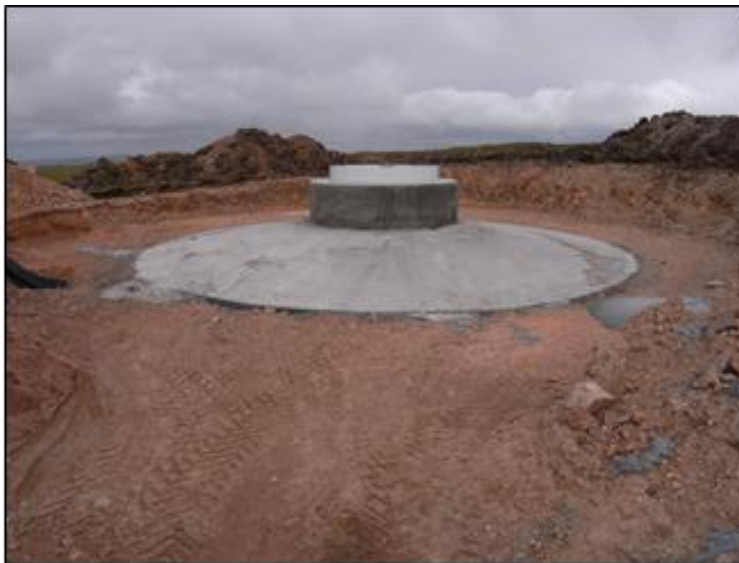
Turbine Bases

Foundations

- 4.3.10 Dependent on the ground conditions at each wind turbine location, a piled or gravity foundation would be used to support the wind turbines. A typical foundation arrangement showing a gravity foundation solution is shown on Figure 4.3: Typical WTG Foundation, although these would vary depending on the final turbine selection, the applied loads from the wind turbine and ground conditions at each turbine location. Piled foundations may also be used dependant on site ground conditions. Site-specific designs would be developed once the turbine is selected and detailed intrusive ground investigations are undertaken during the detailed design phase.
- 4.3.11 Construction of a gravity foundation would generally require the excavation of subsoil and rock to a specified sub-formation level, usually up to 5m below existing ground level. The depth of the excavation would depend on the depth to a competent bearing strata with the excavation slopes graded to a safe angle to ensure they remain stable during construction. The sub-formation would then have a layer of structural fill placed across it to create a level platform, prior to the in-situ casting of a steel-reinforced concrete foundation. Foundations would likely be circular and consist of a main base section with a smaller plinth section cast above this. The foundations would have a diameter of approximately 21m. This is an increase compared to the Consented Development (which had a 19.5 m diameter).
- 4.3.12 Where a piled foundation is required, the construction process follows that of the gravity base, with the pile group installed following the completion of the structural fill platform. The construction process would then be completed as per the gravity base.
- 4.3.13 Each foundation would require approximately 750m³ of concrete and 85 tonnes of steel reinforcement.
- 4.3.14 Dependent on the wind turbine selected for use on the site, the connection piece used between the wind turbine and foundation can vary. Possible solutions include cans, pedestal length bolts and full length bolts. Cans and pedestal bolts would be cast into the foundation pedestal, full length bolts will extend through the pedestal and into the main base section. The construction process would be as per the above for gravity and piled bases with the connection piece placed at the appropriate stage during the process.

- 4.3.15 The foundation excavation would be back-filled with compacted layers of suitable graded material from the original excavation. The finished surface around the turbines would be capped with crushed rock to allow for safe personnel access to each turbine.
- 4.3.16 Plate 4.1 illustrates the typical construction of turbine foundations.

Plate 4.1: Construction of Turbine Foundations (photos from Gordonbush Wind Farm)



- 4.3.17 Electrical cable ducts and other ancillary services would be installed into the foundations as required.

Hardstandings

- 4.3.18 As shown on Figure 4.3: Typical WTG Foundation, the turbine foundations would be surrounded by a hardstanding. It is anticipated a maximum area of 1900m² would be required for the hardstanding at each turbine. This is consistent with the hardstanding area included as part of the Consented Development. The hardstanding areas accommodate the cranes required for construction and maintenance, and provide a laydown area for temporary storage of components adjacent to each turbine location.
- 4.3.19 Crane hardstandings would be constructed level to ensure the safe operation of the cranes. The final detail of the crane hardstanding would depend on the exact specification of the wind turbine supplier. It is anticipated that a large crawler or wheeled/mobile crane (estimated at

1200 tonne capacity) would be required for turbine erection, with one smaller (estimated 160 tonne capacity) pilot crane assisting with the lift procedure.

- 4.3.20 Hardstanding construction would involve stripping the topsoil (and peat where present) to expose a suitable bearing strata on which to build the hardstanding. The hardstanding would then be constructed by placing and compacting suitable crushed rock (obtained from suitable on-site borrow pits) to the required level. The upper soil/peat horizon, together with any vegetation, would be placed to one side for later reinstatement, if appropriate.

Access Tracks

- 4.3.21 The access track layout is shown on Figure 4.1: Site Layout. From the C6 Strath Brora road at Ascoile, access to the site would be achieved by utilising the existing track infrastructure developed as part of the operational Gordonbush Wind Farm where possible (see Plate 4.2a and 4.2b).
- 4.3.22 There is currently approximately 21km of track constructed as part of the operational wind farm site that has been built to a high standard with a width of around 4.5-5m. Approximately 11.3km of the existing tracks would be utilised to access the Proposed Varied Development and the existing control and substation buildings. Localised widening of the existing track may be required to facilitate the delivery of the wind turbine components dependent on the wind turbine chosen to be used on the Proposed Varied Development.

Plate 4.2a: Junction from C6 Strath Brora road at Ascoile



Plate 4.2b: Existing Gordonbush Wind Farm Access Track



- 4.3.23 Approximately 5.33km of new tracks with a minimum 4.5m wide running surface and localised widening on corners would be required to access the turbines from the existing access tracks, for use both during construction and operation. The access track would be designed to incorporate passing places that would be suitable for construction plant and 4x4 traffic (approximately 25m x 3m) (see Figure 4.4: Typical Access Track Details). This is a reduction in new track length from the Consented Development of 2.63km.

Access Track Construction

- 4.3.24 As per the Consented Development, site access tracks would be constructed with locally (on site) won graded rock from borrow pits and, where necessary, geotextiles with the surface course comprising of a durable unbound graded rock surfacing material. This construction broadly matches the existing access tracks created for Gordonbush Wind Farm.
- 4.3.25 Depending on local ground conditions, access tracks would be constructed using a combination of 'floating track' or 'cut track' designs:
- Generally, a 'floating track' design does not involve excavation and would be utilised on the site in areas where peat depth is greater than 1m, where practical¹. Geotextile material is laid onto the unbroken existing surface at a width to suit the track. Layers of crushed stone would then be laid on the geotextile to form a track capable of supporting the turbine delivery vehicles and construction plant. This type of track construction is typically used in peaty areas across Scotland including other constructed wind farm developments and public roads. The benefits of the floating track design are that it allows access track construction on soft terrain and does not require excavation of deep peat as the surface layer is not broken, resulting in reduced peat volumes for re-use across the site. There is minimal disruption of the sub-surface flow of water within the peat body, and no new channels are formed by which water can drain from the peat mass.

¹ This is not always feasible due to peat stability risk associated with a combination of peat depth, gradient and underlying soil parameters. In addition, consideration will be given to the transition lengths between floating and founded track construction where a proportion of this transition may be in areas where the peat is in excess of 1m. Where isolated pockets of peat are greater than 1m in depth it may not be possible to transition from a cut track to a floated track due to the length of transition required.

- In areas of shallow or no peat (0-1m), a 'cut track' design would be utilised for which the topsoil and peat would be stripped to expose a suitable bearing strata on which to build the track. The track would then be constructed by placing and compacting suitable crushed rock (obtained from suitable on-site borrow pits) to the required level. Given the variable and undulating topography across the site, earthwork cuttings and embankments will be required to achieve the required gradients for tracks and crane hardstandings. The upper soil/peat horizon, together with any vegetation, would be placed to one side for later reinstatement, if appropriate.

4.3.26 This approach is consistent with the Consented Development.

4.3.27 Where appropriate, peat and soil from excavations on site would be utilised for reinstatement along both sides of the track verges and allowed to regenerate naturally. Further details are provided in Appendix 4.1: draft CEMP.

Access Track Drainage

4.3.28 Construction of site access tracks requires robust drainage. Run-off from the access tracks will be shed via a crossfall into track side ditches and settlement lagoon/ponds to attenuate flows and remove sediments before discharging to land. Further details are provided in Appendix 4.1 draft CEMP. Existing drainage infrastructure will be utilised where possible.

4.3.29 Where practical, interceptor (cut-off) ditches would be formed on the upslope side of the track to collect and divert clean water away from the access tracks. Refer to Figure 4.4: Typical Access Track Details.

4.3.30 Cross drains would be installed at regular intervals to prevent flooding / surcharging of trackside drainage and maintain hydraulic pathways. As far as possible, these would coincide with naturally occurring drainage channels.

Access Track Watercourse Crossings

4.3.31 The proposed routes for the site tracks have been designed to ensure that no new watercourse crossings are required, with the existing access tracks constructed as part of Gordonbush Wind Farm utilised where possible.

Temporary Construction Compound

4.3.32 A temporary construction compound containing: welfare; offices; parking for cars and plant; and storage facilities, would be required for construction workers at the location shown on Figure 4.1: Site Layout. This location is consistent with the Consented Development.

LiDAR

4.3.33 One permanent LiDAR station (Light Detection and Ranging) would be constructed to collect meteorological data for the operational life of the Proposed Varied Development and has been located to ensure it obtains the best quality data for the site. Figure 4.1: Site Layout indicates its location and a typical plan and elevation are shown on Figure 4.5a: Proposed LiDAR Unit Plan and 4.5b: Proposed LiDAR Unit Elevation. It is assumed that the LiDAR would have a maximum reinforced concrete foundation of 10m x 10m.

4.3.34 The inclusion of a LiDAR station means that there is no longer a requirement for one permanent and one temporary meteorological mast, both of which formed part of the Consented Development.

Electrical Infrastructure

Grid Connection

- 4.3.35 As per the Consented Development, the Proposed Varied Development would connect to the electricity transmission network using the existing control building and grid substation developed for Gordonbush Wind Farm (see Figure 4.1: Site Layout and Plate 4.3). Works to the existing substation and operations building would be required to accommodate additional cables and equipment associated with the Proposed Varied Development. The substation would connect the Proposed Varied Development to the adjacent existing Beauly to Dounreay 275kV transmission line.

Plate 4.3: Existing Gordonbush Wind Farm Substation



On-site Cabling

- 4.3.36 Turbines are likely to be connected by electrical circuit 'arrays', with the output connecting to the substation. The cabling for this would be laid in trenches of varying width (depending on the number of cables) and approximately 1m in depth alongside the site access tracks where suitable, or otherwise unless agreed in writing with the Highland Council in consultation with SEPA (see Condition 11: Micrositing, subject to variation as per Appendix 1.2). These trenches would also carry earthing and communications cables.
- 4.3.37 Cables would be laid directly in trenches with a sand surround and then backfilled with excavated sub-soil and peat topsoil. Alternatively, cable ducts could be installed underground, backfill materials would be as per those aforementioned, and the cables pulled through following completion of the duct installation or cables could be installed directly into the ground by use of cable ploughs. Earthing cables and communications cables would be included in the same trench. This is consistent with the Consented Development.

4.4 Associated Development Components

Concrete Batching

- 4.4.1 It is anticipated that concrete batching would be undertaken on site. The location of the batching plant has been moved from the consented location at Borrow Pit 2 to a revised location adjacent to Borrow Pit 1 (see Figure 1.3: Proposed Variation). This is due to better stone quality at Borrow Pit 1. The batching facility would comprise batching towers and a number of feeder hoppers used to store the constituent parts (water, fine and course aggregates and cement), which are mixed to form concrete. This process is consistent with the Consented Development.

Borrow Pits

Predicted Aggregate Requirements

4.4.2 It is estimated that approximately 109,000m³ of stone would be required for construction of the Proposed Varied Development (including access tracks, structural fill beneath turbine foundations, and hardstandings at turbine bases and compounds). This is approximately 35,000m³ less stone than estimated for the Consented Development.

Borrow Pit Locations

4.4.3 Stone required during construction is expected to be obtained from borrow pits which were utilised for the existing Gordonbush Wind Farm site (as shown on Figure 4.1: Site Layout). Where the borrow pits do not yield suitable material for certain construction operations such as concrete batching or access track capping, it may be necessary to import material to the site. This would be determined following detailed ground investigation works.

4.4.4 The volumes provided in Table 4.3 are considered to be indicative of the volume of stone each borrow pit would provide but this is subject to detailed ground investigation and design during the pre-construction design phase. It is anticipated the extraction volumes from each borrow pit would vary as further information becomes available during the detailed design phase. Further details are provided in Appendix 9.1: Borrow Pit Assessment.

Table 4.3: Borrow Pits

Borrow Pit Reference	Location Coordinates	Indicative Volume
BP1	284827, 912623	105,600m ³
BP2	285989, 913374	39,600m ³

4.4.5 The borrow pits would require the use of plant to both win and crush the resulting rock to the required grades. It is anticipated that rock would be extracted by breakers and some blasting may be required.

Borrow Pit Reinstatement

4.4.6 Following construction, the borrow pits would be reinstated with a suitable restoration profile (refer to Appendix 9.1: Borrow Pit Assessment).

4.5 Construction Programme

4.5.1 It is expected that many of the above operations would be carried out concurrently, although predominantly in the order identified in Table 4.4 below, to minimise the overall length of the construction programme. A typical construction period for a wind farm of this size is estimated to be approximately 13 months. The 13 month construction programme is illustrated in Table 4.4 below, with the final period dependent on weather and ground conditions experienced at the site. This programme is consistent with the Consented Development.

4.5.2 Site reinstatement would be programmed and carried out to allow rehabilitation of disturbed areas as early as possible in order to minimise storage of excavated material on vegetation. Details on reinstatement would be provided within the CEMP, secured through Condition 23 of the Conditions of Consent.

Working Hours

4.5.3 As proposed for the Consented Development, construction activities are anticipated to be between 07.00 and 19.00 hours Mondays to Fridays, and 07.00 to 14.00 hours on Saturdays between April and September. In winter months (i.e. between October and March), working hours are anticipated to be between 07:30 and 17:00 Mondays to Fridays and 07:30 and 14:00 on Saturdays. No working activities would be planned on Sundays during any period. In the

event of work being required outwith these hours, e.g. abnormal load deliveries, commissioning works or emergency mitigation works, the Planning Authority will be notified prior to these works taking place, wherever possible.

- 4.5.4 As per Condition 15 of the Conditions of Consent, any blasting on site shall only take place on the site between the hours of 10.00 to 16.00 on Monday to Friday inclusive and 10.00 to 12.00 on Saturdays with no blasting taking place on a Sunday or on National Public Holidays, unless otherwise approved in advance in writing by the Planning Authority.
- 4.5.5 Operation of crushing equipment located within / next to borrow pits will generally be limited to 08.00 to 18.00 hours Mondays to Fridays and 08.00 to 13.00 hours Saturdays, with no operation on Sundays.

Table 4.4: Indicative Construction Programme

Activity/Month	1	2	3	4	5	6	7	8	9	10	11	12	13
Mobilisation													
Borrow Pits													
Access Track Construction													
Hardstanding Construction													
WTG Foundations													
WTG Erection													
Reinstatement													
Demobilise													

4.6 Environmental Management during Construction

4.6.1 Prior to construction works, sensitive ecological areas, and other specific sensitive locations (e.g. watercourses) would be marked out as appropriate on site by specialist advisers in order to avoid unnecessary encroachment and protect sensitive areas during construction. The contractor would ensure that no vehicle movements or other activities take place outwith the approved working area. There may be a requirement to microsite elements of the Proposed Varied Development as a result of additional constraints encountered during site works. As per Condition 11 of the Conditions of Consent, turbines, access tracks, and crane hard standing areas may be micro sited within 50m of the positions shown in Figure 4.1: Site Layout. Beyond this, agreement would be sought from the Planning Authority in consultation with SEPA. Appendix 1.2: Requested Changes to Conditions of Consent, highlights a proposed variation to Condition 11, with the addition of cables to the description. Any micrositing would require agreement of the specialist advisers (e.g. the Ecological Clerk of Works) as appropriate.

Construction Environmental Management Plan

- 4.6.2 A CEMP for the operational Gordonbush Wind Farm was put in place during the construction of that scheme following agreement with The Highland Council, SNH and SEPA. The same principles of this CEMP would be adopted for Gordonbush Extension; however, new best practice techniques and lessons learned from the operational scheme would be incorporated.
- 4.6.3 In line with Condition 23 of the Conditions of Consent, a CEMP will be submitted to the Planning Authority outlining site specific details of all on-site construction works, post-construction reinstatement, drainage and mitigation, together with details of their timetabling. A draft CEMP is provided in Appendix 4.1 of this EIA Report.

Site Environmental Management

- 4.6.4 The appointed contractor would have overall responsibility for environmental management on the site. In line with Condition 24 of the Conditions of Consent, the services of specialist advisors e.g. Ecological Clerk of Works would be retained as appropriate to be called on as required to advise on specific issues. The appointed contractor and the Applicant would ensure construction activities are carried out in accordance with the mitigation measures outlined in this EIA Report, or taken forward from the 2015 ES / 2016 FEI Report (see Appendix 4.2: Schedule of Mitigation).
- 4.6.5 Contractors would be required to adhere to the following in order to reduce or mitigate the environmental effect of the construction process:
- the Conditions of Consent;
 - relevant environmental regulations; and
 - any other relevant mitigation measures identified in this EIA Report, or where applicable the 2015 ES / 2016 FEI Report (see Appendix 4.2: Schedule of Mitigation).
- 4.6.6 A copy of any Conditions of Consent would be incorporated into tender documents and CEMP as appropriate. The selection criteria for the construction contractor would include their record in dealing with environmental issues, and provision of evidence that they have incorporated all environmental requirements into their method statements.

Waste Management

- 4.6.7 Waste management is addressed in detail in the draft CEMP (Appendix 4.1). Wherever possible, excavated stone or soils would be reused on site, primarily for reinstatement of disturbed ground. Any materials to be removed from site (packaging etc.) would be segregated on site and removed to suitable recycling facilities or disposed of to a suitably licensed waste management facility, in accordance with current waste management regulations.
- 4.6.8 Demolition material removed from site during decommissioning would also be disposed of as above, and recycled where possible. All material would be disposed of in accordance with the waste regulations and best practice applicable at the time.
- 4.6.9 In line with Condition 23 of the Conditions of Consent, a Waste Management Plan would be provided by the Contractor as part of the CEMP.

Health and Safety and Related Issues

- 4.6.10 Health and safety would be initially addressed as part of the Pre-Construction Information Pack prepared by the Principal Designer for the project under the Construction (Design and Management) Regulations 2015. The contractor would be required to prepare a Construction Phase Health and Safety Plan and forward information to the Principal Designer during the works to enable the Health and Safety File to be completed.
- 4.6.11 Turbines are designed to be safe and are built to withstand extreme wind conditions. The turbines selected for the Proposed Varied Development would have the appropriate health and safety certification.
- 4.6.12 In accordance with Sections 6(1)(g) and (h) of the Land Reform (Scotland) Act 2003, access rights are not exercisable while building or civil engineering works, or working of minerals, are being carried out. This will be applied throughout the construction working area for health and safety reasons. Condition 21 of the Conditions of Consent requires the production of an Outdoor Access Plan to be provided to the Planning Authority prior to commencement of development. It is proposed to vary this Condition (see Appendix 1.2).
- 4.6.13 An Operations and Maintenance Manual for the design life of the wind farm would be prepared, which would cover all operational and decommissioning procedures.

- 4.6.14 The existing operations building located at the substation area and developed as part of Gordonbush Wind Farm is some 5.3km from the site entrance. This provides a base in the event of inclement weather.

Site Reinstatement

- 4.6.15 Reinstatement works are generally undertaken during construction (and immediate post-construction phase) and aim to address any areas of ground disturbance and changes to the landscape as part of the construction works. Reinstatement is undertaken as soon as practical following the construction works in each area, such as the re-dressing of road and track verges and turbine bases (and other areas that may be disturbed as a result of the construction process).
- 4.6.16 The works would involve the reinstatement of areas disturbed during the construction works. This would be undertaken to provide a natural ground profile with non-geometric surfaces and tie-ins with existing undisturbed ground levels to prevent the collection of surface water. It would in all instances be undertaken at the earliest opportunity to minimise storage of turf and other materials and to provide completed reinstatement at the earliest opportunity. Typical reinstatement works are outlined in Section 15 of the draft CEMP (see Appendix 4.1), the details of which would be provided to the Planning Authority under Condition 23 of the Conditions of Consent.
- 4.6.17 Site tracks and hardstanding areas at each turbine location would be retained for use in ongoing maintenance operations (including component replacement) and decommissioning of the wind farm. The edges would as far as possible be blended to the adjacent contours, natural vegetation being allowed to re-establish.
- 4.6.18 Any other temporary hardstanding areas would be re-graded with peat or soil to a natural profile and reinstated as appropriate.
- 4.6.19 All construction equipment and other temporary infrastructure would be removed from site and the temporary storage areas would be reinstated. All waste would be removed from site for safe disposal at a suitable facility in accordance with current waste management regulations.

Consultations with the Local Community during Construction

- 4.6.20 Consultation with the local community during the construction of the Proposed Varied Development would be an important consideration for the Applicant and the successful contractor. At Gordonbush Wind Farm, a community liaison group was set up which provided the local community with information about key construction activities and a mechanism by which concerns from within the local community could be shared and discussed. Condition 20 of the Conditions of Consent requires a similar working group would be established during the construction of the Proposed Varied Development and it is not proposed to vary that.

Site Operation and Maintenance

- 4.6.21 Once commissioned, it is expected that the Proposed Varied Development would have an operational life of 25 years and would require the continued use of the current existing infrastructure within the site boundary.
- 4.6.22 Routine maintenance and servicing would be carried out on each turbine as required at the Proposed Varied Development, including gear box oil changes and blade inspections. Appropriate maintenance works would be carried out immediately following any unexpected events on site, such as failure of a generator or gearbox.

Track Maintenance

- 4.6.23 Frequency of track maintenance depends largely on the volume and nature of the traffic using the track, with weathering of the track surface also having an appreciable effect. Heavy plant is particularly wearing and on-going track maintenance would be undertaken as necessary throughout the year. Safe access would be maintained all year round, as is the case at Gordonbush Wind Farm.
- 4.6.24 There would be no public vehicular access to the site.

Habitat Management Plan

- 4.6.25 As part of the Gordonbush Wind Farm, a Habitat Management Plan (HMP) was designed and implemented to deliver a range of long-term mitigation and enhancement measures on Gordonbush Estate. The HMP was secured by means of an agreement under Section 75 of the Town and Country Planning Act.
- 4.6.26 The overall aim of the HMP is to provide mitigation for any potential adverse effects of the wind farm on golden eagle, merlin and golden plover both by deterring species from the wind farm site ('push' factors) and attracting them elsewhere on the estate ('pull' factors) by enhancement of peatland, woodland and grassland habitats, which are being met via the implementation of a number of methods and specific plans, including the following: Reduction in deer on the Estate to promote heather moorland;
- Removal of coniferous forestry plantations to restore peatland habitats;
 - Improved moorland and heather management;
 - Blocking of drains on peatland;
 - Native woodland management; and
 - Low-intensity cattle grazing.
- 4.6.27 The Consented Development site boundary overlaps a small part of the HMP area. The Ecological Impact Assessment (EclA) undertaken as part of the 2015 ES concluded that none of the HMP Objectives in terms of habitat management and enhancement would be compromised by the Consented Development. There is no change to these findings as a result of the Proposed Varied Development (see Chapter 8: Ecology).
- 4.6.28 Condition 25 (HMP) of the existing consent requires the submission of a habitat management plan to the Planning Authority. A Habitat Management Plan for the Proposed Varied Development has been provided to enhance the overall biodiversity of the area through an additional 20ha of blanket bog restoration, tying into that already completed through the Gordonbush Estate HMP. The Proposed Varied Development's Habitat Management Plan is proposed in Appendix 8.2.

Site Decommissioning

- 4.6.29 The decommissioning period for a wind farm of this size is estimated to be 12 months.
- 4.6.30 In accordance with Condition 8 of the Conditions of Consent, detailed decommissioning proposals would be established and agreed with relevant authorities prior to commencement of decommissioning activities. Variations to this Condition are proposed (see Appendix 1.2: Requested Changes to Conditions of Consent).
- 4.6.31 Following the 25 year period of wind farm operation, dismantling of the wind farm would be undertaken. This is anticipated to involve:
- dismantling and removal of the turbines and site substation;
 - removal to 1m below ground level of the turbine foundations;
 - removal of substation building foundations; and

- re-instatement of all land affected, in accordance with best practice at the time.

- 4.6.32 It is not anticipated that the access tracks/spine road or underground cabling would be removed.
- 4.6.33 The turbines would be dismantled and removed from the site in a manner similar to that of their erection. Cranes would be used to split the turbines into sections, which would then be transported, from the site.
- 4.6.34 It is anticipated that turbine foundations would be broken out to a level of 1m below the final ground level. Typically this would involve the removal of the upstand plinth to the top surface of the main foundation base. All material arising from demolition would be disposed of responsibly and in accordance with relevant waste management regulations prevailing at the time.
- 4.6.35 All buildings and equipment would be removed including removal of fencing and of building foundations. All material arising would be disposed of responsibly as described above (see paragraph 4.6.34).

4.7 Summary

- 4.7.1 Table 4.5 provides a summary of the project’s components and construction processes, and the relevant Condition of Consent that secures appropriate mitigation.

Table 4.5: Summary of Changes and associated Conditions of Consent

Description	s.36 Consented Development	s.36C Proposed Varied Development	Related Condition / Mitigation
Number of turbines (WTG)	15	11	Details to be provided to Local Planning Authority under Condition 7 of the Conditions of Consent. Micro-siting of turbines would be achieved under Condition 11 of the Conditions of Consent.
Maximum Tip Height (TH)	115m x 3 (WTG)	N/A – These turbines are removed	
	130m x 12(WTG)	Up to 19.9m increase @149.9m x 11 (WTG)	
Maximum Rotor Diameter (RD)	Max RD 93m (3 WTG @ 115m TH)	N/A – These turbines are removed	
	Max RD 105m (12 WTG @ 130m TH)	Up to Max 136m	
Turbine Positions	As per Consented layout	No change to remaining eleven turbines	
Borrow Pits	BP1 indicative extraction volume= 48,000m ³ BP2 indicative extraction volume= 96,000m ³ Net indicative extraction volume=144,000m ³	No change to BP search area. Amend the indicative volume of extraction BP1: increase from 48,000m ³ to 105,600m ³ BP2: decrease from 96,000m ³ to 39,000m ³ . Net indicative extraction volume increased to 145,200m ³	Details of the working and restoration of borrow pits required under Condition 14 of the Conditions of Consent.
Temporary	North of BP2	New location	Details required under

Description	s.36 Consented Development	s.36C Proposed Varied Development	Related Condition / Mitigation
Batching Plant			Condition 13 of the Conditions of Consent.
New Access Tracks	7.96km	5.33km	Details to be confirmed to Local Planning Authority under Condition 5 of the Conditions of Consent. Micro-siting of turbines would be achieved under Condition 11 of the Conditions of Consent.
Operations Building	As per Consented layout	No longer required.	N/A
Meteorological Mast	Permanent and temporary met mast as per Consented Layout. Removal of existing operational Gordonbush Wind Farm meteorological mast (southern).	LiDAR proposed, removing requirement for permanent and temporary met masts. Retention of existing operational Gordonbush Wind Farm meteorological mast (southern).	Details required under Condition 13 of the Conditions of Consent.
Blasting			In accordance with Condition 15 of the Conditions of Consent.
Construction Environmental Management			Details to be provided in accordance with Condition 23 of the Conditions of Consent.
Waste Management			Details to be provided in accordance with Condition 23 of the Conditions of Consent.
Site Reinstatement			Details to be provided in accordance with Condition 23 of the Conditions of Consent.
HMP			Condition 25 of the Conditions of Consent requires the submission of a habitat management plan to the Planning Authority.
Decommissioning			Details to be provided in accordance with Condition 8 of the Conditions of Consent.