TECHNICAL APPENDIX 2 – DESCRIPTION OF DEVELOPMENT

TA2.1: Outline Construction Environmental Management Plan (CEMP)

TA2.2: Borrow Pit Assessment

TA 2.1: Outline Construction Environmental Management Plan (CEMP)

Strathy South Wind Farm

Technical Appendix 2.1

Outline Construction Environmental Management Plan (CEMP)

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CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

CONTENTS

DOCUMENT CONTROL SHEETS

SECTIONS

Figures

PART 1 – CONSTRUCTION ENVIRONMENTAL MANAGEMENT

1 INTRODUCTION

1.1 Construction Environmental Management: Aims & Objectives

1.1.1 This document provides information on Environmental Management and details on Construction Methods (Part 2 of this CEMP) for the Proposed Varied Development. This document has been prepared for the Planning Authority and statutory consultees and outlines the proposed management methodology to be employed during the construction of the Proposed Varied Development.

1.1.2 The principal objective of this document is to provide information on the proposed infrastructure and information on how SSER (the *Employer*) intend to avoid (where possible), minimise and control adverse environmental impacts associated with the Proposed Varied Development. Furthermore, this document aims to define good practice as well as specific actions to be implemented following receipt of a consent.

1.1.3 The information contained within the CEMP will form part of the Civils Works Contract. The methods and principles contained herein, as well as within referenced legislative instruments and published guidance documents, are adhered to by the *Contractor* in developing the detailed design, construction method statements and other plans relating to environmental management as required by the Contract.

1.1.4 The *Contractor* submits all relevant information as detailed in this document to the *Employer* for acceptance in according with the contract provisions. No works commence prior to the *Employer's* acceptance.

1.1.5 The *Employer* provides an updated CEMP to the Planning Authority post-consent / pre-works (CEMP v1.1). The Employer provides the *Contractor* with an electronic copy of the CEMP v1.1 which the *Contractor* developments and maintains for the duration of the works (CEMP Version 2.0).

1.1.6 This document is read and implemented on site in conjunction with industry best practice, published guidance documents, and other documents referred to within the CEMP (see Section 17).

1.2 Roles, Responsibilities and Structure of the CEMP

1.2.1 The *Contractor* appoints an appropriately competent (qualified and experienced) person or persons (*Contractor's* Site Environmental Representative) to undertake relevant environmental tasks as detailed in this document prior to, during and upon completion of the construction works. It shall be assumed that the role will be a full-time role and the relevant person will be based on site unless otherwise agreed by the Employer prior to commencement of construction.

1.2.2 The *Contractor* demonstrates the competence of the Site Environmental Representative to the *Employer* via submission of relevant information (e.g. CV, training records, membership records) for acceptance prior to commencement of construction works.

1.2.3 The *Contractor* is responsible for obtaining all necessary consents, licences and permissions[1] for his activities as required by current legislation governing the protection of the environment.

1.2.4 A copy of this document and related files and documents will be kept in the site offices for the duration of the site works and will be made available for review at any time. Upon completion of the construction works, the *Contractor* submits a complete CD copy of the final set of information to the *Employer* for their records.

1.2.5 Where the *Contractor* has standard documents within his own company / corporate Environmental Management Plan which might cover a particular requirement of this CEMP, these will either be inserted or cross referenced within the relevant Section of the detailed CEMP (v2.0).

1.2.6 A **Checklist** has been included in Section 18, providing the *Contractor* with a summary of the minimum information to be provided to the *Employer* pre- during and post-construction. The information / documents listed in the Checklist represent the minimum information to be provided to the Employer / Planning Authority at the stages indicated in the Checklist.

[1] For example, discharge consents, abstraction licenses, Waste Management License (WML) Exemption, Permission, notification or consent for road closure, opening or diversion.

2 PROJECT ENVIRONMENTAL CONSTRAINTS

2.1 Schedule of Mitigation, Commitments Register and Planning Conditions

2.1.1 Mitigation measures for the Consented Scheme are summarised in the relevant technical chapters of the EIAR Volume 2: Main Report, under the section heading "Summary of Effects of the Consented Scheme" and, where applicable, updated in the S36C application, which is summarised in EIAR Volume 2: Chapter 13: Schedule of Mitigation.

2.1.2 Following receipt of consent to the Section 36C application, this Schedule of Mitigation will be updated with any further commitments and Planning Conditions, to present one Commitments Register.

2.1.3 The Commitments Register will be included as part of the post consent updated CEMP v1.1.

3 CORRESPONDENCE & GENERAL COMMUNICATION

3.1 Roles & Responsibilities

3.1.1 The Contractor provides a **Communication Plan** illustrating roles, responsibilities and communication routes for environmental management during the works. This plan will make reference to or incorporate communication during an environmental emergency or incident (Section 17).

3.2 Correspondence, Records & Reports

3.2.1 The *Contractor* provides a complete record of all relevant communication and reports associated with all aspects of environmental management. The *Contractor* maintains records of the following where applicable to the project:

A) Minutes and attendance record of start up meeting (on-site meeting prior to commencement of construction works).

B) **Environmental risk register** (as part of the SHE risk register required under the SHE Specification)

C) Minutes of weekly meetings covering environmental (ecology, ornithology, archaeology, hydrology) issues (meetings may be combined with e.g. progress meetings)

D) **Communication Plan** (Section 3.1)

E) *Employer* and *Contractor* **Audit Reports** (Section 3.3)

F) **Records of toolbox talks** (Section 4)

G) **Dust / noise monitoring records** (Section 5)

H) **Waste Management Plan** and records (Section 6)

I) **Drainage Maintenance Register** (Section 7)

J) **Water Quality Monitoring Records** (Sections 8)

K) **Excavation Register** (Section 14)

L) **Geotechnical Risk Register** (Section 14.3)

M) **Licensing and Consents**: copies of all permissions, consents, licenses and permits and related correspondence.

N) **General Correspondence**: All other relevant internal and external communication records relating to environmental management.

3.3 Environmental Audits

3.3.1 The *Contractor* undertakes a programme of environmental audits, including audits of his sub-contractors, on a quarterly basis (as a minimum) and provides an audit report to the Employer within 2 weeks of the audit being undertaken.

3.3.2 Audits may be completed at any time by the *Employer,* but at least one per quarter. The *Contractor* maintains a record of all completed audit forms and records of corrective action and close outs.

3.4 Risk Assessments and Method Statements

3.4.1 The *Contractor* provides risk assessments and method statements (RAMS) for all works and tasks prior to these being undertaken. These documents take into account and address all of the environmental aspects of the planned works and will include proposed mitigation measures.

3.5 Notice Boards

3.5.1 The *Contractor* provides and maintains project environmental notice board(s) which are positioned to ensure that all operatives have the opportunity to review a notice board on a daily basis. As a minimum this will include one notice board to be placed in each compound.

3.5.2 The environmental notice boards are maintained by the *Contractor's* Environmental Representative and shall be updated at least monthly. As a minimum, the notice boards contain:

- Description of the key environmental risks and intended risk mitigation measures;
- Accompanying Environmental Constraints/Eco Map illustrating the location of the key risks and required exclusion zones / buffer zones and location of emergency response equipment, as required by the CEMP; and
- Key contact numbers and responsible personnel identified within the Environmental Incident and Emergency Response Plan (EIERP).

4 SITE INDUCTION AND TRAINING

4.1.1 The *Contractor* ensures that all contractor employees, sub-contractors, suppliers, and other visitors to the site are made aware of the specific environmental issues relating to their work. Accordingly, environmental specific induction training will be prepared and presented to all categories of personnel working and visiting the site

4.1.2 As a minimum, the *Contractor* provides inductees with the following information:

- Identification of specific environmental risks associated with the work to be undertaken on site by the inductee (e.g. exclusion zones, fuel handling, spill kit locations, sensitive habitats, bird nesting sensitivities, drainage control/mitigation, spill control, silt pollution control, waste minimisation and recycling, reporting of environmental observations).
- Environmental Incident and Emergency Response Procedures (including specific Environmental Communication Plan requirements – refer to Section 17 for further information).

4.1.3 The *Contractor* provides a convenient sized copy of an **Eco Map / Environmental Constraints Map** to all inductees showing sensitive areas, protected species, exclusion zones, wash out areas, watercourses, refuelling exclusion areas, location of skips, etc. The map shall be updated and re-issued as required. Any update will trigger a tool box talk –see below- to comment and stress on necessary change.

4.1.4 The *Contractor* submits a **tool box talk schedule** at least 1 week prior to commencement of works. The proposed schedule –to be considered as a live document- shall be consistent with the programme of works. Additional tool box talks shall be added as required based on circumstances such as unforeseen risks, repeated observation of bad practices, perceived lack of awareness, pollution event, etc.

4.1.5 The *Contractor* provides as a minimum one environmental related tool box talk or other environmental related training session per month on the above topics, along with any other environmental issues which arise on site. Additional tool box talks shall be added as required based on circumstances such as unforeseen risks, repeated observation of bad practices, perceived lack of awareness, pollution event, etc.

4.1.6 Where necessary, the *Contractor* requests the assistance of specialist personnel on site (e.g. ECoW, GCoW, ACoW, *Contractor's* Site Environmental Representative, etc.) to undertake specific toolbox talks or parts thereof as required.

4.1.7 The *Contractor* provides, as a minimum, training on the use of spill kits (on ground and in surface waters), to be provided on a regular basis (to account for staff/subcontractor changes etc).

4.1.8 The *Contractor* maintains a record of all toolbox talks or other environmental related training sessions delivered, their content and the attendees.

5 POLLUTION PREVENTION & MITIGATION

5.1 CAR Licensing & PPP

5.1.1 A Construction Site License will be required under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (the "CAR" Regulations) and the Water Environment (Miscellaneous) (Scotland) Regulations 2017.

5.1.2 A CAR Construction Site License is required for any construction site that meets the following criteria:

- it comprises an area greater than 4 hectares, or
- it is a linear development greater than 5 km, or
- it has an area of more than 1 hectare or any length of more than 500 m on ground with a slope in excess of 25 degrees.

5.1.3 A Construction Site Licence requires a Pollution Prevention Plan (PPP) to be produced by the 'Responsible Person'. Depending on the time available between contract award and construction start, the developer of the site may act as Responsible Person until such time as a Principal Contractor is appointed, at which point the license and Responsible Person nomination will be transferred to the Principal Contractor. Upon transfer of the license, the Principal Contractor will prepare any further site/works-specific plans and documents to update the PPP dependent on his design of the Works. These will be submitted with the license transfer application prior to commencement of construction.

5.2 Responsibility

5.2.1 The *Contractor* is responsible for pollution prevention for the duration of the contract and until such time as permanent measures, such as permanent drainage and silt mitigation controls, are deemed to be adequate and appropriately constructed.

5.2.2 This responsibility will include the actions of any third party who is sub-contracted by the *Contractor* or otherwise involved in the project.

5.2.3 It is the responsibility of the *Contractor* to contact SEPA, other statutory and non-statutory bodies in the vicinity of and downstream of the proposed project so that the requirements and interests of these parties are adhered to and protected throughout the duration of the Contract.

5.2.4 The *Contractor* is familiar with and executes works in accordance with the guidance provided in the SEPA Pollution Prevention Guidelines and other guideline documents as detailed in Section 17.

5.2.5 The *Contractor* ensures that all staff and subcontractors working on site will be familiar with pollution prevention and mitigation measures as detailed in this document; this includes subcontractors, *Employer's* direct contractors and other *Employer's* representatives working on the site.

5.3 General Pollution Prevention Measures

5.3.1 The following points (not exhaustive) indicate general pollution prevention measures in accordance with those highlighted within the guidelines referenced in this document and the EIA Report, particularly Chapter 10 Soil and Water (EIAR Volume 2). Pollution Prevention measures relating to specific tasks are also detailed in the respective sections of this document.

i. Any material or substance which could cause pollution, including fuels/oils, wet cement, raw concrete or silty water will be prevented from entering groundwater, surface water drains or watercourses by the appropriate use of and appropriate placement of (temporary) silt fences, cut-off drains, silt traps and drainage to vegetated areas where appropriate. Any sign of failing water treatment measures or sight of silted or contaminated water entering any watercourse on site will be reported immediately and mitigating action taken.

ii. Any silty water generated on site will ideally be settled out as much as possible through drainage mitigation measures (silt traps, etc.) and channelled into vegetated (not blanket bog or similarly protected) areas at least 70 m where possible. Where this buffer distance cannot be achieved a minimum distance will be agreed with the ECoW.

iii. External fuel delivery lorries will only be allowed as far as the site compound where there will be a covered refuelling area equipped with an impermeable base.

iv. Fuel transfer / refuelling will be undertaken by specifically trained and competent staff or undertaken under competent supervision.

v. Areas of waste oil / fuel / chemical storage and permanent refuelling will be located 70 m away from watercourses or drainage paths. Where this is not possible, advice will be sought from the ECoW and a minimum distance will be agreed with the *Employer*. Such storage areas will be sited on an impervious base to prevent the downward percolation of contaminants to natural soils and groundwater.

vi. All refuelling will be carried out at least 50 m from watercourses. Where this buffer distance cannot be achieved a minimum distance will be agreed with the ECoW. Fuel pipes on plant, outlets at fuel tanks etc will be regularly checked and maintained to ensure that no drips or leaks to ground occur.

vii. Spill kits will be available within each plant on site and also located close to identified pollution sources or sensitive receptors (fuel storage areas, water course crossings, etc).

viii. Irrespective of the buffer distance and location of refuelling, interceptor drip trays (or similar, e.g. plant nappies, – open metal drip trays are not acceptable) will be available. Interceptor drip trays will be positioned under any stationary mobile plant to prevent oil contamination of the ground surface or water.

ix. All stockpiled materials will be stored in designated areas and isolated from any surface drains and a minimum of 70 m away from watercourses. Where this buffer distance cannot be achieved a minimum distance will be agreed with the ECoW. Aggregate or fine materials storage with dust or run off potential will be enclosed and screened/sheeted**.**

x. Washing-out of concrete wagons on site shall only be permitted when the *Contractor* has provided a designated, suitably prepared impermeable wash-out area with signage identifying the area as suitable for concrete wagon wash-out.

xi. The concrete 'washout' in the designated area shall not be emptied into any watercourse and shall be disposed of in accordance with the Site Waste Management Plan.

xii. Tools, equipment or materials will not be washed in watercourses. Mortar mixing and material storage areas must be away from watercourses.

5.4 COSHH

5.4.1 The *Contractor* is responsible for ensuring that all materials ordered or brought to site listed as hazardous under the Control of Substances Hazardous to Health (COSHH) Regulations are accompanied with a hazardous information sheet. The *Contractor* complies with the COSHH Regulations.

5.5 Pollution Monitoring & Controls

5.5.1 The *Contractor* carries out regular inspections of oil/fuel storage areas and plant. The frequency and responsibility for undertaking these inspections will be recorded by the *Contractor* and communicated to the *Employer* prior to commencement of the works.

5.5.2 To ensure compliance of the works with this document and pollution prevention requirements, the *Employer* regularly monitors the *Contractor's* works. **Should the *Employer* identify any failure to comply with the requirements of this document or the *Contractor's* own method statements the *Employer* may stop the associated works until such time as the failure is rectified**. Any associated cost or time delay incurred will be borne by the *Contractor.*

6 WASTE MANAGEMENT

6.1 Site Waste Management Plan (SWMP) Implementation and Records

6.1.1 In accordance with best practice the *Employer* requires a Site Waste Management Plan (SWMP) for all their construction sites[2]. The *Contractor* utilises one of the available WMP templates e.g. Smart Waste or WRAP waste management plans[3], or similar.

6.1.1 The SWMP provides details on how waste reduction is to be implemented at the site and also how this is to be monitored throughout the construction phase. The *Contractor* nominates a site representative who takes responsibility for implementation and monitoring of the SWMP.

6.1.2 The *Contractor* provides details of their proposed waste contractors (carriers, transfer station, waste recipient etc) to the *Employer* as part of the SWMP, according to the provisions of the contract.

6.1.3 The requirements of the SWMP are communicated to all site operatives during their induction. Furthermore, all operatives on site attend waste reduction toolbox talks on a monthly basis to increase awareness of recycling/waste reduction and separation.

6.1.4 The *Contractor* provides 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.

6.1.5 The *Contractor* provides a site plan showing all waste disposal and recycling locations.

6.2 SWMP Monitoring and Auditing

6.2.1 The *Contractor's* Environmental Site Representative checks the contents of the site waste and recycling skips on a weekly basis. Non-compliance will be highlighted at the weekly progress meeting and appropriate actions taken e.g. a toolbox talk to all site operatives.

6.3 Anticipated Construction Waste Streams

6.3.1 A number of difference waste streams are likely to arise during construction of the Proposed Varied Development. The *Contractor* identifies all waste streams[4] and provides an estimate of expected waste volumes for each waste type generated within the waste stream.

6.3.2 The *Contractor* ensures all relevant information is taken into account in preparing his SWMP (for example intrusive ground investigation data, supply chain assessments, options appraisals etc).

[2] SWMP are already a legal requirement for certain projects in England and Wales. For projects in E&W where a SWMP is legally required, the Employer provides a draft SWMP prior to works commencing.

[3] Information on WRAP and SMART SWMPs can be found on http://www.wrap.org.uk/content/site-waste-management-plans-1 and http://www.smartwaste.co.uk/page.jsp?id=97

[4] For example 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.

7 TEMPORARY DRAINAGE

7.1 Scope and Minimum Requirements

7.1.1 The *Contractor* submits all temporary drainage designs and drawings as required to comply with conditions of the CAR Construction Site License and PPP.

7.1.1 The *Contractor* undertakes maintenance of all temporary and permanent drainage solutions as and when required at a frequency at least weekly whilst Principal Contractor, the *Contractor* maintains a **Drainage Maintenance Register** and issues this to the *Project Manager* on a weekly basis.

7.1.2 The *Contractor* designs all new permanent drainage to accommodate a 1:200 year + climate change storm event, as a minimum. Temporary drainage should be as required to comply with SEPA guidance and must accommodate a 1:30 year event as a minimum but may designed to accommodate larger flows depending on the specific site conditions.

7.1.1 The *Contractor* designs and constructs a drainage system including all silt mitigation measures necessary to prevent the pollution of existing drainage systems and watercourses for construction and post construction activities.

7.1.2 As a minimum all temporary drainage is installed as the track is constructed, where possible the permanent drainage is installed as the *works* progress. In the event that temporary drainage is installed at the time of construction the permanent drainage is installed within 3 months of that section of track being completed.

7.1.3 All drainage associated with the *works*, with the exception of that carrying purely Greenfield run-off, is not permitted to discharge directly into any existing drainage or watercourse without at least 2 treatment volumes.

7.1.4 Except where necessary to facilitate the crossing of a watercourse, the Strathy South infrastructure layout has been designed to be outwith 70[5] m of any mapped watercourse (except where an element of infrastructure may be downslope of a watercourse).

7.1.5 The *Contractor* does not discharge water on either a temporary or permanent basis unless he has acceptance from the ECoW (through a permit to pump system of notification, in advance of works), and complied with the requirements of the relevant Authorities, Utilities and Service Providers.

7.1.6 The *Contractor* does not discharge any drainage within 70 m of a watercourse unless accepted otherwise by the Project Manager and the ECoW.

7.2 Clean Water Diversion

7.2.1 Where possible, green field run-off will be kept separate from silty water or other potentially contaminated water. Where appropriate, interceptor ditches and other drainage diversion measures will be installed – in advance of any excavation works – in order to collect and divert green field run-off away from construction disturbed areas.

[5] 50 metres from watercourses is considered to be standard. 70 metres was agreed through consultation for the Consented Scheme and will be upheld for the Proposed Varied Development.

7.2.2 The *Contractor* channels separately silty and clean water drainage to vegetated areas at least 70 metres from watercourses to allow the settlement of solids. Where settlement over vegetation is not practical or adequate to deal with the volume of silt generated, the *Contractor* provides and maintains silt traps or settlement lagoons.

7.3 Silt Mitigation and Settlement Ponds

7.3.1 The *Contractor* erects and maintains silt fences to protect all watercourses, which may be affected by the works. The *Contractor* maintains these weekly to the satisfaction of the *Project Manager* and the ECoW.

7.3.2 All drainage associated with the works, with the exception of that carrying purely greenfield run-off, is not permitted to discharge without receiving the equivalent of at least 2 treatment volumes as a minimum.

7.3.3 The *Contractor* undertakes maintenance of all temporary and permanent drainage solutions as and when required and at a frequency of at least weekly whilst Principal Contractor, the *Contractor* creates and manages a Drainage Maintenance Register and issues this to the *Project Manager* and ECoW on a weekly basis.

7.3.4 Silt laden run off should be expected from any areas of recently exposed soil or rock. This silt laden run-off will be captured and directed via berms or ditches towards specially constructed sediment control structures.

7.3.5 Siting of settlement ponds will take into consideration access requirements for reinstatement and maintenance (for example: periodic silt removal, expansion of ponds or incorporation of additional silt mitigation measures, etc.).

7.3.6 The *Contractor* discusses and agrees the location of lagoons and other drainage mitigation measures with the ECoW prior to associated works taking place.

7.3.7 Details of typical settlement ponds and silt mitigation measures are indicated on Drawing 1 as included in this CEMP. Additional filtration measures may include flow attenuation measures such as weirs, rock bars and / or anchored and embedded straw bales within settling ponds or between series of ponds.

7.4 Borrow Pit Drainage

7.4.1 Schematic representation of a typical borrow pit drainage arrangement is provided on Drawing 4 as included in this CEMP.

7.4.2 The *Contractor* incorporates interceptor (cut-off) drains to prevent water ingress to the area of *works* from the surrounding topography.

7.4.3 The *Contractor* incorporates a toe drain to control water ingress and flow around the base of the excavation.

7.4.4 The *Contractor* channels borrow pit drainage to settlement ponds located a minimum of 70 m from any watercourse.

7.4.5 The *Contractor* constructs all necessary drainage prior to commencing excavation of the borrow pit, which is inspected in advance of excavation by the Employer and ECoW.

7.5 Turbine Foundations and Crane Hardstandings

7.5.1 Schematic representation of a typical turbine base and crane hardstanding drainage arrangement is provided on Drawing 5. Further details on relevant construction methods are provided in Part 2 of this CEMP.

7.5.2 Foundation excavations for turbines are generally below the level of the surrounding ground and hence surface water ingress from up slope or groundwater seepage may occur, leading to standing water within the base of the excavation. A **'permit to pump'** procedure will be in place prior to water being pumped from an excavation. The *Contractor* seeks the ECoWs approval prior to granting a 'permit to pump'.

7.6 Construction Compounds, Substation and Control Buildings

7.6.1 Schematic representation of a typical drainage arrangement around construction compounds and welfare/ control building excavations are provided on Drawing 6. Further details on relevant construction methods are provided in Part 2 of this CEMP.

7.6.2 As with tracks and borrow pits, green field run-off and development run-off will be kept separate and appropriate silt mitigation measures will be deployed. Pumping of water from excavations is subject to a 'permit to pump' (see 7.5).

7.6.3 The construction compound(s) is/are free draining and contains an impermeable sealed bunded area with oil interceptors, sufficiently sized to allow for maintaining vehicles and plant a dedicated refuelling area and fuel storage capacity. Any other pollution control measures, as appropriate / required to protect existing water courses and private water supplies, will be put in place.

7.6.4 The laydown area(s) are free draining and contain a bunded area with oil interceptors for maintaining vehicles and plant and refuelling and fuel storage (where these activities are required), or other pollution control measures, as appropriate / required to protect existing water courses and private water supplies.

7.7 Access Track Drainage

7.7.1 The *Contractor* designs all new drainage to be installed alongside the access tracks, where appropriate. The dimensions of the ditches will be sized to accommodate the development run-off from site infrastructure and green field run-off from adjacent ground resulting from a 1:200 year + climate change storm event.

7.7.2 The *Contractor* designs the frequency of permanent relief drains crossing the access tracks to ensure the longitudinal track drainage ditches do not surcharge during the 1:200 year + climate change storm event.

7.7.3 The *Contractor* installs all permanent drainage concurrently with all adjacent infrastructure, in particular the *Contractor* installs the permanent drainage in tandem with the access track construction such that no section of access track is trafficked until the associated drainage is complete.

7.7.4 If the *Contractor* constructs any parts of the *works* without its designated drainage system in place, or a sufficient temporary alternative, the *Project Manager* may instruct the *Contractor* to exclude all non essential traffic from that area until the drainage system is in place.

7.7.5 The *Contractor* provides pipe culverts for cross drainage. Pipe culverts extend beyond the edge of access track construction materials by at least 1m. Check dams are installed immediately above a cross drain inlet.

7.7.6 The *Contractor* provides silt traps / catch pits at the inlet of all cross drains to prevent the pipes becoming blocked and prevent erosion at the inlet points. Silt traps / catch pits are designed to allow access by gully suckers to remove silt during the operational phase of the wind farm and are designed to present no risk to livestock and animals, whilst permitting unrestricted water flow into the catch pit.

7.7.7 The *Contractor* provides erosion protection at all inlets and outlets to protect against the erosive force of flow during high rainfall events. The type of erosion protection may vary and will be influenced principally by the flow capacity of the culvert / relief drain, velocity and turbulence of flow and sensitivity of the outfall environment.

7.7.8 The *Contractor* erects and maintains silt fences to protect all watercourses, which may be affected, within 70 m of any element of the *works* or drainage outfall. The *Contractor* regularly maintains the integrity of structures and removes silt build up, in order to maintain full function of measures installed.

7.7.9 All drainage channels are sufficiently wide as is practicable to allow wildlife to safely enter/exit the channel. Slope angles are a minimum of 1(v):3(h), except where the *Contractor* can demonstrate a more efficient design.

7.7.10 The *Contractor* provides scour / erosion protection to slow the flow of water.

7.7.11 The *Contractor* provides permanent check dams / water bars (flow barriers or dams constructed across the drainage channel) at regular intervals within drainage ditches. Check dams are required in order to reduce the velocity of water and therefore allow settlement of coarser sediment particles, as well as silt at low flow conditions. Reduction in velocity will also prevent scouring of the drainage channel itself.

7.7.12 Check dams are constructed of clean aggregate graded 50 mm – 300 mm and are embedded into the side walls and invert of the excavation by at least 100 mm. The number and location of check dams will be dependent on the slope gradient, flow and volume of water though the minimum frequency of check dams 1 per 75 m length of ditch.

7.7.13 Green field run-off and development run-off will be kept separate where possible and will be channelled separately to suitably vegetated areas at least 70 m from watercourses to allow the settlement of solids on site. Schematic arrangements for tracks and watercourse crossings are illustrated on Drawing 2 included in this CEMP, a schematic section of a typical cut and fill track drainage is provided on Drawing 3.

7.8 Peat and Soil Storage Drainage

7.8.1 The *Contractor* considers the location of any temporary peat or soil storage areas such that erosion and run-off is limited, leachate from the stored material is controlled and stability of the existing ground, particularly in peatland areas, is not affected. The *Contractor* also gives consideration to the impacts of poor drainage control in any areas where peat is used in reinstatement (see sections 14 and 15).

7.8.2 Interceptor ditches, down slope drainage collection systems, containment berms (embedded where appropriate), and appropriate drainage mitigation measures will be required as with other infrastructure described above.

7.8.3 The *Contractor* carefully selects the locations and design the peat and other spoil storage requirements including methods for reinstatement works and incorporated drainage elements. Such design will be prepared in consultation with the ECoW and *Employer* prior to works commencing.

7.8.4 Details of Peat Management Practices are also contained within the Draft Peat Management Plan (PMP) contained in EIAR Volume 4: Technical Appendix 2.2 of the Section 36C application.

8 WATER QUALITY MONITORING

8.1 General Requirements

8.1.1 In line with best practice, the *Employer* undertakes surface water quality monitoring where an impact on surface water bodies cannot be ruled out. The *Employer* considers it best practice to obtain baseline surface water quality data prior to commencement of the works, and to monitor water quality during the works in order to identify any significant changes of water quality which may be attributed to the construction works.

8.1.2 An extensive baseline programme of monthly water quality sampling, quarterly invertebrate and annual fish surveys was carried out in support of the operational Strathy North Wind Farm, which is in the same catchment as the Proposed Varied Development. It is proposed to undertake baseline surveys for 12 months in advance of the start of enabling or construction works, continuing thereafter throughout the construction period. The surface water monitoring programme is implemented and maintained by the *Employer* and either undertaken by the *Employer's* environmental staff or by an environmental consultant appointed by the *Employer.*

8.1.3 Where a decrease in water quality resulting from construction works is observed the *Contractor* will undertake remedial measures and will bear the costs of all associated sampling and investigation. The *Contractor* may wish to undertake confirmatory sampling and analysis at any point during the works at his own cost.

8.1.4 An updated surface water monitoring plan will be prepared following receipt of consent for the Porposed Varied Development. The Water Quality Monitoring Plan (WQMP) will detail proposed monitoring locations, monitoring frequency and analytical parameters and will be submitted to the Planning Authority post-consent / pre-commencement of works as part of the updated CEMP.

8.2 Surface Water Quality Monitoring Locations

8.2.1 Monitoring of water quality will be carried out on selected watercourses; specific monitoring locations will be identified post-consent during the detailed design phase (pre-commencement of works).

8.3 Monitoring Frequency and Analytical Parameters

8.3.1 Pre-construction monitoring frequency will be determined at least a year before construction commences to allow a full seasonal cycle of baseline data to be collected.

8.3.2 Construction phase monitoring is likely to be undertaken at least monthly commencing within 2 weeks of start of works, and ad-hoc if deemed necessary, e.g. following a pollution incident.

8.3.3 Post-construction monitoring is likely to be undertaken monthly for at least 3 months following completion of the main civil construction works.

8.3.4 Monitoring of specific locations may cease within 3 months of works ceasing in a particular area, following consultation with SEPA where necessary.

8.3.5 The surface water quality monitoring will include the monitoring of field parameters at each location prior to the collection of water samples at each location for analysis at a UKAS accredited laboratory.

8.3.6 The field parameters monitored during each monitoring round and obtained via use of a hand-held monitoring device, are pH, electrical conductivity, temperature, and dissolved oxygen. Monitoring results will be recorded in the field.

8.3.7 Water samples at each location will be obtained and submitted to a UKAS accredited laboratory. Generally, analysis for the following parameters will be undertaken:

PROPOSED LABORATORY ANALYTICAL PARAMETERS	
Analytical test	**Rationale**
Electrical Conductivity	Useful indicator of the overall salinity of surface or spring water
pH	Overall water quality parameter which could indicate effects on water acidity due to changes in land use and disturbance of peatlands.
Temperature	General physical indicator
Dissolved Oxygen	Likely to be high in all streams but needs determining as an important indicator of water quality.
Turbidity	Measurable on site, and the most noticeable indicator of impact to a water course
Total Suspended Solids (TSS)	TSS: measure of water quality for construction developments and hence a TSS limit is generally specified for discharges from construction sites.
Biochemical Oxygen Demand (BOD)	A measure of the biologically degradable substances in water and a standard surface water quality parameter.
Chemical Oxygen Demand (COD)	Measure of possible releases from disturbed peat turf and peat.
Dissolved Organic Carbon (DOC)	Key component of carbon cycle and known to be sensitive to development on peatland. Organic carbon can help to reduce metal toxicities. May correlate closely with colour.
Soluble Iron	Solubility can be affected by pH. High iron concentrations may precipitate out if physical conditions change.
Ammoniacal Nitrogen	Nutrient, known to occur as pulse after ecosystem disruption.
Total Reactive Phosphorus (orthophosphate)	Standard nutrient parameter, known to occur as pulse after ecosystem disruption and may lead to eutrophication (algal blooms).
Nitrate	End product of nitrogen pollution. Principal nutrient and standard nutrient parameter. Indicator of background pollution and needed for assessing any impact of ground disturbance during construction.
Soluble Aluminium	Solubility affected by pH. Of concern in forested areas where low pH of surface water can lead to an increase in levels of aluminium.

PROPOSED LABORATORY ANALYTICAL PARAMETERS	
Analytical test	**Rationale**
Chloride as Cl	Indicator of rainfall inputs and site weathering, often related to geology of catchments, partly controls electrical conductivity readings.
Total Petroleum Hydrocarbons (TPH) (CWG by GC-FID)	Monitor impact from potential hydrocarbon releases on site during construction works.

8.4 Surface Water Quality Monitoring Reports

8.4.1 A monthly monitoring report on the findings of the monitoring exercises will be prepared and provided to the *Employer* and the *Contractor* within 1 week of receipt of analytical results.

8.4.2 The pre-construction monitoring results will inform baseline values (average and maximum baseline levels), and the monthly monitoring reports for the period covering the construction and post-construction works will highlight any results exceeding the baseline conditions.

8.5 *Contractor's* Visual and Field Water Quality Monitoring

8.5.1 The *Contractor* ensures that all personnel and visitors on site are encouraged (at site inductions) to report visual indications of changes in water quality (e.g. discolouration or other evidence of contamination) in any watercourses on site.

8.5.2 **The *Contractor* undertakes visual inspections of the watercourses on site**, including the monitoring locations referred to in section 8.2 above, at least once a week. The *Contractor's* monitoring records will include the following minimum information:

- Antecedent and current weather conditions;
- Current construction activities within the vicinity and in particular up stream or up gradient of the observation point;
- Visual assessment of water colour, turbidity and flow rate;
- Evidence of chemical contamination;
- Visual evidence of silt or sediment pollution within the water column or on the bed of the watercourse/standing water body.
- Details on any communication, corrective action and / or mitigation undertaken as a result of any water quality issues observed during the monitoring visit.

8.5.3 Where evidence of pollution is observed to the water environment, emergency response procedures will be implemented and the incident will be reported to the *Employer* within 30 minutes (section 16). Remedial measures will be implemented immediately and details of action taken will be recorded.

8.6 Private Water Supplies (PWS)

8.6.1 No PWS are identified to be at risk from the Proposed Varied Development (refer to EIAR Volume 4: Technical Appendix 10.5: Private Water Supply Risk Assessment) therefore no monitoring or mitigation is expected to be required at this site. This will be verified prior to commencement of construction to verify that no new supplies have been registered in the interim period. Should new PWS be identified then appropriate monitoring and mitigation will be implemented as required.

9 WATERCOURSE CROSSINGS

9.1 General

9.1.1 The Controlled Activities (Scotland) Regulations 2011 regulate activities in or in the vicinity of rivers, lochs and wetlands, including engineering activities like river crossings and culverting. Works may require (depending on the nature of the works) Registration with, or a Licence from, SEPA.

9.1.2 The *Contractor* produces a detailed Water Course Crossing Plan prior to commencement of the works, i.e. detailed plans for each of upgrades or new built structures. The *Contractor* submits these plans to the *Employer* and SEPA (via the Planning Authority) for acceptance.

9.1.3 The *Contractor* obtains all necessary permissions prior to the execution of any works affecting a watercourse.

9.1.4 The ECoW is consulted with regard to all Watercourse Crossing works. The ECoW carries out surveys immediately prior to construction or upgrading to identify areas of mammal activity in watercourses.

9.2 Design Philosophy

9.2.1 The *Contractor* adheres to general good practice in Watercourse Crossing design in line with relevant guidance, in particular CIRIA and Scottish Government publications (section 16), taking into account various requirements summarised below:

i) All watercourses over which the access roads cross will be routed through culverts or under bridges appropriately sized and designed not to impede the flow of water and allowing safe passage for wildlife;

ii) Culvert design will be over-engineered so that it can be sunk into the bed of the watercourse allowing riverine substrate to stabilise on the floor of the culvert (i.e. leaves the watercourse in as natural condition as possible);

iii) Low maintenance; and

iv) Visually in keeping with the surroundings.

9.2.2 All river crossings will be designed to convey a minimum 1:200 year + climate change storm event, and individually sized and designed to suit the specific requirements and constraints of its location.

Culverts

9.2.1 The design of all culverts is in accordance with CIRIA Report C786 (2019), unless otherwise updated. Inlet and outlet will be as 'Headwall' design type as stated in the Report for all watercourse crossings. Multiple pipe culverts are not permitted.

9.2.2 The natural bed and banks of any existing watercourse will remain unaffected by any new structure.

Bridges

9.2.1 The *Contractor* consults and complies with the requirements of the relevant Statutory Authorities, Utilities and Service Providers, including the onsite ECoW and the *Employer* for the construction of any culverts or bridges.

9.2.2 The *Contractor* provides watercourse crossing structures (i.e. bridges) with sufficient clear span as to ensure no *works* are required within the one metre of the watercourse, unless accepted in writing by the *Project Manager.*

9.2.3 The *Contractor* designs all new and upgrades any existing structures spanning watercourses to accommodate the flow resulting from the 1:200 year + climate change storm event. The *Contractor* designs these structures to ensure they do not to affect any existing floodplain or the downstream flow characteristics of the watercourse.

9.2.4 Where the *Contractor* demonstrates the passing of the unrestricted flow from the 1:200 year + climate change storm event negatively affects the downstream catchment the *Contractor* designs the access track and associate drainage to ensure any surcharging during the 1:200 year + climate change storm event does not jeopardise the structural integrity of any assets while protecting the downstream catchment.

Erosion Protection

9.2.5 Erosion protection is generally required at the outlet of the culvert (and to a lesser extent at the inlet). However, by appropriately sizing and designing the structure erosion can be minimised reducing the need for any engineered protection.

9.2.6 Where possible the design will avoid using artificial bank reinforcement, and the watercourse kept as natural as possible. Bank protection measures will have to be justified to SEPA regardless of the required level of authorisation (under the Controlled Activities Regulations) required.

10 PROTECTION OF HABITATS, PROTECTED SPECIES AND BIRDS

10.1 Responsibilities

10.1.1 Implementation and monitoring of Habitat, Species Protection Plans and the Bird Protection and Mitigation Plan will be the responsibility of the Ecological Clerk of Works (ECoW). For implementation of the latter, the ECoW will be supported by appropriately experienced ornithology staff. The ECoW will be a qualified and experienced ecologist and a Member of the Institute of Ecology and Environmental Management (IEEM).

10.1.2 The ECoW is appointed and employed by the *Employer*, the appointment being subject to approval by the Planning Authority after submission of details of qualifications and experience. The role and duties of the ECoW are further detailed in Section 10.5 below.

10.1.3 The *Contractor* is required to comply with all control measures detailed within any Habitats, Species Protection and Bird Protection and Mitigation Plans.

10.2 Habitat, Species Protection and Bird Protection and Mitigation Plans: Definitions, coverage and scope

10.2.1 Species protection (including for birds) may be defined as the set of measures used to minimise the risk of disturbance, injury or death to species of nature conservation interest. Particular attention is paid to species protected under EC and/or UK legislation.

10.2.2 Habitat protection may be defined as the set of measures used to minimise the risk of damage or destruction to the terrestrial and aquatic habitats of the site.

10.2.3 The generally applicable and best practice protection and mitigation measures to be applied at the site are summarised below. Following receipt of Consent, habitat, species and bird protection and mitigation plans will be drafted to incorporate site specific requirements as detailed in the EIA Report and stipulated in relevant planning conditions, together with any further or adapted mitigation requirements identified during post-consent (pre-works) species surveys.

10.3 Habitat Protection Plans

Aquatic Habitats:

10.3.1 The purpose of the aquatic habitat protection plan is to maintain a high water quality to support aquatic habitats used by any existing aquatic species like otters, water voles and fish and associated eco systems, both within the development site and downstream of the site, including salmon spawning grounds.

Terrestrial Habitats:

10.3.2 Protection of terrestrial habitats (through avoidance and minimisation of damage and loss) is required.

10.3.3 All site working practices need to consider their possible effects on sensitive habitats and soils and mitigate significant negative effects as far as is reasonably possible.

Habitat Protection Measures:

10.3.4 Proposed measures for both aquatic and terrestrial habitat protection are generally as follows:

- A **70 m buffer** will typically be maintained between working areas, machinery and watercourses where possible except at watercourse crossing points (any buffer zones less than70 m have to be authorised by the ECoW, the minimum buffer zone is 10 m). Buffer zones will be demarcated, where necessary, by the ECoW. The *Contractor* will discuss and agree the requirement for demarcation with the ECoW and the *Employer* prior to commencement of any works.

- Details on watercourse crossings design and work, taking into account habitat and species protection are provided in Section 9 of this CEMP;
- A Water Quality monitoring programme, to be implemented prior to commencement of the construction works and undertaken in the pre, during and post construction phase of the development is detailed in Section 8 of this CEMP;
- Construction activities around watercourses will adhere to general good practice measures and published guidance. Relevant guidance documents are referenced in Section 17 of this CEMP;
- Pollution prevention measures will be installed and maintained as appropriate, Sections 5 and 7 provide details on pollution control and drainage mitigation measures;
- Any forestry felling works, in the vicinity of watercourses will adhere to general good practice measures as outlined in Section 13 of this CEMP;

10.3.5 The ***Contractor*** ensures the protection of habitats as detailed in this CEMP. The *Contractor*

- Includes information on habitat and species protection and legal requirements in the daily inductions and toolbox talks, in consultation with the ECoW (see Section 10.5).
- Ensures that all staff, contractors subcontractors and visitors are aware of the emergency response procedures to be followed in the event of a pollution incident.
- Microsites development infrastructure to reduce the damage to sensitive habitats, in consultation with the ECoW and the GCoW and ACoW, as necessary.
- Makes best use of excavated turf and peat as part of reinstatement procedures (see Sections 14 and 15 (Excavated Materials and Reinstatement).
- Adheres to buffer distances relating to watercourses / lochs / springs and species as detailed in this CEMP and revisions thereof.
- Prevents discharge or run-off of silty or polluted water to ground / habitat / watercourses.
- Consults the ECoW ahead of any clean water discharge to ground / habitat / watercourses.

10.4 Species Protection Plans

Bird Protection and Mitigation Plan

10.4.1 Reflected by the Caithness and Sutherland Peatlands Special Protection Area and Ramsar Site, there are several bird species in the areas surrounding the Proposed Varied Development that are afforded special levels of protection from disturbance. In addition to this, the active nests of all wild birds are protected, whatever the species. Therefore, to ensure compliance with wildlife legislation, ensuring there is no significant disturbance and no harm to nesting birds, the Bird Protection and Mitigation Plan will be implemented as part of the CEMP.

10.4.2 The legislation protecting all breeding birds at the nest is the Wildlife and Countryside Act 1981 (as amended), under which it is an offence to kill them or damage nests, eggs or young. If disturbance were sufficient to prevent parent birds from incubating their eggs or feeding their nestlings, so that the brood died, this could be regarded as an offence under the 1981 Act.

10.4.3 Species listed in Schedule 1 of the Act are specially protected, so that it is an offence merely to disturb them while nesting.

10.4.4 Other specially protected species are listed on Annex 1 of the EC Birds Directive, which also prohibits wilful disturbance of these species when nesting.

10.4.5 Oversight of the Bird Protection and Mitigation Plan will be the responsibility of the ECoW. However, in order to ensure sufficient specialist staffing is available, and sufficient cover around the site, there will also be a full-time ornithologist employed from mid-March to the end of August for each year of construction, plus additional part-time ornithology staff as required. The lead ornithologist will have responsibility for implementing all the measures included in the Plan, and for advising the ECoW on all ornithological matters (e.g. bird deterrence measures, exclusion zones around nesting sites, and pre-commencement surveys).

Birds - Pre-Construction measures

10.4.6 In the breeding season prior to construction, standard bird surveys will be completed on behalf of the *Employer* for moorland breeding birds, breeding divers and breeding raptors covering the Proposed Varied Development plus respective buffers of 1 km, 2 km and 2 km. The resulting territory information will be digitised and incorporated into the GIS and shown on the **Eco Map / Environmental Constraints Map.** This is to ensure there is up-to-date data on the location of bird sensitivities on site, and on neighbouring landholdings within the Caithness and Sutherland Peatlands SPA.

10.4.7 Pre-works survey findings will further inform any additional mitigation measures deemed necessary for the construction works phase. This information will be included in the updated CEMP (v1.1).

10.4.8 Prior to any vegetation clearance within the breeding season (including the Strathy South conifer plantation), nest checks will be carried out by the ornithologist/s and any nests identified will have appropriate exclusion buffers established and communicated to site staff via toolbox talks. These will remain in place until nesting is completed. No construction activity or construction staff (unaccompanied by the ornithologist) are permitted within any exclusion zone. The timing of breeding season nest checks will take account of early nesting species, such as crossbill, and the possibility of several species having second broods, extending nesting late into the breeding season (August, with divers potentially present into September).

10.4.9 If construction commences before the end of the breeding season the ***Contractor*** working on the advice of the lead ornithologist, may use appropriate bird deterrence measures on site prior to the start of the breeding season. For Annex 1 species, this will be done in liaison with SNH. Retention of tree belts during construction will also be considered as a means of preventing disturbance to breeding birds on the SPA.

10.4.10 Specific measures to prevent disturbance at key locations will be required in relation to specially protected species. These will be developed by the lead ornithologist as required prior to commencement of construction. As a minimum, these targeted measures will be set out for red-throated diver, hen harrier, merlin and greenshank.

10.4.11 Prior to works commencing, the lead ornithologist, working with the ECoW, marks buffers around all known nests using a marking method and distance approved by the planning authority in consultation with SNH.

10.4.12 As a number of the species around the site are specially protected, the ***Contractor*** will ensure that confidentiality of nest locations is respected by site staff.

Birds - Measures during construction

10.4.13 In each breeding season during the construction period, standard bird surveys will be completed on behalf of the *Employer* for moorland breeding birds, breeding divers and breeding raptors covering the Proposed Varied Development plus respective buffers of 1 km, 2 km and 2 km. The resulting territory information will be digitised and incorporated into the GIS and shown on the **Eco Map / Environmental Constraints Map.** This is to ensure that throughout the construction period there is up-to-date data on the location of bird sensitivities on site and on neighbouring landholdings within the Caithness and Sutherland Peatlands SPA.

10.4.14 The specific measures to prevent disturbance at key locations will be implemented throughout construction, including, as a minimum, for red-throated diver, hen harrier, merlin and greenshank.

10.4.15 The *Contractor* informs the ECoW and lead ornithologist at least one week ahead of works commencing and consults the ECoW and lead ornithologist on any mitigation measures required as part of the works.

10.4.16 During the construction period, the ornithologist/s complete further checks, including checks ahead of the construction front. The lead ornithologist, working with the ECoW, marks buffers around all resulting known nests using a marking method and distance approved by the planning authority in consultation with SNH. These will continue to be monitored by the ornithologist until nesting has completed, and until then no construction activity will take place within the exclusion areas.

10.4.17 All site personnel report any sightings of nesting birds encountered on site to the ECoW as soon as possible. Toolbox talks (including use of video footage of key species) will be given to all site personnel to inform them on signs to look out for that are indicative of nesting or adults having young present.

10.4.18 The lead ornithologist, working with the ECoW, will maintain a mapped record of checked areas and a log of bird surveys and informs the *Contractor* and *Employer* as soon as possible of any potential restrictions and limitations to the planned works as a result of the checks/survey findings.

10.4.19 As a number of the species around the site are specially protected, the Contractor will ensure that confidentiality of nest locations is respected by site staff.

Mammals

Otters and Water Voles - Pre-Construction measures

10.4.20 Within 3 months prior to commencement of the development on site (or during the suitable survey period prior to commencement of works), a pre-construction otter and water vole survey will be carried out by the *Employer*. This will be conducted by a suitably qualified and experienced ecologist. Surveys will not be undertaken during, or after heavy rain or periods of flood.

10.4.21 If required, the ECoW will make relevant licence applications (e.g. licence to disturb) to SNH on behalf of the Employer and will oversee and/or undertake related mitigation measures in accordance with any licence obtained.

10.4.22 Prior to works commencing, the ECoW marks buffers around all known otter shelters (and water vole burrows, if applicable) using a marking method and distance approved by the planning authority in consultation with SNH.

Otters and Water Voles - Measures during construction

10.4.23 The *Contractor* informs the ECoW at least one week ahead of works commencing in or near watercourses and consults the ECoW on any mitigation measures required as part of the works.

10.4.24 The *Contractor* does not commence construction activities and blasting within 100 m from a watercourse used by otters until two hours after sunrise, ceasing two hours before sunset; machinery lights will be directed away from watercourses. Sunrise and sunset time can be obtained from the internet (www.timeanddate.com);

10.4.25 The *Contractor* ensures that

- all open excavations are ramped to enable easy exit by otter and other species;
- culvert pipes stored on site are capped, or if caps are not available, pipes are stored vertically, to prevent otter entrapment;
- design of any permanent or temporary lighting is such that it is directed away from watercourses and that an unlit corridor of 30 m either side of watercourses is maintained.

10.4.26 During the construction period, the ECoW carries out further checks, including checks ahead of the construction front.

10.4.27 The ECoW maintains a mapped record of checked areas and a log of otter and water vole surveys and informs the *Contractor* and *Employer* as soon as possible of any potential restrictions and limitations to the planned works as a result of the checks/survey findings.

10.4.28 The ECoW notes key areas of otter and water vole activity and any potential shelters outwith a licensable distance from construction and monitors activity at these areas and shelters regularly during construction.

10.4.29 All site personnel report any sightings of otters and water voles and any potential otter shelters / water vole burrows encountered on site to the ECoW as soon as possible.

Badgers - Pre-Construction measures

10.4.30 Within 3 months prior to commencement of site works (or during the suitable survey period prior to commencement of works) pre-construction checks for badgers will be undertaken by a suitably qualified ecologist, if applicable. Checks will be undertaken within 150 m of any proposed construction works.

10.4.31 If badgers are reported, ahead of construction works, the ECoW marks out exclusion zones around any badger setts. These exclusion zones will extend to 200 m from any sett. No construction activity is permitted within 200 m of any badger sett.

10.4.32 If required, the ECoW will make relevant licence applications (e.g. licence to disturb) to SNH on behalf of the Employer and will oversee and/or undertake related mitigation measures in accordance with any licence obtained.

10.4.33 The ECoW maintains a mapped record of checked areas and a log of badger surveys.

10.4.34 The ECoW provides induction material and tool box talks ensuring all staff and visitors on site are aware of the legal obligations, restrictions on site and applicable protection measures / behaviour in relation to badgers.

Wildcat- Pre-Construction measures

10.4.35 Within 3 months prior to tree felling and site works, pre-construction checks for wildcat will take place by a suitably qualified ecologist. Checks will be undertaken within 250 m of any proposed construction works.

The ECoW will mark out a 200 m exclusion zone for a potential wildcat den.

10.4.36 Pre-construction checks for wildcat denning sites will take place 14 days or less before scheduled commencement of construction in those areas by the ECoW. These checks will ascertain the level of usage of all potential denning sites, allowing an accurate assessment of potential impact to be made.

10.4.37 No works will take place within 200 m buffer zones around a known or suspected wildcat denning site. Distances greater than 200 m may be required for natal dens. SNH will be consulted before any works proceed within this exclusion zone. It may be necessary to obtain a 'Licence to Disturb wildcat before any works can proceed within this zone. Where natal dens are identified, a cessation of works within the exclusion zone for up to 5-8 weeks may be necessary until kittens are mobile.

10.4.38 The ECoW maintains a mapped record of checked areas and informs the Contractor and Employer as soon as possible of any potential restrictions and limitations to the planned works as a result of the checks/survey findings.

Pine Marten-Pre-Construction measures

10.4.39 Within 3 months prior to tree felling and construction site works, pre-construction checks for pine marten will be undertaken by a suitably qualified ecologist.

10.4.40 Additional checks of all potential pine marten den sites will take place 14 days or less before scheduled commencement of construction by the ECoW. These checks will ascertain the level of usage of all potential denning sites, allowing an accurate assessment of potential impact to be made.

10.4.41 All confirmed pine marten dens will have a minimum 30 m exclusion zone demarcated around them. Suspected natal or maternal dens will have a minimum exclusion zone of 60 m. A distance of greater than 100 m may be required for some activities, with the nature of the den taken together with the type of activities strongly influencing the safety distance required. A cessation of works within the exclusion zone for up to 12 weeks may be necessary until young are mobile.

Other Species (Red Squirrels, Bats, Reptiles, Fish etc) - Pre-Construction Measures

10.4.42 Within 3 months prior to commencement of the development on site (or in relevant suitable species survey season, prior to commencement of works) pre-construction species surveys relevant to those species identified in the EIA Report will be carried out by a suitably qualified and experienced ecologist on behalf of the *Employer*.

10.4.43 If required, the ECoW will make relevant licence applications to SNH on behalf of the *Employer* and will oversee and/or undertake related mitigation measures in accordance with any licence obtained.

10.4.44 Pre-works survey findings will further inform any additional mitigation measures deemed necessary for the construction works phase. This information will be included in the updated CEMP (v1.1).

10.5 The Ecological / Environmental Clerk of Works (ECoW)

Background and Term of Appointment

10.5.1 The *Employer* considers it best practice to provide an ECoW for the duration of the construction works, irrespective of whether or not this role is required as part of a Consent.

10.5.2 The ECoW will generally be appointed 3-4 months prior to work commencing on site. The role will be full-time for the duration of the main construction period (construction of infrastructure and associated

facilities) and may be reduced to a part time role (2-4 days/week) thereafter (turbine deliveries, electrical works etc) subject to Contractor performance and general consensus between ECoW, *Employer* and the Planning Authority (where required).

10.5.3 The ECoW will be a Chartered member of the Institute of Ecology and Environmental Management (CIEEM) with suitable experience.

ECoW tasks

Overview

10.5.4 The ECoW advises and assists the *Contractor* in avoiding, minimising and mitigating adverse effects. The *Contractor* consults with the ECoW prior to undertaking specific works as detailed below and considers the ECoW's advice at all times.

10.5.5 Where the ECoW disagrees with works being undertaken by the *Contractor,* resulting in a breach of planning conditions or measures detailed in the ES and the CEMP, the ECoW informs the *Employer* immediately. On advice of the ECoW the *Project Manager / Employer* may halt *the works* or parts thereof.

10.5.6 The following are anticipated to represent the main tasks which translate these aspects of the role into action. This list is not intended to be exhaustive and will require modification during the construction period as and when circumstances dictate.

Micrositing

10.5.7 The ECoW (in consultation with the Archaeological Clerk of Works and the Geotechnical Clerk of Works, if applicable and required) advises on micro-siting, where required. The *Contractor* consults the ECoW prior to micro-siting being undertaken.

Drainage Management and Watercourses

10.5.8 The ECoW conducts weekly inspection of site pollution prevention measures (silt fences, settlement ponds, check dams etc) and visually assesses their effectiveness. This includes inspection of water management measures installed by contractors such as excavation pumping and diversion channels.

10.5.9 In advance of works, the ECoW assesses habitats and species on ground that may be affected by drainage management and reviews drainage management proposals, including drainage required at temporary peat storage and reinstatement works in advance of such works commencing.

10.5.10 In advance of any works near or crossing a ditch or watercourse the ECoW surveys the condition of the watercourse and protected terrestrial and aquatic species, using an established specialist if necessary.

Excavated materials and reinstatement

10.5.11 The ECoW reviews working areas and access route corridors, in consultation with the Archaeological Clerk of works (ACoW) as necessary.

10.5.12 The ECoW agrees proposals for side casting and temporary excavated material storage areas as development proceeds.

10.5.13 The ECoW monitors the condition of stored turf and agrees any required hydroseeding specification, including seed mix and fertiliser quantities, if required, in liaison with SNH.

Tasks for Habitats, Protected Species and Birds

10.5.14 The ECoW erects and maintains markers and notices for limits around watercourses, exclusion zones and other areas with protected species, birds or habitats; the ECoW also considers requests and granting of permission to enter within any habitat, protected species or bird exclusion zones established at the site.

- The ECoW conducts weekly checks for protected species and sensitive habitat (e.g. peatland, watercourses) within and adjacent to construction areas, and maintains a register of all habitat inspections carried out.
- The ECoW implements any species and habitat protection plans and checks compliance with control measures detailed therein. The ECoW also executes the terms of any Licence to Disturb which might be required.
- The ECoW liaises with the lead ornithologist to ensure bird protection and mitigation measures are implemented.

On-site communication and liaison with Consultees

10.5.15 The EcoW will always inform the *Employer*'s Project Manager and *Contractor* of areas of particular concern, who will then make a decision as to the subsequent action.

10.5.16 The ECoW is involved in the delivery of biodiversity-related Toolbox Talks as part of the site induction process. All staff will know of the circumstances when the ECoW should be contacted, and the relevant phone numbers.

10.5.17 The ECoW liaises with the statutory consultees as required and agreed with the *Employer* in line with any Planning Authority requirements (if applicable).

Meetings and Recording

10.5.18 The ECoW attends a weekly (or fortnightly, if agreed) meeting which will include representatives from the *Employer*, *Contractor*, sub-contractors. The purpose of these meetings is to:

- review the effectiveness of mitigation / controls as construction progresses in the context of ecological and environmental mitigation;
- discuss construction programme for the following week / fortnight look-ahead and agree actions on these matters.

10.5.19 The ECoW keeps a record of the following:

- animal sightings and signs (including birds, in addition to other site ornithological monitoring), particularly those noted in searches one or two days in advance of construction;
- weekly checks on the effectiveness of silt and pollution prevention measures;
- the habitats of ground to be developed via survey at least a week in advance of construction work;
- record of tasks carried out and written record of all verbal advice given.

10.5.20 The ECoW maintains a **GIS database** of key recordings made during the construction period. Field records will use, if necessary, differential GPS technology captured into a field GIS system.

10.5.21 The ECoW assists the *Employer* with the supply of relevant information for compliance assessment.

10.5.22 The ECoW provides monthly reports throughout the construction period. On completion of construction works, the ECoW produces a final report to the *Employer* documenting the environmental and ecological effects of the construction period. The evidence for effects will be based on findings included in the minutes of weekly/fortnightly meetings, together with other recording information maintained by the ECoW. The report will relate results to residual effects predicted in the site's EIAR. The report will be made available to the *Contractor* and the Planning Authority.

11 ARCHAEOLOGICAL PROTECTION

11.1.1 Any construction works involving ground disturbance will pay due attention to the potential presence of unknown and recorded archaeological subsurface features or structures. To ensure this, the following measures will be put in place:

11.1.2 **Archaeological support will be provided by an Archaeological Consultant appointed by the *Employer***. Where applicable, the consultant will prepare a methodology for the identification, preservation and recording of archaeological remains at the site ('Written Scheme of Investigation' (WSI)). The contents of the WSI will generally be agreed with the Planning Authority's archaeologist.

11.1.3 The services provided by the consultant will include a walkover survey of the precise locations of the wind farm's ground impacts (tracks, turbine bases, etc) prior to commencement of construction works. Any archaeological features identified will be fenced off / demarcated prior to commencement of construction works. Information on such areas will be included in the site induction / toolbox talks.

11.1.4 A 'Contractors Guidelines' document will be prepared by the consultant, which provides brief and clear guidelines for all construction contractors undertaking any ground works including topsoil and overburden stripping, cable laying, turbine base foundations or access track construction. The guidelines contain details of arrangements for calling upon professional archaeological support (the Archaeological Consultant) in the event that buried remains of potential archaeological interest are discovered during the absence of a watching brief.

11.1.5 As part of the WSI / Contractors' Guidelines' a call-out procedure will be put in place which should ensure the presence of an archaeologist on site, generally within 24 hours of a call-out.

11.1.6 The *Contractor* familiarises themselves with the contents of the above documents and ensures that their contents is communicated to relevant staff, subcontractors and plant operators via the induction and toolbox talks prior to commencement of any ground works.

12 FORESTRY WORKS

12.1.1 This Section applies only where the *Employer* has control over the forestry works, i.e. where works are carried out on behalf of the *Employer* / under a contract with the *Employer*.

12.1.2 Any type of forestry works has the potential to affect protected species, e.g. nesting birds, and sensitive, including surface waters for fish (salmonids), otters, water voles, badgers, possibly red squirrels and bats.

12.2 General Control Requirements

12.2.1 Forestry operations are undertaken in accordance with the Forests and Water UK Forestry Standard Guidelines, 2017, published by the Forestry Commission.

12.2.2 Tree felling operations will be undertaken by a qualified tree felling/forestry contractor and their subcontractors (if applicable).

12.2.3 The forestry contractor will liaise with the *Employer* to ensure that any protected species (including all nesting birds) and/or sensitive habitats have been considered prior to commencement of the works, and appropriate mitigation measures have been agreed.

12.2.4 All access and egress points for the forestry contractor will be as agreed with the *Contractor*. For all road vehicles all normal highway rules will apply on all routes, at all times. Traffic management will normally be under the control of the *Contractor*. Where there are localised site traffic risks associated with tree felling operations, traffic management will be set up by the forestry contractor in consultation with the *Contractor*.

12.2.5 The forestry contractor should provide details of the harvesting and extraction subcontractor and the timber haulage subcontractor (if applicable) prior to commencement of forestry works to the *Contractor* and the *Employer*.

12.2.6 The tree felling contractor and their subcontractors will be familiar and comply with the Pollution Prevention and the Environmental Incident and Emergency Response measures as detailed in the CEMP. The Principal *Contractor* will ensure that subcontractors are familiar with the contents of the relevant CEMP sections.

12.2.7 Large scale machinery will not operate within 20 m of sensitive watercourses or watercourses feeding important mire and bryophyte areas. Within these areas if felling is required, it will be undertaken manually or with small scale machinery to minimise disturbance to watercourses or water dependent habitats. Cable extraction methods will be used to minimise soil disturbance. To reduce the likelihood of soil and water contamination biodegradable chain oil will be used in harvesting machinery over the whole site. All forestry machines on site will carry an oil spill kit specially compiled for forestry operations.

12.2.8 The forestry contractor provides spill kits and drip tanks to prevent pollution from fuelling operations. All plant regularly checked for fuel and oil leaks, at least once a day. Re-fuelling activities will comply with the Pollution Prevention and the Environmental Incident and Emergency Response measures.

Specific Tree Removal Objectives and Methods

Objectives

1. Tree removal for infrastructure site investigation and construction
2. Tree removal for habitat management and peatland restoration

Methods

12.2.9 Objective 1. trees will be cleared by conventional shortwood harvesting with forwarder extraction utilising brash mats to support machinery. Stemwood will be despatched off site to the appropriate end users.

12.2.10 Objective 2. by definition the peat restoration areas are predominantly saturated and sustain poor tree growth. Whole tree mulching of small trees, as above, is expected to be the appropriate technique but where 'utilisable' timber is accessible the conventional shortwood harvesting and extraction will take place. Where this occurs brash mats and tree stumps will be mulched.

12.2.11 Whole tree harvesting opportunities which utilise all forest tree material and end users which accept both stemwood and brash are under constant development. However, at this stage they do not currently exist in significant scale in the North of Scotland. Such processes being pursued by SSER for Strathy South include a consented local biomass plant and on site processing as woodfuel.

13 LANDUSE AND PUBLIC ACCESS

13.1 Agricultural Land

13.1.1 The *Contractor* liaises with relevant landowners prior to commencement of works. The *Contractor* undertakes a site walk-over of relevant areas with the landowner (and *Employer* as appropriate).

13.1.2 The *Contractor* will provide a risk assessment for all works on agricultural land, identifying potential hazards/sensitive areas and proposed mitigation measures, as identified in liaison with the landowner.

13.1.3 The risk assessment, method statements and mitigation measures will address the following potential issues (this is not an exhaustive list and the *Contractor* will amend as applicable)

- General access restrictions (gates, fences, unstable ground);
- Stock movement (type of stock, numbers, location of stock and requirements/timetable for movement, access restrictions, specific risks e.g. cattle/bulls etc);
- Season-depending risks/restrictions (lambing season, crop harvesting etc);
- Cattle grids and gates (proper use, repair and installation of cattle grids, gates etc);
- Fencing (requirement for removal/replacement/repair of fencing, location of electrical fencing etc); and
- Surface water (drainage, surface water bodies, livestock drinking water supplies and routes).

13.2 Public Access

13.2.1 All public access will be monitored through the site and may require restrictions to walkers to be escorted in the interest of health and safety. During construction there will be a requirement for temporary closure of the hill track which runs through the site An Access Management Plan would be prepared as part of the Consent requirements and this will detail all specific measures to be taken during construction including temporary track closures.

14 EXCAVATED MATERIALS

14.1 Contractor Requirements

14.1.1 I**n advance of each main phase of works**, the *Contractor (*in consultation with ECoW, and other specialists where required), provides a **method statement detailing expected volumes, material classification, storage and reuse procedures for the excavated materials anticipated from that particular work area**.

14.1.2 The *Contractor* liaises with SEPA on all aspects of waste management, if required, to ensure compliance with all appropriate regulatory controls prior to and during construction works.

14.1.3 The EIA Report contains information on expected soil types and volumes requiring excavation and reuse as part of the construction works. The *Contractor* utilises this information and any additional investigation findings post-consent when planning the works.

14.1.4 Any material that is not suitable for a predetermined use without the requirement for treatment (e.g. dewatering) is classed as waste and requires to be dealt with in accordance with the *Contractor's* developed Site Waste Management Plan.

14.2 Excavations

14.2.1 The *Contractor* creates, and maintains, an **Excavation Register**, which is updated weekly and details the location and extent of all open excavations and the current and original location of all stockpiled material. The *Contractor* makes this available to the *Project Manager* upon request.

14.2.2 The *Contractor's* attention is drawn in particular to the risk of slope instability and peat slides at wind farm sites. The *Contractor* ensures that under all conditions, the ground surface stability is fully maintained both during investigation and construction of the wind farm.

14.2.3 The *Contractor* undertakes sufficient additional studies and intrusive Site Investigations, where required, to establish the prevailing ground conditions at the Site and the likely ground conditions following completion of the construction and installation *works*. This includes geotechnical and geo-environmental investigations, hydro-geological and hydrological investigations or other investigations to ensure that the ground conditions are fully understood. Particular attention should be paid to peat or similar organic deposits, even on shallow slopes.

14.2.4 The *Contractor* undertakes turf and soil stripping and excavation works in line with best practice as described in relevant guidance documents in Section 17, in particular:

- *Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste* (2012); and
- *Good Practice During Wind Farm Construction (4th Edition, 2019).*

14.2.5 The *Contractor* employs a construction management team and plant operators of proven experience of working in a peat environment for all peat drainage, excavation (including cable trenches), track construction and reinstatement & restoration *works*

14.3 Handling and Temporary Storage of Excavated Material

14.3.1 Where material is not required for immediate reinstatement, temporary storage may be required. To

minimise handling and haulage distances, where possible excavated material will be stored local to the site of excavation and/or local to the end–use site where it is required for re-profiling, landscaping or structural purposes. The *Contractor* agrees storage location(s) with the ECoW prior to commencement of excavations.

14.3.1 Where the *Contractor* excavates topsoil, peat vegetation, or other organic soil the turfs are stored separately, with vegetation facing upward. The *Contractor* waters the turfs to maintain them as suitable for reinstatement and restoration. The *Contractor* stores turfs for a maximum period of 6 months.

14.3.2 Where the *Contractor* excavates peat soils these are segregated by material type and stored separately in stockpiles. Peat soils are stockpiled no higher than 1 m.

14.3.3 Where practical the *Contractor* reuses topsoil/peat immediately, however, where this is not possible it is stockpiled for a maximum period of 6 months.

14.3.4 Where the *Contractor* makes stockpiles these are located in non-trafficked areas. The *Contractor* only handles topsoil or peat twice: once from the excavated area to a stockpile and secondly from the stockpile to its final position unless agreed, in advance, with the *Project Manager* and the ECoW.

14.3.5 Stockpiles will be isolated from any surface drains and a minimum of 70 m away from watercourses, unless otherwise agreed with the ECoW. Stockpiles will include appropriate bunding to minimise any pollution risks where required.

14.3.6 The *Contractor* maintains the **Geotechnical Risk Register**. The *Contractor* makes this available to the *Project Manager* on a monthly basis for the duration of the *works*.

14.4 Cabling Works

14.4.1 Prior to cabling works commencing in any area, the cabling *Contractor* walks each cable route section and consults with the ECoW to verify any updates to Environmental Constraints maps and to identify all sensitive areas (e.g. soft ground, watercourses, watercourse crossing points, steep slopes) and all other potential constraints and sensitive receptors which may be impacted by his works.

14.4.2 Trenches will be reinstated as soon as possible to minimise the time they are left open and to avoid trenches acting as conduits for surface water, causing erosion and potential silt run off.

14.4.3 The cabling Contractor stores excavated materials in close proximity to the excavated trench, however, consideration will be given to minimising impact to sensitive habitats and species, prevent risks from material instability (particularly in peatland areas) and run off into watercourses.

14.4.4 The cabling Contractor carefully strips soils to avoid cross contamination between distinct horizons. Once excavated, the Contractor avoids double handling and unnecessary haulage of soil and turves where possible. Turves shall be stripped and handled with care such that damage to the living vegetation mat is prevented or minimised as far as possible.

14.4.5 Distinct horizons of soil (subsoil and topsoil) or peat (catotelmic, acrotelmic and turves) will be stored in separate stockpiles. Stockpiles will be formed avoiding excess consolidation during placing and with naturally stable side slopes. Turves must be stored turf side up and must not be allowed to dry out.

14.4.6 The cabling Contractor reinstates trenches and vegetation using the turves or soils stripped and stored during the cable trench excavation. Turves with their intrinsic seed bank will ensure reinstatement of vegetation as reinstatement of cable trenches will be undertaken immediately following cable installation (usually within 1 week of trench excavation).

14.4.7 To maintain local hydrological conditions and hydraulic connection in sensitive habitats mitigation may be required within the trench. This may include clay plugs/ peat bunds to prevent the trenches from becoming a preferential flow path for water flows. The number of in trench cut-offs or bunds to be installed will be proportionate to the gradient of the trench section and take into account the elevation differential to avoid excessive head on the clay plugs/peat bunds. Where wetlands with more discrete groundwater flows are intercepted (e.g. spring and flush habitats) a clay plug may be placed immediately either side of the spring or flush feature to maintain the original hydrological conditions/flows within the wetland on either side of the cable trench.

14.4.8 Where cable trenches cross watercourses, consideration will be given to directional drilling where possible as this offers reduced risk to the water environment and minimal reinstatement.

15 REINSTATEMENT

15.1.1 The *Contractor* undertakes reinstatement. Reinstatement works are those undertaken during construction and aim to address any damage inflicted on the landscape as part of the construction *works*. Reinstatement is undertaken in parallel with, or as soon as possible 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). Where redressing proves unsuccessful re-seeding and hydro-seeding may be part of reinstatement measures. Reinstatement is primarily undertaken using in-situ and Site-sourced materials (turfs and topsoils).

15.1.2 The *Contractor* provides proposed methods for reinstatement of materials in landscaping and re-profiling of: track verges; turbine bases; construction compounds; borrow pits; cable trenches; other disturbed areas and redundant construction features (such as drainage ditches, settlement ponds or other sediment control measures, concrete wash out pits and other features which may not be required as part of the permanent works). Reinstatement proposals will provide details on methods proposed for replacement of turves and re-seeding where appropriate. If reseeding is required, this will be undertaken, where possible, using native species of local provenance.

15.1.3 Excavated peat from cut and fill sections of access tracks will be used for dressing the side slopes of floating track sections. No mineral soil will be used for dressing the side slopes of tracks to prevent silt run off.

15.1.4 Where practicable, reinstatement and re-profiling of, and around, infrastructure and borrow pits will be carried out as the work front progresses, or as soon as is practical after the substantial completion of the works themselves in a particular area. Early reinstatement and re-profiling are required to minimise visual impact and temporary storage / stockpiling of soils and to promote vegetation and habitat reinstatement as early as possible.

15.1.1 Where feasible, to prevent scour and run off and facilitate vegetation re-establishment, any down-slope embankments will be graded such that the slope angles are not too steep and there is a gradual transition with the surrounding / existing ground profile.

15.1.2 Outline design proposals for borrow pit re-profiling, including details on reinstatement material origin and classification, placement method, final ground profiles and surface dressing will be submitted by the

Contractor, signed off by their GCoW and agreed by the ECoW prior to commencement of re-instatement.

15.1.3 The *Contractor* maintains comprehensive records of the location, depth and volumes of all materials used in reinstatement of the borrow pit.

15.1.4 The preservation and reinstatement of vegetated turves is critical to the successful restoration of peat and the *Contractor* takes all necessary precautions and measures as described in the current published guidance documents referenced above to prevent damage and desiccation to the turves prior to re-use.

15.1.5 Reinstatement of vegetation will be focused on natural regeneration utilising peat or other vegetated turves or soils stripped and stored with their intrinsic seed bank. To encourage stabilisation and early establishment of vegetation cover, where available, peat turves or other topsoil and vegetation turves in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface. If insufficient turves are available, then the turves should be laid over the exposed peat in a checkerboard pattern to maximise coverage which will aid in a quicker restoration.

15.1.6 Following completion of the access tracks the side-cast topsoil and vegetated material will be used to dress off the batters of the new track as part of an ongoing reinstatement process. The turves should be re-instated as soon as is practicable

15.1.7 The *Contractor* undertakes all works in such a way as to allow reinstatement of disturbed areas to proceed as early as possible and in a progressive and sustainable manner and in accordance with the Habitat Management Plan.

15.1.8 Any accidental damage or other impacts caused during the works are repaired and reinstated or restored by the *Contractor* to the *Employer's* satisfaction and in accordance with the Planning Consent and any agreements with the landowners, all prior to taking over by the *Employer*.

16 ENVIRONMENTAL INCIDENT & EMERGENCY RESPONSE

16.1 General Requirements

16.1.1 The *Contractor* prepares a detailed Environmental Incident and Emergency Response Plan (EIERP) in line with Guidance on Pollution Prevention GPP21 (2017) and GPP22 (2018).

16.2 SEARS and Environmental Auditing

16.2.1 An SSE Safety and Environmental Awareness Report (SEAR) is required to be completed for any potential or actual environmental incident or emergency which occurs or is noted on site. Blank SEAR forms will be provided by SSE Renewables.

16.3 Summary Sheet for Machinery / Plant Operators

16.3.1 The *Contractor* provides a 1 page Summary Sheet containing the key information for incidents response to be used as a quick reference for any on-site personnel witnessing an incident. A laminate copy of this Summary Sheet will be located with all plant / machinery / on-site vehicles. A Communication Plan (to be followed in the event of a spillage) will be provided by the *Contactor*, in liaison with relevant stakeholders and will be provide to the *Employer*, according to the Contract provisions, prior to commencement of the site works.

Key Information to be provided to the ***Project Manager*** **and/or the ECoW within 30 minutes** of an incident (irrespective of the scale / severity of the incident):

- E.g. What substance was spilled;
- Approximate volume and time of spillage;
- Accurate Location of spill (GPS or grid reference if possible, or bridge ID/number referenced on map etc);
- All measures taken;
- Help required i.e. manpower, machinery, expert advice, disposal, etc; and,
- Whether the spill has reached a watercourse.

17 REFERENCE DOCUMENTATION

- SEPA/EA Pollution Prevention Guidelines (PPGs) and Guidance on Pollution Prevention (GPPs):
  - PPG 1: Understanding your environmental responsibilities - good environmental practices
    A basic introduction to pollution prevention, with signposts to other PPGs and publications. (July 2013)
  - GPP 2: Above ground oil storage tanks
    For above ground oil storage, excluding oil refineries and distribution depots. (January 2018)
  - PPG 3: Use and design of oil separators in surface water drainage systems
    For identifying where an oil separator is required and, if so, what size and type of separator is appropriate. (April 2006)
  - GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
    For selecting the correct sewage disposal, treatment and disposal options, and maintenance and legal requirements (November 2017)
  - GPP 5: Works and maintenance in or near water
    For construction or maintenance works near, in, or over water. (January 2017)
  - PPG 6: Working at construction and demolition sites
    For the construction and demolition industry. (2012)
  - GPP 8: Safe storage and disposal of used oils
    For storing and disposing of used oils. Applies to activities ranging from a single engine oil change to those of large industrial users. (July 2017)
  - GPP 13 Vehicle washing and cleaning (April 2017)
    For washing and cleaning any vehicle using automatic wash systems, high pressure or steam cleaners and washing by hand.
  - GPP 21: Pollution incident response planning
    For producing emergency pollution incident response plans to deal with accidents, spillages and fires. (July 2017)
  - GPP 22: Dealing with spills
    For anyone who is responsible for storing and transporting materials that could cause pollution if they spill. (October 2018)
  - GPP 26 Safe storage - drums and intermediate bulk containers
    For site operators of industrial and commercial premises storing and handling drums and intermediate bulk containers (IBCs) containing oil, chemicals or potentially polluting substances. (February 2019).
- Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, a joint publication by Scottish Renewables and the Scottish Environment Protection Agency, Version 1 January 2012.
- Good Practice during Windfarm Construction, Version 4, a joint publication by Scottish Renewables, SNH, SEPA, Forestry Commission Scotland (FCS) and Historic Environment Scotland (HES) (4th Edition, 2019).
- SEPA Regulatory Position Statement, Developments on Peat, National Waste Policy Unit, 9 February 2010.

- Engineering in the Water Environment, Good Practice Guide, Construction of River Crossings, First edition, SEPA, April 2008.
- Prevention of Pollution from Civil Engineering Contracts: Special Requirements publication (SEPA, 2006).
- The Waste Hierarchy, National Waste Strategy: Scotland. SEPA, September 2006. (http://www.sepa.org.uk/waste/moving_towards_zero_waste/waste_hierarchy.aspx).
- Scottish Natural Heritage (SNH):
  - Floating Roads on Peat, Forestry Civil Engineering and SNH, August 2010.
  - Constructed tracks in the Scottish Uplands, 2nd Edition, June 2013.
- British Standards Institute (BSI):
  - Code of Practice for Earth Works, BS6031:2009
  - Code of practice for noise and vibration control on construction and open sites. Noise, BS5228-1: 2009.
- Forestry Commission:
  - Forests and Water UK Forestry Standard Guidelines, 5th Edition 2011.
  - The UK Forestry Standard. The governments' approach to sustainable forestry, 2017
- CIRIA Publications:
  - Control of Water Pollution from Construction Sites – Guide to Good Practice (SP156)
  - Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532)
  - Control of Water Pollution from Linear Construction Projects – Technical Guidance (C648)
  - Control of Water Pollution from Linear Construction Projects – Site Guide (C649)
  - Culvert Design Guide, 2019 (C786);
  - Environmental Good Practice – Site Guide (C741)
  - Site Handbook for the Construction of SUDS (C698)
  - The SuDS Manual (Report C753). CIRIA, 2015.
- Practitioner Series No.11: Waste Management: A Guide for Business in the UK, Institute of Environmental Management and Assessment (IEMA), September 2008.
- River Crossings and Migratory Fish: Design Guidance, Scottish Government, Feb 2012.
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 ("CARs") as amended by Water Environment (Miscellaneous) (Scotland) Regulations 2017.

- "The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide" Version 8.4, Oct 2019.
- "Supporting Guidance, Sector Specific Guidance: Construction Sites", SEPA, WAT-SG-75, Version v1, Feb 2018.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN
Strathy South Wind Farm

18 CHECKLIST – Required *Contractor's* Information

The information listed in the table below will be provided by the *Contractor* to the *Employer* according to the provisions of the contract, as indicated.

Pre-commencement of works:	**Yes/No**
Name and CV of nominated and appropriately qualified person for site based single point of contact for all environmental matters (Section 1)	
Communication Plan (Section 3)	
Risk Assessment & Method Statements (Section 3)	
Schedule of toolbox talks (Section 4)	
Eco Map (Section 4 and 10)	
A Site Waste Management Plan (SWMP, Section 6)	
Details of proposed waste contractors and site plan showing waste collection / storage points (Section 6)	
Drainage Maintenance Register (Section 7)	
Watercourse crossing plans and CAR licences/authorisations(Section 9)	
Excavation / Reinstatement plans (Section 14 and 15)	
Environmental Incident and Emergency Response Plan (Section 16)	
During and post-completion of works:	**Yes/No**
Records of relevant communication, meetings and reports (Section 3)	
Records of site inductions and tool box talks (Section 3)	
Records of communication with SEPA, SNH, PMO (Section 3 and 5)	
Eco Map (Section 4 and 10)	
Records of all environmental checks/inspections (Section 5)	
COSHH documentation (Section 5.3)	
Site Waste Management Plan and related information (Section 6)	
Drainage Maintenance Register (Section 7)	
Records of water quality monitoring (Section 8)	
Excavation Register (Section 14)	
Records of borrow pit reinstatement (Section 15)	

Note: The above list only relates to requirements of this CEMP. As part of the Contract, other information provisions will be required from the *Contractor*.

PART 2 – CONSTRUCTION METHODS

19 INTRODUCTION

19.1 General

19.1.1 The following sections describe the general methods of construction which are stipulated in the Employer's Civil Technical Requirements generally included in the Civils Work Contract forming the basis for the Contractor's detailed design.

19.2 Working Hours and Noise

19.2.1 Construction activities will generally be stipulated as part of a planning consent, normally limited between 07.00 and 19.00 hours Mondays to Fridays, and 07.00 to 14.00 hours on Saturdays, with no working activities on Sundays. 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.

19.2.2 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 12.00 hours Saturdays, with no operation on Sundays.

19.2.3 Any blasting on site shall only take place 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.

19.3 Plant and Equipment

19.3.1 The works shall be undertaken in strict accordance with the Provision and Use of Work Equipment Regulations "PUWER" (as amended) covering all types of plant and equipment found on construction sites.

19.3.2 All site operatives will be appropriately trained and experienced and hold certification of training achievement issued by CITB or other construction industry approved schemes.

19.3.3 All site plant and equipment shall be fitted with effective silencers / insulation.

19.3.4 A non-exhaustive list of plant that may be utilised during the construction activities detailed in this Construction Method Statement is as follows; 360° tracked excavators, tipper trucks, dumper trucks, tractor dozers, vibratory rollers, ground ripping plant, mobile crushers and screeners.

20 SITE ACCESS CONSTRUCTION

20.1 Signage

20.1.1 Sufficient signage will be employed on site, for both site personnel and the public, to clearly define the boundary of the works where they coincide with areas accessible to the public.

20.1.2 Ecological awareness signs (e.g. potential otter crossing) are also required at speed limit signs in certain areas of the site.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN
Strathy South Wind Farm

21 ONSITE PREPARATORY CONSTRUCTION

21.1 Introduction

21.1.1 Onsite preparatory construction concerns the formation of the Temporary Construction Compound (TCC), laydown areas and associated works required to establish the site offices, welfare facilities and storage arrangements for materials, plant and equipment in connection with the wind farm construction phase.

21.1.2 The TCC is a temporary work for the duration of the construction phase of the project. Following commissioning, the TCC shall be dismantled and all plant, welfare facilities and equipment removed from the site. Reinstatement of this area shall be in line with the requirements stated within the main CEMP document.

21.1.3 The main TCC will comprise of site offices for the Principle Contractor, the Wind Turbine Supplier (WTS), any other sub-contractors, project support staff (i.e. the ECoW and ACoW) and *Employer*, together with all the necessary welfare facilities for the workforce.

21.1.4 Where required, imported crushed rock will be used to construct the temporary construction compound (and the access track to the TCC), to allow a safe compound (with working welfare) to be established prior to any major borrow pit works.

21.1.5 The *Contractor* and any subcontractors will be familiar with, and take account of, the planning conditions relevant to the construction works and the requirements of the CEMP prior to construction work commencing.

21.1.6 Prior to the works commencing at site, a pre-condition survey of the existing tracks and associated field boundary features (fences, walls and gates) will be undertaken by the *Contractor* in conjunction with the *Employer* and landowners, where appropriate, to visually record the existing conditions. This will entail the preparation of a Pre-condition Survey Report, which will include text, diagrams and photographs clearly referenced to the locations at site.

21.2 Temporary Construction Compound Preparation

21.2.1 The *Contractor* designs and constructs an area of hardstanding, as specified in the Civil Works Information, of sufficient load bearing capacity, as the construction compound(s). Where appropriate a geo-textile layer is used to maximise the effectiveness of stone removal when the compound is removed.

21.2.2 The compound(s) include all Site accommodation and welfare facilities, bunded fuel tanks and other liquid storage areas with segregation, bunded refuelling areas, general and protected storage areas, vehicle parking, security, lighting and services, communications and laboratory/testing or holding facilities, signage, pedestrian and vehicular circulation routes, and safety barriers. The *Contractor* provides recycling facilities at the Site compound and professional collection thereof.

21.2.3 The compound(s) are free draining with oil interceptors and contain a bunded area for maintaining vehicles and plant, or other pollution control measures, as appropriate / required to protect existing water courses and private water supplies.

21.2.4 The typical construction activities associated with the TCC are detailed below:

- Stripping of any topsoil / peat and careful stockpiling of this material as per CEMP requirements.
- Excavating the remaining superficial soil materials and stockpiling of this material on the surrounding

undisturbed area in accordance with CEMP requirements.

- Installation / construction of temporary surface water drainage in accordance with CEMP requirements.
- Laying and compacting crushed rock in layers to form a hardstanding. Crushed rock material will be site won from local excavations and have a low fines content to reduce the risk of sediment contamination.
- Delivery of offices, mess area, toilets and associated infrastructure on flat bed lorries.
- Erection of offices, mess area, toilets, and installation of all bunded areas to contain generator and fuel stores.
- Erection of fencing around the perimeter of the main TCC.
- Following the completion of all construction activities, the TCC shall be reinstated according to the methods set out in the CEMP.

21.2.5 Welfare facilities will be provided for site operatives under the Construction and Design Management Regulations 2007 including sanitary conveniences, washing facilities, drinking water, changing rooms and accommodation for clothing not worn during working hours and rest facilities.

21.2.6 Toilets during the construction phase will be chemical toilets or soakaway, depending on ground suitability and discussion with SEPA. The waste will be emptied on a regular basis by a registered waste disposal contractor. Toilets will be located within the TCC areas.

21.2.7 Potable water will be supplied via a borehole or surface water extraction subject to licences/authorisations obtained from SEPA under CAR. The water will be used for messing purposes during the construction phase.

21.2.8 If additional water is required to be impounded and / or abstracted from site water bodies for site based activities (i.e. dust suppression, etc), the CAR Regulations apply and advice will be sought from SEPA prior to any abstraction.

21.2.9 The duration of the works may extend into winter months. If required, external lighting will be required to be provided at the TCCs. Lighting columns will be erected in proximity to security gates and any site offices / welfare facilities and stores. Compound lighting shall face inwards to reduce light pollution and environmental impact effects.

21.2.10 All areas of the site including accommodation areas shall be kept clean and tidy with a regime of good housekeeping established to facilitate mobility of personnel and plant/equipment around the site and eliminate potential hazards and environmental pollution.

22 BORROW PITS

22.1 General Method of Work

22.1.1 To construct the access tracks (including passing bays) and formation of new hardstanding areas for the crane pads, site construction compounds and laydown areas crushed rock is required. It is proposed to source this material, where possible, from on-Site borrow pits, to reduce the need to import materials. In addition, and where suitable, some rock types may be utilised as a source of aggregate for concrete batching for the turbine foundations.

22.1.2 Site surveys of each borrow pit location have been undertaken and details of the position, size, potential yield and restoration proposals have been developed. “Areas of Search” have been developed for each consented borrow pit location within which the maximum extents of the borrow pit shall be situated.

22.1.3 Following assessment of information from a further ground investigation, the precise location and details of the borrow pits, including maximum size and depth, a fully detailed plan incorporating contours and a programme of implementation will be submitted to and approved in writing by the Planning Authority.

22.1.4 The rock will be extracted using recognised quarrying techniques and crushed to provide the required properties (material size or “grade”). The rock extraction method will vary from location to location, and is dependent upon the nature of the material encountered, depth of weathering and level of fracturing. A combination of digging, ripping and blasting shall be utilised, followed by crushing, as appropriate.

22.1.5 The borrow pit works will be subject to significant health, safety and environmental constraints, including:

- Segregation and fencing off of processing plant with only authorised personnel permitted to enter. These works will be carried out on a level working platform.
- Bunding and fencing of borrow pit high wall to prevent plant / personnel falling into the void.
- Surface water / drainage mitigation to prevent pollution, silt run off and inundation into the void.
- Exclusion zones implemented during blasting works.
- Fitting of spray bars to the processing plant to keep dust down during dry / windy periods.

22.2 Borrow Pit Establishment

Demarcation

22.2.1 Prior to any borrow pit works beginning at each location is shall be surveyed and the “Area of Search” pegged out. In areas of recently cleared forestry consideration shall be given to the freshly exposed ground profile / topography.

22.2.2 Once the extent of the borrow pit will be established a temporary Heras type fence shall be erected to this boundary with appropriate warning signs. Where necessary a Rylock sheep fence shall be erected to protect grazing livestock from entering the working area. All fencing and warning signs will be checked on a regular basis and repaired/replaced as necessary.

22.2.3 Once a proposed borrow pit location has been surveyed and pegged-out, the Ecological Clerk of Works (ECoW) and Archaeological Clerk of Works (ACoW) shall be consulted prior to any further development of the location. Once the ECoW and ACoW have given their approval for the demarked location, borrow pit preparation may commence with drainage measures installed prior to an excavation.

Borrow Pit Preparation

22.2.4 Surface vegetation (turves) shall be cut and placed to one-side. This material shall be monitored, and watered (as appropriate) to be retained for reinstatement purposes once the borrow pit workings are completed.

22.2.5 The removal of the existing superficial soil materials (“overburden”) would typically be undertaken using a combination of crawler tractor dozers and backtrackers with the material loaded by mechanical loading shovel onto 30 tonne articulated dump trucks and transported (within the “Area of Search” of the individual

borrow pit) to designated stockpile locations adjacent to the worked area and retained for reinstatement purposes. Where different overburden materials are present these will be stored according to type. Overburden shall be stockpiled carefully, with consideration given to slope gradient, proximity to watercourses or other sensitive receptors, and shall avoid loading areas of deeper (> 1m deep) peat. This excavated overburden will be lightly tracked to seal the windrows to prevent erosion.

22.2.6 Care will be taken not to traffic undisturbed soils unnecessarily and to limit the working area as far as possible to avoid unnecessary ground excavation and disturbance.

Drainage

22.2.7 Borrow pit drainage requirements are detailed within the drainage section 7 of this CEMP, and require to be in place ahead of excavation.

Programme of Implementation

22.2.8 Borrow pits will not be opened up until rock extraction is required and each borrow pit will be restored as quickly as possible following completion of extraction works. Borrow pits shall be established as the works progress in accordance with their proximity to the active areas of work.

22.2.9 Where it is necessary to cease production in borrow pits and return later in the works to extract rock for a particular product, the borrow pit will be securely fenced off during this period of inactivity.

22.2.10 Borrow pits will be reinstated as soon after cessation of production as possible. However, in some instances borrow pits may be required to be kept open for longer, for example where they may be suitable for the situation of an on-site batching plant, or where there is a need for additional laydown areas. These would be agreed with the ECoW in advance.

22.3 Borrow Pit Working

22.3.1 Following the exposure of the rock head, the material will be dealt with either by digging, ripping or blasting, or a combination of techniques. A combined approach may be required due to variability in the strength and integrity of the rock within individual pits and from pit to pit.

22.3.2 Ripping will be carried out with large tractor dozers, typically a CAT D9 fitted with a towed ripper. Following passes by this ripper, a 360° excavator will load the broken material into dump trucks for transportation to the pre-crusher stockpile. Where the gradients are too steep or heights of faces inappropriate for ripping, a 360° excavator located at the bottom of the working face may be utilised to "pick" the rock face. In both cases where any pieces are too large for the crusher, they will be broken with a 360° excavator fitted with a hydraulic breaker.

22.3.3 A maximum of 5m high benches would be worked in accordance with standard construction practice. Where the rock is prohibitively resistant to allow digging or ripping, blasting will be undertaken. This would be undertaken by a competent specialist sub contractor utilising good blasting practice and would be in compliance with the relevant health and safety regulations (The Quarries Regulations 1999) and other relevant provisions. The blasted rock will subsequently be ripped/dug as required and treated as described above. Blasting operations will be kept to an absolute minimum and only utilised where in-situ rock material cannot feasibly be removed by mechanical equipment.

22.3.4 Mobile crushing and screening plant will be established within each borrow pit and all crushing and grading and stockpiling of material will take place within the confines of the identified borrow pits.

22.3.5 Stone excavation will be carried out using a 45 tonne or 65 tonne excavator loading dump trucks for haulage

to the processing plant. The processing plant will be located adjacent to the extraction area with an area cleared to stockpile the processed material. The processing operation will comprise:

- Initial screening to segregate the oversize material requiring crushing
- Secondary breaking of large rocks using a hydraulic breaker attached to a tracked excavator.
- Crushing of oversize rock using a mobile tracked crusher and secondary screening if required using a 3 way split screen.

22.3.6 A number of products will be produced in this operation including:

- Track base material (nominally 125 mm down product). Track topping material if suitable for use (nominally 50 mm down product)
- Belt end fines for cable sand
- Clean single size product for aggregates if the rock type permits

22.3.7 Each product will be separately stockpiled. Due to the limited available space at most of these locations it is intended to match as closely as possible processing productions with the capacity to incorporate the product into the works whilst maintaining a cushion to allow for plant down time etc.

22.3.8 The stockpiled material won within each borrow pit will be transported to its location of use, with the broad spread of borrow pits ensuring that travel distances are minimised.

22.4 Reinstatement

22.4.1 The borrow pit areas will be backfilled in accordance with reinstatement plans to be provided by the *Contractor*.

22.4.2 On completion of the backfilling with construction spoil, surface profile restoration will be undertaken using the stockpiled overburden materials dozed back into place and finished off with turves.

22.4.3 The *Contractor* will provide records of the borrow pits reinstatement works (original levels, reinstated levels, material utilised) to the *Employer*.

22.4.4 All borrow pits (unless specifically requested by the ECoW) shall be reinstated as soon as possible after the working of them is complete. Once reinstated a borrow pit shall be inspected periodically to monitor for any settlement or surface erosion that may occur, or deterioration of the surface vegetation.

22.4.5 Consideration shall be given to the need for watering a restored area during prolonged dry periods, to encourage re-establishment of vegetation. Should the ECoW identify any unacceptable degradation to a reinstated borrow pit then further restoration management techniques shall be considered, including re-profiling of the surface or reseeding of vegetation, as appropriate.

23 WTG & ANEMOMETER MAST FOUNDATION CONSTRUCTION

23.1 Construction of Turbine Foundations

23.1.1 The Wind Turbine Generators (WTG's) will be erected on reinforced concrete gravity foundations.

23.1.2 Proposed turbine foundation locations are inspected by the *Contractor* to ensure that all potential ecological and archaeological constraints have been identified, demarcated and/or mitigated for prior to

the on-set of construction in that area. The final location of the turbines will be within approved micrositing allowances of the consented positions in accordance with Planning Conditions. The turbine coordinates are supplied by the *Employer* and any proposed micrositing by the C*ontractor* must be first agreed with the *Employer*. The regularity of inspections (hourly, daily, weekly, as appropriate) during construction shall be determined in advance for each particular section, based on anticipated ground conditions, known ecological or archaeological sensitive receptors, prevailing weather conditions, and anticipated rate of progress.

23.1.3 Construction of the turbine foundations shall be the responsibility of the *Contractor*.

23.1.4 The limits of each of the foundation excavations will be surveyed and pegged out at least two weeks in advance of any proposed works, and the ECoW and ACoW shall be consulted to ensure all necessary pre-construction checks have been completed.

23.1.5 The depth of concrete will vary across the base, depending on its shape and dimensions, tapering from around 0.5m at the outer edges to around 2m where it meets the central plinth All concrete works shall implement pollution prevention controls in line with this CEMP.

23.1.6 The turbine foundation design will minimise the excavation requirement where appropriate.

23.1.7 The position of each turbine will be clearly marked on co-ordinates provided by the *Employer* and agreed with the Planning Authority.

23.1.8 The typical construction activities associated with the turbine foundation are detailed below:

- Stripping of surface vegetation (turves) and careful stockpiling of this material as per CEMP requirements.
- Excavating the remaining superficial soil and rock materials and stockpiling of this material as per CEMP requirements.
- The stockpiled materials are to be retained for reinstatement purposes.
- Soil may be excavated to a depth of approximately 4metres. Where rock is encountered this will most likely be removed by mechanical excavation to the required depth and material stockpiled as described above. The potential impacts associated with the use of hydraulic breakers or other such vibratory equipment in the vicinity of sensitive ecological receptors or watercourses shall be assessed and appropriate mitigation measures implemented where required in consultation with the ECoW.
- The foundation design is based on the most efficient use of materials and local ground conditions.
- Temporary fencing shall be erected at locations where there are safety implications for any persons likely to be present on the site e.g. around open excavations. Signage will be displayed clearly to indicate deep excavations and any other relevant hazards associated with the foundation excavation works.
- Following excavation, levels will be set to allow the blinding concrete to be placed and finished to the required line and level as per the WTS requirements.
- The formwork will be pre-fabricated of sufficient quality and robustness to allow repeated use. Formwork will be cleaned after each use and re-sprayed or painted with mould oil within the blinded foundation excavation prior to being fixed in place. The placement of containers with mould oil will be strictly monitored to ensure that storage is only in bunded areas (i.e. in the TCC) on sealed

hardstanding as required by this CEMP. Spraying of mould oil and storage of such sprayed materials will be undertaken in such as way as to avoid pollution.

- Sulphate resistant concrete or other suitable concrete, as appropriate for the prevailing ground conditions, will be used in the turbine base. Prior to pouring the base concrete, the overall quality of the steel fixing will be checked to ensure there is sufficient rigidity to cope with the weight of personnel and small plant during the pour. The quantity, size and spacing of the reinforcement bars will be checked against the construction drawings to ensure compliance with the design detail. The position of the foundation insert, or other appropriately designed foundation mechanism supplied by the turbine manufacturer will be checked to ensure that the level is within the prescribed tolerances. A check will also be carried out to make sure the correct cover from edge of reinforcement to edge of concrete is maintained throughout the structure. A splay will be formed on all external corners.
- The line of ducts will be checked so as not to leave sharp corners that will cause cable snagging and that all bend radius comply with the design illustrated on the construction drawing. All earthing cable or strip connections will also be examined to prove their adequacy to withstand the rigors of the concrete placing process.
- The concrete pour will commence after the blinding concrete has been cleaned of debris and other loose material. Vibrating pokers will have been checked to ensure they are fuelled by compressed air and in good working order. The pour will proceed under the control of the *Contractor*. Personal Protective Equipment (PPE) will be worn by the site operatives and as detailed in the Construction Phase Health & Safety Plan. Pouring will follow best working practice procedures and fresh concrete will be protected from hot and cold weather as required. All concrete works shall implement pollution prevention controls in line with CEMP requirements
- Shutters will be carefully loosened, removed and cleaned no earlier than 24 hours from the finish of the pour.
- Backfilling to the turbine base will proceed in layers of approximately 0.3 metres with compaction as necessary.

23.1.9 A checklist for each foundation will be prepared to show compliance with the documents of each step of the installation process. These lists, once completed, will be stored in the contractor's QA file along with relevant cube test results, and be available for inspection at all times.

23.1.10 Following the completion of all construction activities, the area surrounding the base shall be reinstated according to CEMP requirements.

24 ACCESS TRACK CONSTRUCTION

24.1 Introduction

24.1.1 The overall site design has been developed in accordance with recommendations adopted from the EIA Report and to reflect the requirements and specifications for transporting wind turbine components to the consented turbine locations.

24.1.2 The extent of construction disturbance will be limited to around the perimeter of, and adjacent to, access track alignments, including associated earthworks, and shall be monitored by the ECoW and ACoW as required.

24.1.3 Proposed access track alignments will be inspected by the *Contractor*, ECoW and ACoW prior to the on-

set of construction in that area. The regularity of inspections (hourly, daily, weekly, as appropriate) during the construction period shall be determined in advance for each particular stretch, based on anticipated ground conditions, known ecological or archaeological sensitive receptors, prevailing weather conditions, and anticipated rate of progress.

24.1.4 In general, as part of the design mitigation wherever practicable all proposed site infrastructure has been sited at least 70m from any watercourse.

24.2 General Construction Criteria

24.2.1 It is anticipated that all access tracks will be constructed from aggregate won from local excavations and constructed to the best practices for wind farm access tracks. If site won material does not conform to required engineering specification for the final running surface then imported crushed rock material may be required.

24.2.2 In general, the internal site track layouts have been designed to reflect the contours and design criteria established by the WTS. The internal track length at site will be kept to a minimum to follow the existing topography and tie-in with infrastructure.

24.2.3 Access tracks shall be constructed to a standard running width of 6 m (unless otherwise required), plus shoulders of approximately 0.5 m on either side, to accommodate the maximum transport requirements and specifications of the WTS. Track shoulders may be up to a width of 2 m to accommodate cabling along the access track alignment.

24.2.4 Passing places will be located to ensure inter-visibility between passing places on sections of track which cannot accommodate 2 way traffic movements. All passing places will be appropriately signed such that they are clearly visible to approaching drivers.

24.2.5 Access tracks will be formed from a sub-base of general fill won from local excavations and finished off with a cap-stone / wearing course of graded crushed rock, to provide suitable delivery of the WTG components. Wearing course stone shall be of a suitable material that is not susceptible to breaking down / weathering to a high fines content material.

24.2.6 Maintenance of the running surface will be carried out on a regular basis, as required, to prevent undue deterioration. Loose track material generated during the use of access tracks will be prevented from reaching watercourses by maintaining an adequate cross fall on the tracks. Periodic maintenance of tracks by way of brushing or scraping will be carried out to minimise the generation of wheel ruts. In dry weather, dust suppression methods may be required for track and hardstanding areas. The site access tracks, hardstandings and trackside drains will be inspected on a daily basis by the *Contractor*. Records of such inspections will be held on site for review by the ECoW / Planning Authority (PMO) / *Employer*.

24.2.7 Where floating roads are installed, the contractor will denote this on the site's 'as built' and issue to the Planning Authority.

24.3 Unstable Ground

24.3.1 Unstable ground is herein considered to be any ground conditions encountered along the proposed alignment, or within the immediate vicinity and influence, of the access tracks that has insufficient strength in its existing state to support the proposed load conditions or to remain in-situ for the duration of the construction works, or that has experienced natural failure (i.e. not as a consequence of the wind farm construction works) prior to, but along the alignment of, or within the immediate vicinity and influence of, the proposed access track alignment such as to require re-alignment of the works, or major

civil engineering solution to maintain the proposed alignment.

24.3.2 If any unstable ground is encountered during access track construction, the following procedure shall be adopted:

- Access track construction in the immediate area of the unstable ground shall cease with immediate effect;
- The *Contractor* immediately consults a suitably qualified and experienced geotechnical engineer; and
- If relocation within approved micro-siting allowances of the proposed access track alignment is possible and acceptable to the ECoW/ACoW (as appropriate), without potential for further ground instability to occur, then construction may recommence along the newly agreed alignment, and any stabilisation / mitigation measures that may be required of the unstable ground shall occur in parallel.

24.4 Track Construction

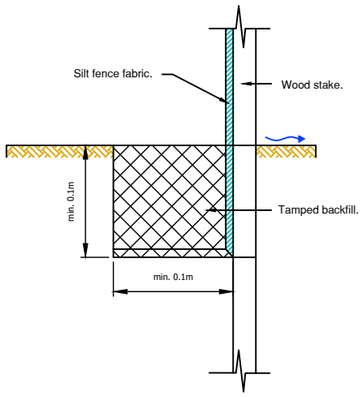
24.4.1 Access tracks (not floating) will be formed on suitable underlying material (soil or rock with sufficient bearing capacity) in the following manner:

- Stripping of surface vegetation (turves) and careful stockpiling of this material as per CEMP requirements.
- Excavating the remaining superficial soil materials (overburden) and stockpiling this material as per CEMP requirements.
- Where different overburden materials are present these will be stored according to type. This material will be monitored and watered (as appropriate) to be retained for reinstatement purposes.
- The exposed suitable track formation shall have rock fill material tipped from dumper trucks directly onto the proposed access track alignment; and
- This material will then be either spread by a dozer or placed by a hydraulic excavator and compacted in layers, typically using vibratory rollers.

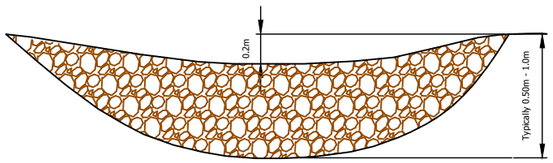
24.4.2 Turning areas will be formed to facilitate the turning of dumper trucks. These turning areas can serve as passing places during the construction period before being reinstated at the end of the works using subsoil/topsoil.

FIGURES

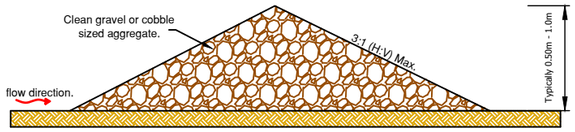
Silt Fence Detail.



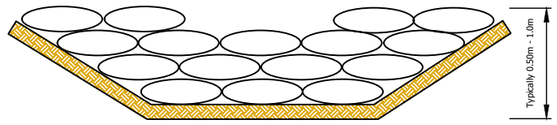
Rock Check Dam Elevation.



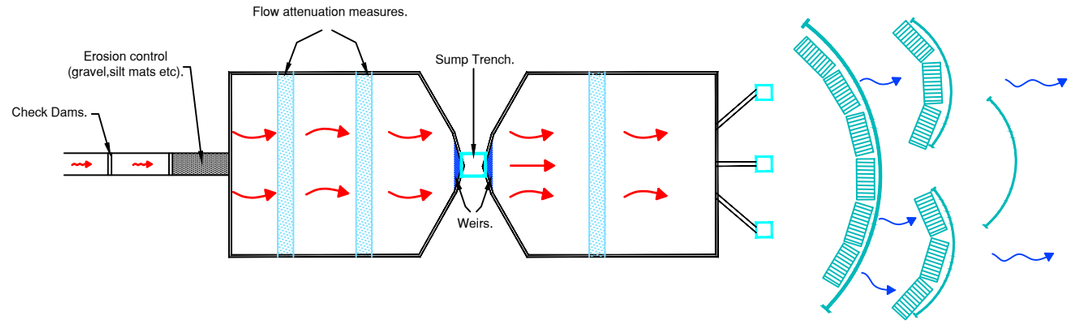
Rock Check Dam Section.



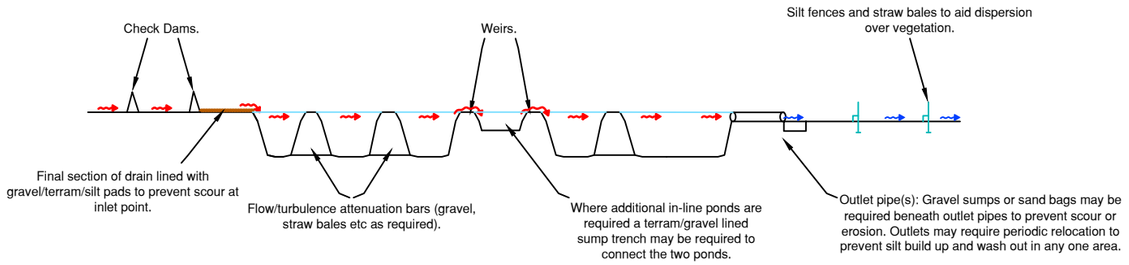
Sand Bag Check Dam Elevation.



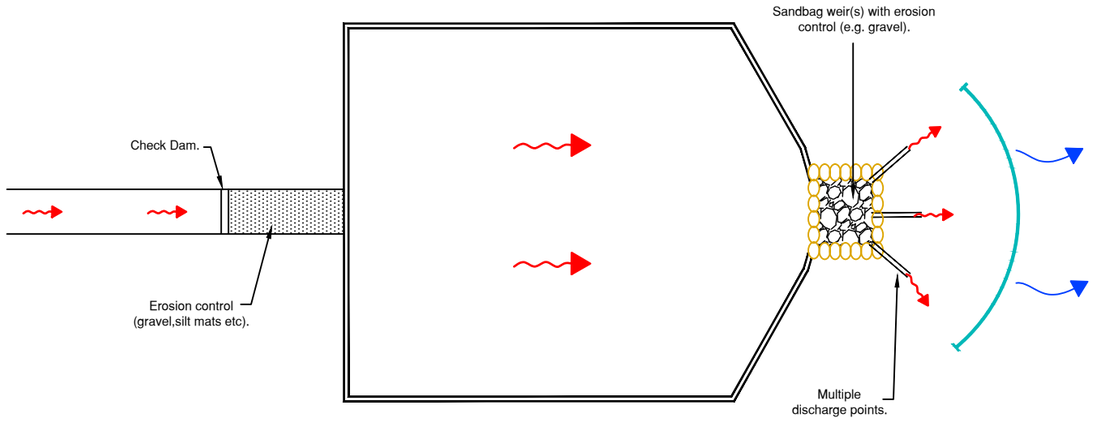
Plan View: In-line Settlement Ponds (typical for higher flow, higher silt load conditions).



Schematic Section: In-line Settlement Ponds.



Plan View: Single Settlement Pond. (Typical for low flow, low silt, load conditions).



sse Renewables

Legend

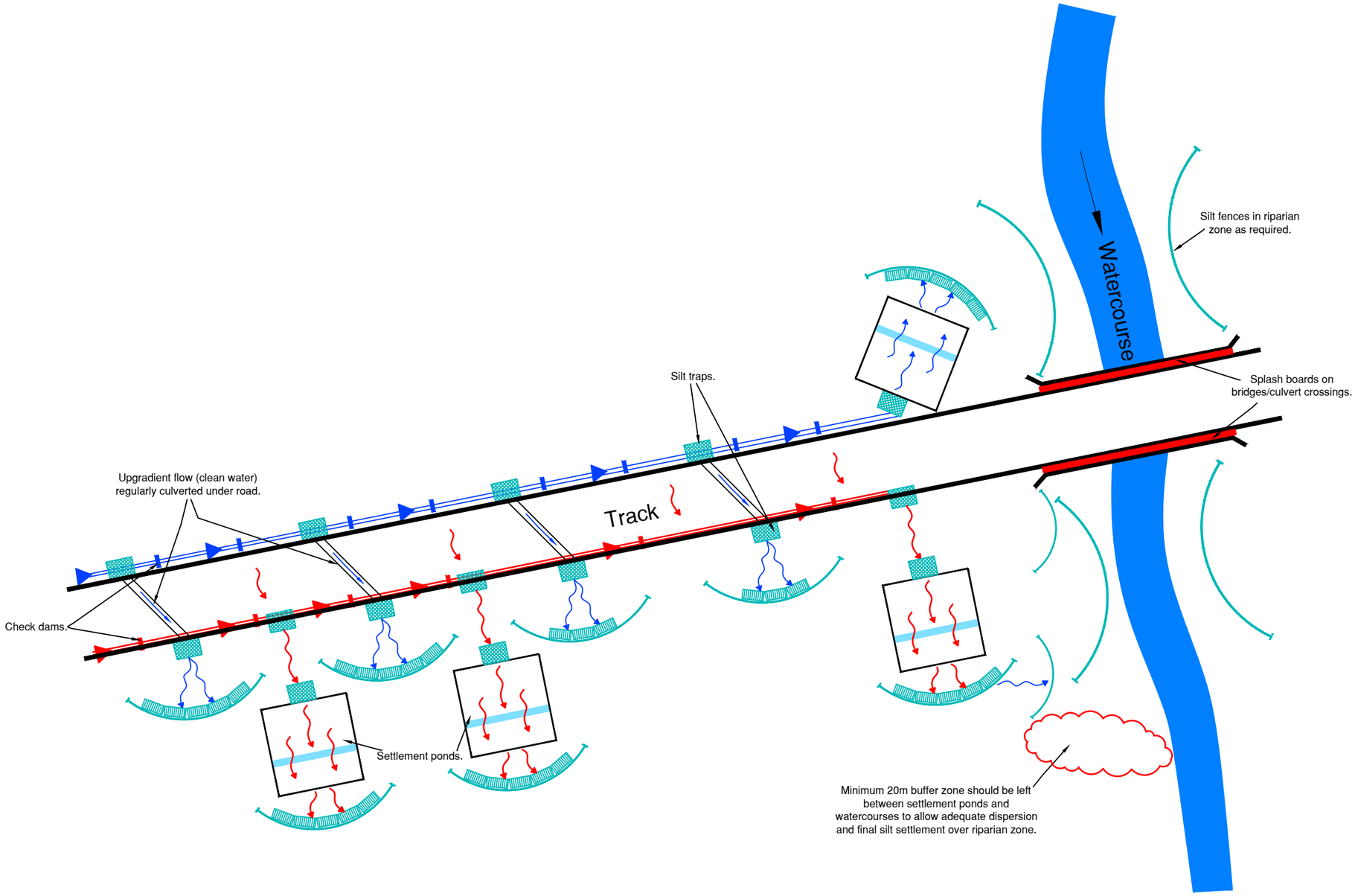
- Silty water
- Clean water

Notes

1. **Dimensions and number of settlement ponds or requirements for flow attenuation measures will depend on volume and velocity of water and silt load chracteristics.**

Figure 2.1.1
Typical Details Of Settlement Ponds And Silt Mitigation Measures

Strathy South Wind Farm
CEMP



sse Renewables

Legend

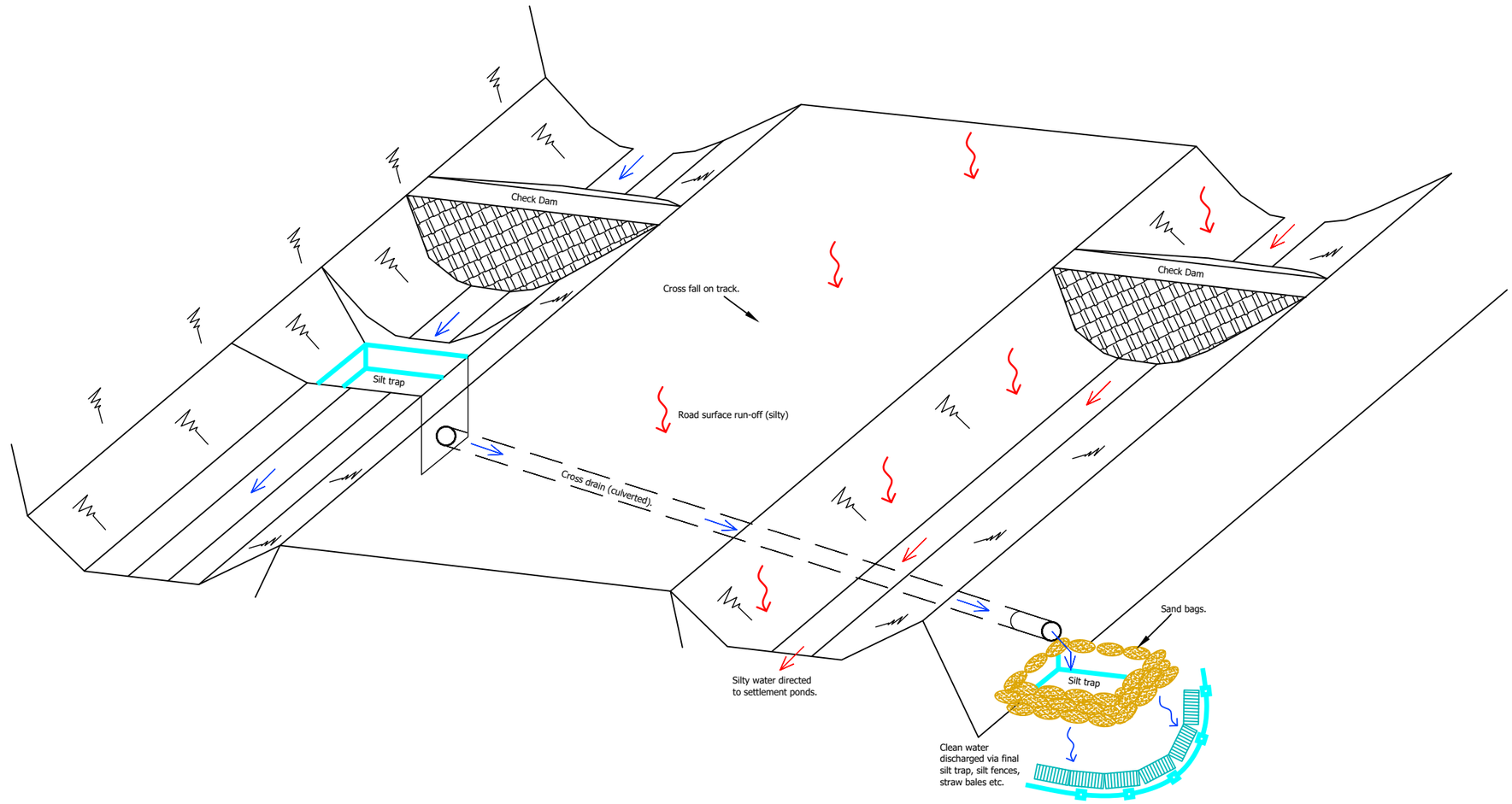
- Silty water
- Clean water
- Silt trap
- Silt fence and straw bales

Notes

1. **In order to reduce volumes of potentially silty laden run-off, 'clean' (upgradient) surface run-off to be kept away from exposed soil areas and seperated from construction works run-off where possible.**
2. **Typical details for settlement ponds, check dams and silt fences are shown in Figure 01.**

Figure 2.1.2
Schematic Drainage Arrangements For Tracks And Watercourse Crossing

Strathy South Wind Farm
CEMP

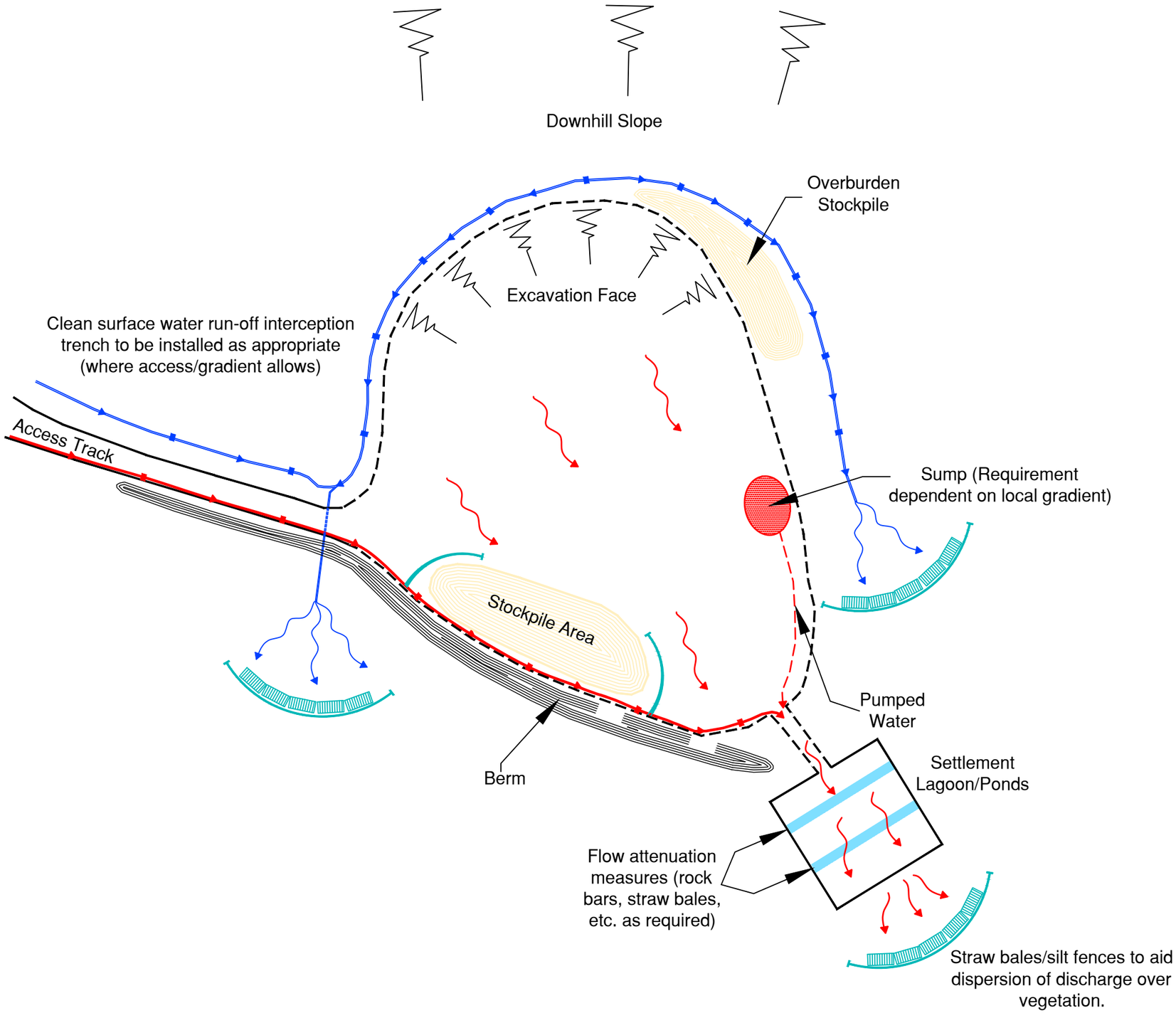


Notes

1. **Refer to Figure 01 for typical details of settlement ponds, check dams and silt fences.**
2. **Refer to Figure 02 for further details on track drainage arrangements.**
3. **Where topography or other constraints preclude the segregation of clean / dirty water drainage (as illustrated on this drawing), the road surface cross fall shall be towards the upslope drainage ditch. Flow rates and volumes within such a combined drainage system may be higher and therefore sediment and silt attenuation measures shall be implemented accordingly to control expected increase in flow, erosion and sediment / silt load.**

Figure 2.1.3
Schematic Section Of Typical Cut And Fill Track Drainage Arrangements

Strathy South Wind Farm
CEMP



sse Renewables

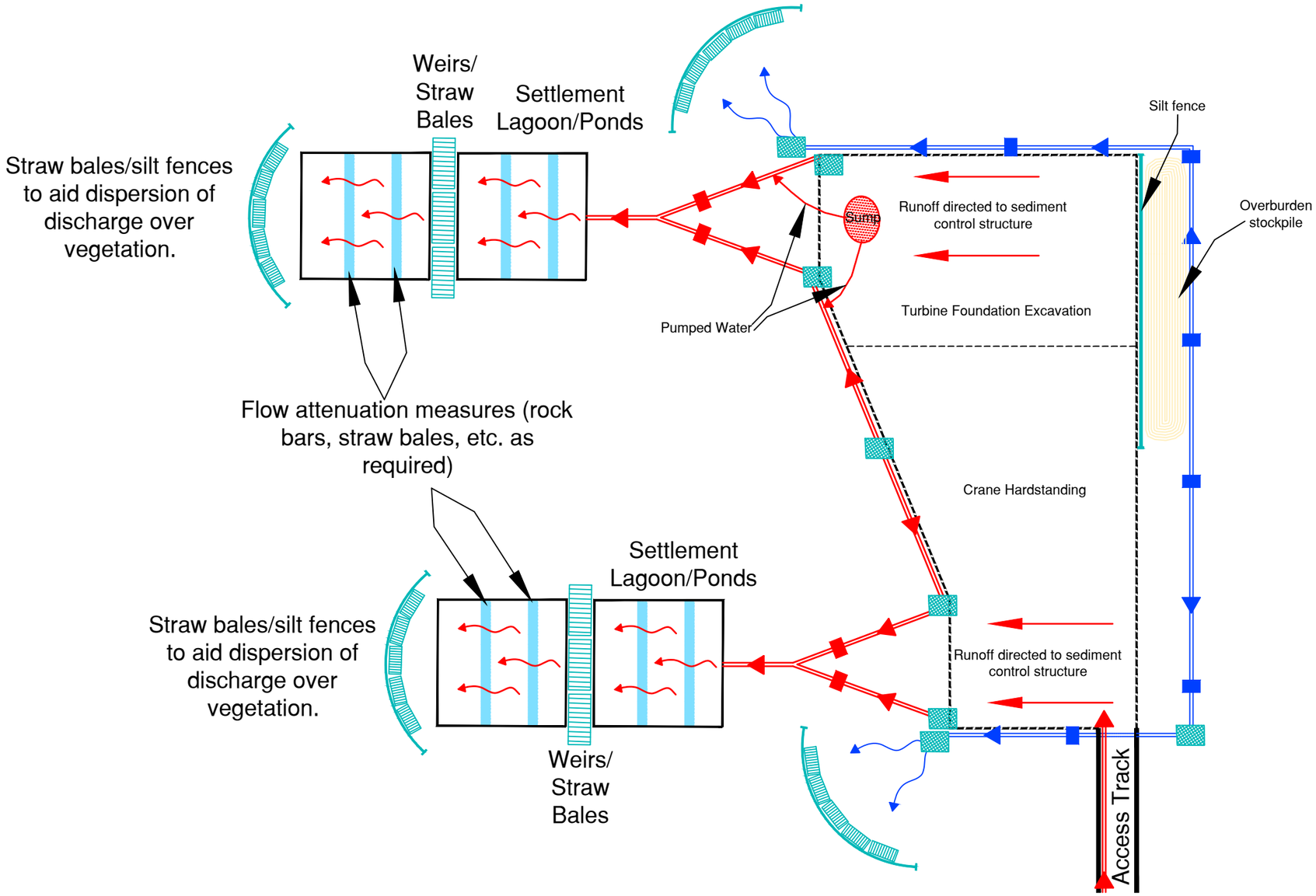
Legend

- Borrow pit boundary
- Potentially silty run-off/drainage
- Check dams
- Clean water run-off/drainage
- Silt fence and/or straw bales to aid dispersion (and protect stockpile)

1. Borrow pit configurations will vary from that indicated on this drawing (for instance borrow pits are likely to be off-line of continuing access tracks); However, the general principles of clean / dirty water drainage segregation, stockpile erosion and run off control, and general sediment and silt control shall apply irrespective of the final borrow pit configuration.

Figure 2.1.4
Schematic Borrow Pit Drainage Arrangements

Strathy South Wind Farm
CEMP



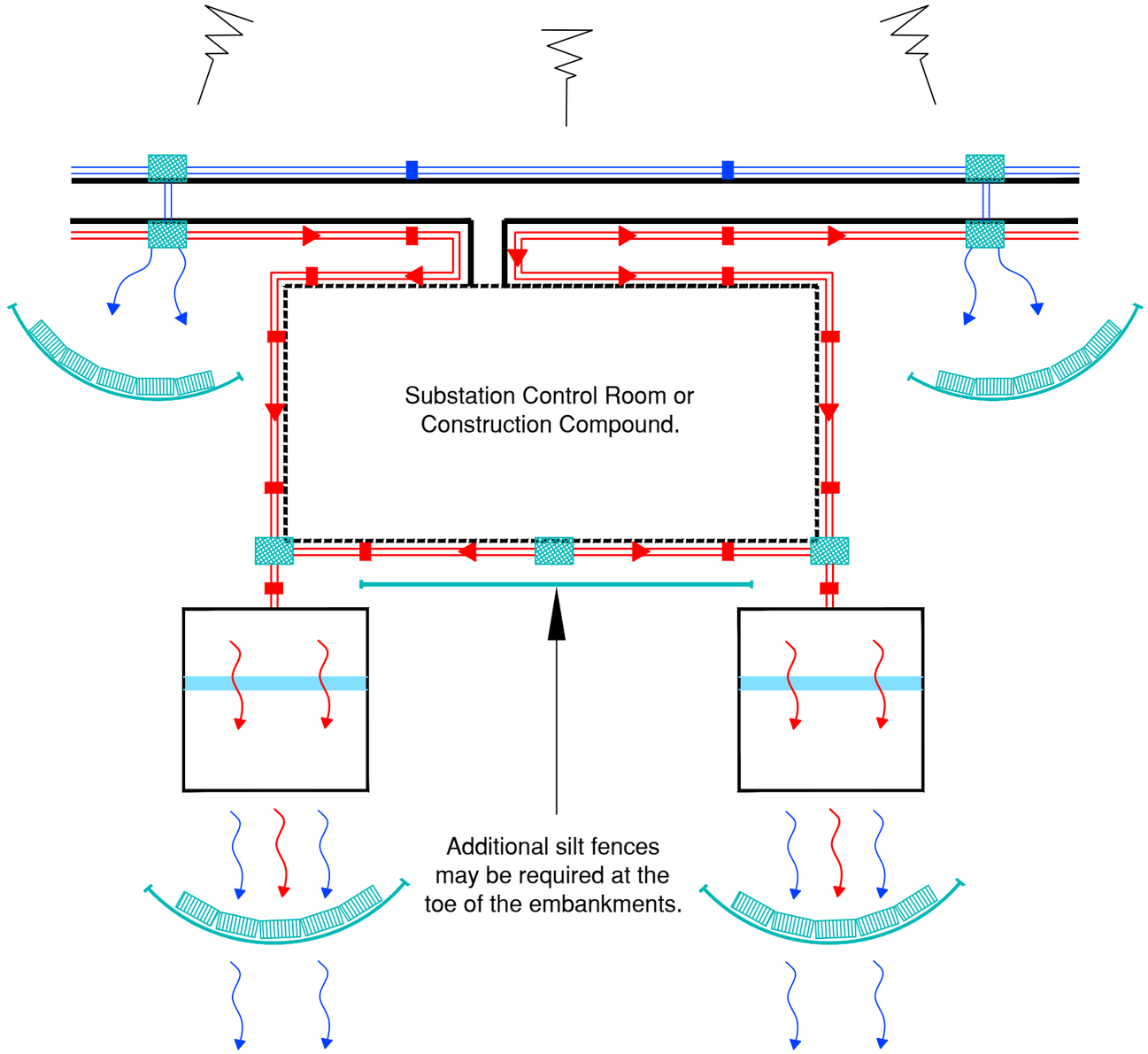
sse Renewables

Legend

- Potentially silty run-off/drainage
- Clean water run-off/drainage
- Silt fence and/or straw bales to aid dispersion (and protect stockpile)
- Check dams
- Silt traps

Figure 2.1.5
Schematic Drainage Arrangements For Turbine Bases And Crane Pads Hardstandings

Strathy South Wind Farm
CEMP



sse Renewables

Legend

- Potentially silty run-off/drainage
- Clean water run-off/drainage
- Silt fence and/or straw bales to aid dispersion (and protect stockpile)
- Check dams
- Silt traps

Figure 2.1.6
Schematic Drainage Arrangements For Substation Control Room

Strathy South Wind Farm
CEMP

TA2.2: Borrow Pit Assessment

TECHNICAL APPENDIX 2.2

STRATHY SOUTH WIND FARM

Borrow Pit Appraisal

Prepared for: SSE Generation Ltd

SLR Ref: 428.00660.00070
Technical Appendix 2.2
Version No: Rev 1
August 2020

BASIS OF REPORT

This document has been prepared by SLR Consulting Limited with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it by agreement with SSE Generation Ltd (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

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CONTENTS

SSE Generation Ltd
Strathy South Wind Farm
Borrow Pit Appraisal

SLR Ref No: 428.00660.00070
April 2020

DOCUMENT REFERENCES

TABLES

FIGURES

APPENDICES

SLR

1.0 Introduction

SLR Consulting Ltd (SLR) was commissioned by SSE Generation Ltd (The Applicant) to undertake a Borrow Pit Appraisal for the proposed Strathy South Wind Farm (the 'site') shown on Figure 2.2.1.

The Applicant currently has planning consent to construct 39 wind turbines with associated infrastructure which includes up to four borrow pits ('The Consented Scheme'). The Applicant proposes to submit a variation to the Consented Scheme, which is referred to as the 'Proposed Varied Development'. The Proposed Varied Development includes up to seven borrow pits and these are discussed within this report. For a full description of the Proposed Varied Development refer to Chapter 2 Description of Development (EIAR Volume 2: Main Report).

1.1 Scope of this Report

There has been substantial works undertaken to date at the site to inform the Consented Scheme and to assess potential on-site aggregate reserves. Although the number of turbines remains the same for the Proposed Varied Development as the Consented Scheme, there would be an increase in the size of the proposed turbines and hardstanding, requiring additional aggregate. The principle objective of this report is to provide an initial assessment of the aggregate requirements for the Proposed Varied Development and identify potential borrow pits suitable for providing this aggregate.

1.2 Methodology

This report provides details of the proposed borrow pits, which would be necessary to provide the aggregates required to construct the Proposed Varied Development.

There are up to seven (A – G) proposed borrow pit locations, of which four are part of the Consented Scheme. Each borrow pit has been selected because of its morphology, accessibility from proposed tracks, orientation and the expected proximity of suitable rock close to surface. The proposed borrow pits are in areas where the peat coverage is minimal and where bedrock outcrops and potential aggregate reserves are expected to occur near the surface. The proposed borrow pit locations are shown on Figure 2.2.2.

This report is based on a desk-based assessment of seven potential borrow pits, supported by a site visit undertaken by an experienced engineering geologist. The desk-based assessment has involved review of previous reports[1,2,3,4],relevant geological plans, including historic geological plans, OS maps, topographic and slope plans and review of available memoirs.

SLR reviewed the peat and geology data gathered as part of previous site visits undertaken by Mouchel Parkman in 2007[1,2] and SLR in 2012-13[3]. An additional visit was undertaken by SLR in September 2019 to review the selected borrow pit locations and provide additional probing where possible, with a further visit undertaken by RPS in February 2020 to gather further probing data at borrow pits E, F and G. Post-consent and prior to construction, site investigations would be carried out to determine the suitability of the geology and rock at the proposed borrow pit locations and to allow geotechnical design of the selected borrow pits.

[1] Mouchel Parkman., (March 2007). *Peat Stability Risk Assessment.* Appendix 14.1 Strathy South Windfarm, EIA Volume 4: Technical Appendices, 2007 Environmental Statement

[2] Mouchel Parkman., (January 2007). *Strathy South Windfarm Borrow Pit Assessment.* Appendix 14.2 Strathy South Windfarm, EIA Volume 4: Technical Appendices, 2007 Environmental Statement

[3] SLR Consulting Ltd., (May 2013) *Strathy South Wind Farm, Peat Landslide and Hazard Risk Assessment* Appendix 14.1 Strathy South Wind Farm, ES Volume 4: Technical Appendices

[4] SSE Renewables (2013). *Strathy South Wind Farm, Environmental Statement Addendum*

SSE Generation Ltd
Strathy South Wind Farm
Borrow Pit Appraisal
SLR Ref No: 428.00660.00070
April 2020

1.2.1 Sources of Information

The following sources of information been reviewed and assessed:

- British Geological Survey (BGS) online map viewer and Geoindex[5];
- Scotland's Environment website[6]; and
- Information gathered during site visits and from previous reporting[1,2,3,4].

1.3 Site Location and Description

The site is located approximately 12 km south of Strathy village in northeast Sutherland, a few kilometres south of SSE Renewables' existing 33 turbine Strathy North Wind Farm. The site location and layout are shown in Figure 2.2.1 and Figure 2.2.2.

The Proposed Varied Development is currently accessed via the existing Strathy North Wind Farm access track off the A836 which enters the north eastern side of the site. The site is located within the Strathy South conifer plantation. No residential properties are located within the site.

The ground elevation ranges from 130 m at Turbine 72 to 200 m Above Ordnance Datum (AOD) in the vicinity of Turbine 36 and the application site occupies an area of about 1,785 hectares (ha).

The site is currently used for commercial forestry and recreational use (fishing) and limited rough grazing. The main site forms a roughly U-shaped boundary and occupies most of the forest between Loch nam Breac Mor and the River Strathy with the River Strathy flowing through the centre of the site to the north. The land immediately adjacent to the site principally comprises open peatlands and moorland which is gently undulating with extensive blanket bog, lochs and pools.

Peaty soil and peat deposits cover most of the site and variously overlie glacially derived soils such as Glacial Till comprising sand and gravels and in places bedrock. There are limited exposures of bedrock, where exposed it is seen to be metasedimentary rocks over the entire site.

[5] British Geological Survey (BGS) *Online Viewer/Geoindex website* Available from: http://mapapps.bgs.ac.uk/geologyofbritain/home.html; http://www.bgs.ac.uk/geoindex/ Last accessed October 2019.

[6] Scotland's Environment Website Available from: www.environment.scotland.gov.uk Last accessed October 2019.

2.0 Geological Setting

This assessment has been completed through a largely desk-based review of soil and geological maps and OS contour data. No intrusive investigation has been undertaken on site to assess the suitability of potential sources of aggregate, however several phases of peat probing have been undertaken to assess the superficial deposits on site.

2.1.1 Superficial Geology

The extent of superficial coverage is presented in Figure 2.2.3, which is a summary of the geology taken from the available British Geological Survey (BGS) maps. The peat is mapped as being developed over the whole of the main site where the peat is extensively draped over existing Glacial Till and bedrock. The peat has been subject to limited erosion from fluvial activity and localised erosion, causing minor hagging and ponding on the peat. The peat on-site is generally a blanket type peat overlying the underlying strata, dissected by distinct watercourses, with thicker peat (deeper isolated peat) at the stream head of the River Strathy to the south of the site.

The BGS Sheet 115W, Bedrock and Superficial Deposits (Strathy Point) confirms that the superficial geology at site is recorded as being predominantly Recent to Quaternary peat. Peat is extensively developed over the site which in turn entirely overlies bedrock. There was no evidence identified during site visits of any Glacial Till deposits on-site, which are recorded as being predominantly glaciofluvial and hummocky glacial deposits developed to the north of the site.

The peat in this area, detailed on Figure 2.2.6 is generally fibrous and shows quite low levels of decomposition in the top 100 cm. The peat is generally flat lying with very little erosion or hagging associated with it. Where the peat was found to be deeper (>1.5 m) the level of decomposition was far more evident with increased humification and higher moisture content. For further information on the peat deposits on site, refer to Technical Appendix 10.2: Peat Landslide Hazard and Risk Assessment (EIAR Volume 4: Technical Appendices).

2.1.2 Bedrock Geology

The bedrock geology at site is almost entirely underlain by Moine age strata. The site can broadly be characterised by two areas, comprising Moine metasediments of the Loch Coire Formation across the western portion of the site and the Kirktomy Gneisses across the eastern portion of the site. The site is divided by the Swordly Thrust Fault which is orientated in a north-northwest to south-southeast orientation, displacing the younger Kirktomy Gneisses over the older Loch Coire Formation. There is no clear evidence of the Swordly Thrust Fault on the site.

Several outcropping granitic rocks occur as sheets on the site, these are seen in the area where rock outcrops at surface. These granitic sheets comprise the Scottish Highland Ordovician Granitic Intrusion Suite. The granitic sheets are divided as those outcropping the west of the Swordly Fault and those to the east of the fault. These areas have been selected as potential borrow pit sites, as they appear to form slight ridges of outcropping rock at or close to surface.

The bedrock geology of the site is shown in Figure 2.2.3. A summary of the bedrock geology on-site is shown in Table 2-1.

Table 2-1
Bedrock Geology Summary

Age	Stratigraphic Group	Unit	Description
Silurian 444 – 419 Ma	-	Clerkhill Appinite Suite	Ultramafitite (mafic igneous rock).
Ordovician 485 – 443 Ma	Caledonian Supersuite	Scottish Highland Ordovician Minor Intrusion Suite	Granite.
Neoproterozoic 1000 – 541 Ma	Moine Supergroup	Kirtomy Gneisses	Semipelite, gneissose metamorphic bedrock.
		Loch Coire Formation (Bettyhill Gneisses)	Migmatitic psammite with migmatitic semipelite.

2.1.3 Mining and Quarrying

Following review of publicly available records, there is no evidence of commercial mining or quarrying within the site boundary or immediate surrounds.

2.1.4 Hydrological Setting

The majority of the site lies within the headwaters of the River Strathy catchment, principally drained at site via the River Strathy, and its contributing watercourses. The area rises to the south where the topography is steeper and comprises hilly moorland. The River Strathy flows through the site, and there are several water bodies on the site, including Loch nan Clach, as well as a number of unnamed water bodies (pools and small lochs).

2.1.5 Hydrogeological Setting

The site is underlain by impervious rock generally without groundwater except at shallow depth or in fractures. A review of aquifer characteristics confirms that water is likely to be retained in the peat and that groundwater may be present within sand and gravel horizons within the Glacial Till (if present) and within fractures or fault zones within the bedrock deposits. Groundwater flow in upland areas typical of much of the site tends to follow flow paths from high ground to adjacent valleys.

3.0 Aggregate Requirements

The proposed turbine locations and their subsequent maintenance would require the construction of a purpose built network of access tracks (including upgrade of existing tracks). These tracks would be single track with occasional passing places, un-mettalled and would be constructed to the turbine suppliers' specifications conforming to the Specification for Highway Works.

Access from the A836 public road and the most southerly part of the Strathy North wind farm is common to both the consented Strathy South wind farm (the 'Consented Scheme') and the consented Strathy North wind farm, it is proposed to utilise this access before taking one of two options to reach the site.

The preferred access then travels south where it would cross the River Strathy and meet up with an existing track within Strathy Wood at NGR 813 551. The alternative access route leaves the consented Strathy North track at NGR 813 564 and travels in a roughly easterly then southerly direction, crossing the River Strathy in Strathy 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 site. The total length of permanent new access track within the main site is estimated to be approximately 19.9 km with an additional 7.7 km of upgraded track. A further 3.8 km (preferred access) or 5.1 km (alternative access) of track is to be created/upgraded between the existing Strathy North Wind Farm and the Proposed Varied Development.

The indicative volumes of rock required for site infrastructure are summarised in Table 3-1 and based on a materials calculator (Appendix A). The aggregate requirements below has been calculated based on the worst case of aggregate volumes required, using the (longer) alternative access route.

If required, imported crushed rock would be used to construct the temporary construction compound prior to any major borrow pit works.

It is assumed that all concrete requirements for turbine bases and a road surface dressing would be sourced off-site.

Table 3-1
Aggregate Requirements

Proposed Infrastructure	Volume of Aggregate Required
Access Tracks	130,104 m^3
Turbine Bases – formation only	10,530 m^3
Fill Above Turbine Bases	86,268 m^3
Crane Pads and Laydowns	106,860 m^3
Substation and Laydown	50,000 m^3
Additional Laydown	10,000 m^3
Construction Compound	3,750 m^3
Concrete Batching Plant	5,000 m^3
Total	**402,512 m^3**

4.0 Aggregate Quality

The primary use of aggregate arising from working of the selected borrow pits would be for the construction of the tracks using unbound aggregate to the turbine suppliers' specifications and conforming to the Specification for Highway Works.

A site investigation would be required to establish that aggregate within the proposed borrow pits would comprise suitable aggregate material; it would be at this stage that it would be subject to geotechnical testing.

5.0 Potential Borrow Pits

5.1 Introduction

It is anticipated that the proposed turbine bases would be sited on glacial soils or shallow bedrock, composed of in-situ metamorphic rock types. The bedrock geology, either at surface or beneath superficial deposits across site comprises Neoproterozoic aged metasedimentary rocks with the occasional igneous intrusion.

Following review of publicly available records, there is no evidence of commercial mining or quarrying within the site boundary or immediate surrounds.

The assessment has been completed through a desk-based review of previous reports[1,2,3,4], geological maps and memoirs and is supported by several walkovers completed between 2012 and 2019.

This section of the report provides an assessment of the potential borrow pits with an evaluation of their potential to meet the Proposed Varied Development's aggregate requirements.

The proposed borrow pit locations have been predominantly selected due to their geological setting. Other factors included environmental impacts, morphology, accessibility from the proposed tracks, orientation and the expected proximity of rock to the surface. The proposed locations are in areas where the superficial coverage is limited and where bedrock is anticipated to have aggregate reserves near to surface.

No account has been taken in the calculations for the fortuitous 'winning' of rock during the construction phase for example during infrastructure excavations. The calculations provided in this report assume a worst case scenario, where the longest of the potential access routes is selected (i.e. the alternative access route), floated tracks are assumed on new access tracks off-site and where no other rock or materials would be found on site during construction. In the event that such rock is available, and the preferred access route is selected, the amount extracted from the borrow pits would be reduced.

5.2 Borrow Pit Selection

A total of seven potential search areas have been selected as possible borrow pit locations, shown on Figure 2.2.2. Of these, four were included within the Consented Scheme (Borrow Pit A, B, C and D). Each location is reviewed in the sections below. Photographs are included as part of Appendix B.

5.2.1 Borrow Pit A

Borrow pit A is located to the east of the existing access track at approximately NGR 280932 951928 shown on Figure 2.2.2 and Figure 2.2.4a with further details in Table 5-1.

The underlying geology in this area comprises Neoproterozoic age metasediments of the Kirtomy Gneisses; semipelites of the Moine Supergroup.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

Table 5-1
Borrow Pit A

Borrow Pit A	
Site Dimensions	Approximately 330 x 190 m
Excavation Area	Approximately 58,999 m^2
Height of Excavation	Approximately 10 m
Gradient	Slope increasing steeply towards the East
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 250,612 m^3
Aggregate Composition	Metamorphic rock

5.2.2 Borrow Pit B

Borrow pit B is located to the east of the existing access track at approximately NGR 280675 950321 shown on Figure 2.2.2 and Figure 2.2.4b with further details in Table 5-2.

The underlying geology in this area comprises Neoproterozoic age metasediments of the Kirtomy Gneisses; semipelites of the Moine Supergroup.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

Table 5-2
Borrow Pit B

Borrow Pit B	
Site Dimensions	Approximately 135 x 115 m
Excavation Area	Approximately 15,505 m^2
Height of Excavation	Approximately 12 m
Gradient	Slope increasing steeply towards the east
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 85,433 m^3
Aggregate Composition	Metamorphic rock

5.2.3 Borrow Pit C

Borrow pit C is located to the east of T47, at approximately NGR 278762 951039 shown on Figure 2.2.2 and Figure 2.2.4c with further details in Table 5-3.

The underlying geology in this area comprises Neoproterozoic age metasediments of the Loch Coire Formation; migmatitic psammite and semipelite.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

Table 5-3
Borrow Pit C

Borrow Pit C	
Site Dimensions	Approximately 175 x 155 m
Excavation Area	Approximately 24,846 m^2
Height of Excavation	Approximately 10 m
Gradient	Slope increasing steeply towards the west
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 56,685 m^3
Aggregate Composition	Metamorphic rock

5.2.4 Borrow Pit D

Borrow pit D is located to the west of the existing access track at approximately NGR 278772 953252 shown on Figure 2.2.2 and Figure 2.2.4d with further details in Table 5-4.

The underlying geology in this area comprises Neoproterozoic age metasediments of the Loch Coire Formation; migmatitic psammite and semipelite.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

Table 5-4
Borrow Pit D

Borrow Pit D	
Site Dimensions	Approximately 90 x 100 m
Excavation Area	Approximately 8,249 m^2
Height of Excavation	Approximately 14 m
Gradient	Slope increasing steeply towards the west
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 30,948 m^3
Aggregate Composition	Metamorphic rock

5.2.5 Borrow Pit E

Borrow pit E is located to the south of the existing access track, west of T61 at approximately NGR 279068 952550 shown on Figure 2.2.2 and Figure 2.2.4e with further details in Table 5-5.

The underlying geology in this area comprises Neoproterozoic age metamorphic rock.

It is anticipated that the borrow pit would comprise a layer of peaty soil, weathered granular material, broken rock and rock close to surface and could provide large volumes of aggregate.

Table 5-5
Borrow Pit E

Borrow Pit E	
Site Dimensions	Approximately 160 x 140 m
Excavation Area	Approximately 24,350 m^2
Height of Excavation	Approximately 18 m
Gradient	Slope increasing steeply towards the west
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 159,830 m^3
Aggregate Composition	Metamorphic rock

5.2.6 Borrow Pit F

Borrow pit F is located to the east of the existing access track at approximately NGR 278971 952196 shown on Figure 2.2.2 and Figure 2.2.4f with further details in Table 5-6**.** It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

The underlying geology in this area comprises Neoproterozoic age metasediments of the Loch Coire Formation; migmatitic psammite and semipelite.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

Table 5-6
Borrow Pit F

Borrow Pit F	
Site Dimensions	Approximately 180 x 78 m
Excavation Area	Approximately 15,484 m^2
Height of Excavation	Approximately 12 m
Gradient	Slope increasing steeply towards the west
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 79,239 m^3
Aggregate Composition	Metamorphic rock

5.2.7 Borrow Pit G

Borrow pit G is located to the west of the existing access track at approximately NGR 278774 952611 shown on Figure 2.2.2 and Figure 2.2.4g with further details in Table 5-7.

The underlying geology in this area comprises Neoproterozoic age metasediments of the Loch Coire Formation; migmatitic psammite and semipelite.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface.

Table 5-7
Borrow Pit G

Borrow Pit G	
Site Dimensions	Approximately 120 x 70 m
Excavation Area	Approximately 7,860 m^2
Height of Excavation	Approximately 8 m
Gradient	Slope increasing steeply towards the west
Details of Extraction	Combination of drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 35,145 m^3
Aggregate Composition	Metamorphic rock

6.0 Proposed Borrow Pit Design

The indicative borrow pit volumes are presented in Table 5-1 to Table 5-7. The design of the borrow pits anticipates extracting a net stone volume suitable for the requirements on-site, excluding imported top surface dressing which would require importing. This target capacity has been determined on the basis of the estimated requirements for construction materials together with additional allowances for overburden material. It is envisaged that overburden/soils together with processing waste would be carefully stored adjacent to the excavation void for eventual use in the restoration process. For further details see Technical Appendix 2.1: CEMP (EIAR Volume 4: Technical Appendices).

6.1 Marking Out and Overburden Stripping

The permitted extents of the borrow pit would be marked out with pegs, and overburden, including topsoil, subsoil and weathered rock horizons, would be stripped from within this delineated area.

The overburden and weathered rock horizons would be stripped using a combination of crawler tractor dozers and backtrackers with the material loaded by loading shovels. The overburden (including surface vegetation turves) would be carefully stripped and stored as a series of separate turves, topsoil, subsoil and weathered rock storage mounds to be used for reinstatement purposes.

6.2 Excavations within Rock

Once overburden and weathered rock horizons have been stripped, and stored, the nature of the underlying solid rock strata would be assessed by a suitably qualified geotechnical engineer/blasting engineer. The engineer would provide advice on suitable extraction techniques including; extraction method, bench and cut face design parameters, and blasting design (if required).

If blasting is required, blasting would be undertaken in accordance with the Quarries Regulations 1999[7] and Annex D PAN 50[8].

A combination of digging, ripping and blasting would be utilised to excavate rock (subject to the nature of the material encountered, depth of weathering and level of fracturing) which would be processed using a mobile crushing and screening plant, which would be sited within the base of the working borrow pit.

6.3 Stockpiling of Materials

The initial overburden strip would be stored within temporary screening mounds around the perimeter of the borrow pit. The screening mounds would be at least 1.5 m in height.

The remaining unsuitable materials (weathered/unsuitable rock horizons) would be stockpiled within the base of the working borrow pit. The stockpiles would have a maximum height of 5 m, with maximum side-slope gradients of 1(V) in 2.5(H) and be in full compliance with the Quarries Regulations 1999[7] and QNJAC Guidelines[9]. This material would be used as part of the restoration profiling on the cut faces.

---

[7] Health and Safety Executive (2014)., *Health and Safety at Quarries, Quarries Regulations 1999, Approved Code of Practice and Guidance (Second Edition).*

[8] Scottish Government (2000)., *PAN 50 Annex D: Controlling the Environmental Effects of Surface Mineral Works.*

[9] Quarries National Joint Advisory Committee (2020), Available at: http://qnjac.co.uk/what-is-qnjac/. Last accessed April 2020.

6.4 Access Tracks/Haulage routes

The proposed access to the borrow pit(s) would involve constructing access tracks from the main wind farm access track. The access tracks would include suitable roadside drainage ditches, with soakaways located, where appropriate.

The tracks (haulage routes) within the borrow pit would have a gradient of no steeper than 1(V) in 10(H).

6.5 Water Management/Drainage

The borrow pit(s) would feature a perimeter surface drain, which would aim to prevent water in-flow into the borrow pit. The water collected within the surface drains would be discharged either into the surrounding vegetation, or into suitably located settlement lagoons.

Where necessary, surface settlement lagoons would be constructed within the borrow pit. These would be constructed with the aim of containing any surface water collection within the excavation voids, and from collection of water from the perimeter surface drains. The lagoons would be contained within a bunded area at the base of the borrow pit, with suitable pumping systems installed allowing water to be pumped to soakaways as required. For further details on drainage, see Technical Appendix 2.1: CEMP (EIAR Volume 4: Technical Appendices).

6.6 Restoration

Upon completion of extraction at the borrow pit(s), surface profile restoration would be undertaken using the stockpiled overburden materials and other suitable materials excavated on-site (including peat) subject to review by the Ecological Clerk of Works (ECoW).

General fill material would be sourced from the stockpiles located within the borrow pit void. These would comprise materials with unsuitable engineering properties for the Proposed Varied Development construction such as weathered rock and unsuitable/poor quality rock horizons, and unsuitable materials arising from the crusher/blasting operations. This material would be utilised to provide the basis of the restoration profile.

The fill materials would be used as general fill to soften the benched profile of the excavations and provide a gentler sloping gradient than near vertical working face slope designs. The fill materials would also be used to provide a suitable gradient on the borrow pit floor to prevent ponding.

The stripped soils, and subsoil horizons which would be stored within perimeter screening mounds would be utilised as the surface dressing layer in which to provide a suitable medium for seeding and planting as appropriate.

The restoration of the borrow pit sites would not involve importing any material onto site. Only materials arising from the excavations would be utilised as part of the restoration scheme. The base of the borrow pit would re-use existing stockpiled materials/soils generated from the site excavations to create a habitat on the floor of the borrow pit, this would be to a maximum of 2 meters thick across the floor area, if suitable, some of these soils could be used to ‘dress’ shallower side slopes but not on the steeper faces.

An ECoW would be in place, in order to monitor the restoration and aftercare of the borrow pits.

6.7 Best Practice Guidance Documents

A number of general pollution prevention measures would be employed to minimise the risks to ground and surface waters during creation and use of the borrow pits. Extraction operations would be carried out in accordance with relevant SEPA Guidance for Pollution Prevention[10] and other codes of best practice, to ensure that both ground and surface waters are not contaminated. These would include relevant codes of best practice relevant to the site include:

- Scottish Planning Policy (SPP) (2014);
- European Commission (EC) Water Framework Directive (2000/60/EC);
- Planning Advice Note (PAN) 50, Controlling the Environmental Effects of Surface Mineral Workings Scottish Government (2000)[8];
- Good Practice on Controlling the Effects of Surface Mineral Working on the Water Environment, Department of the Communities and Local Government and Mineral Industry Research Organisation. (2008);
- Guidance for Pollution Prevention (GPPs) (various dates and references), SEPA; and
- Environmental Good Practice on Site C692, CIRIA, (2010).

[10] SEPA (2019).,*Guidance for Pollution Prevention (GPPs).* Available at https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ Last accessed April 2020.

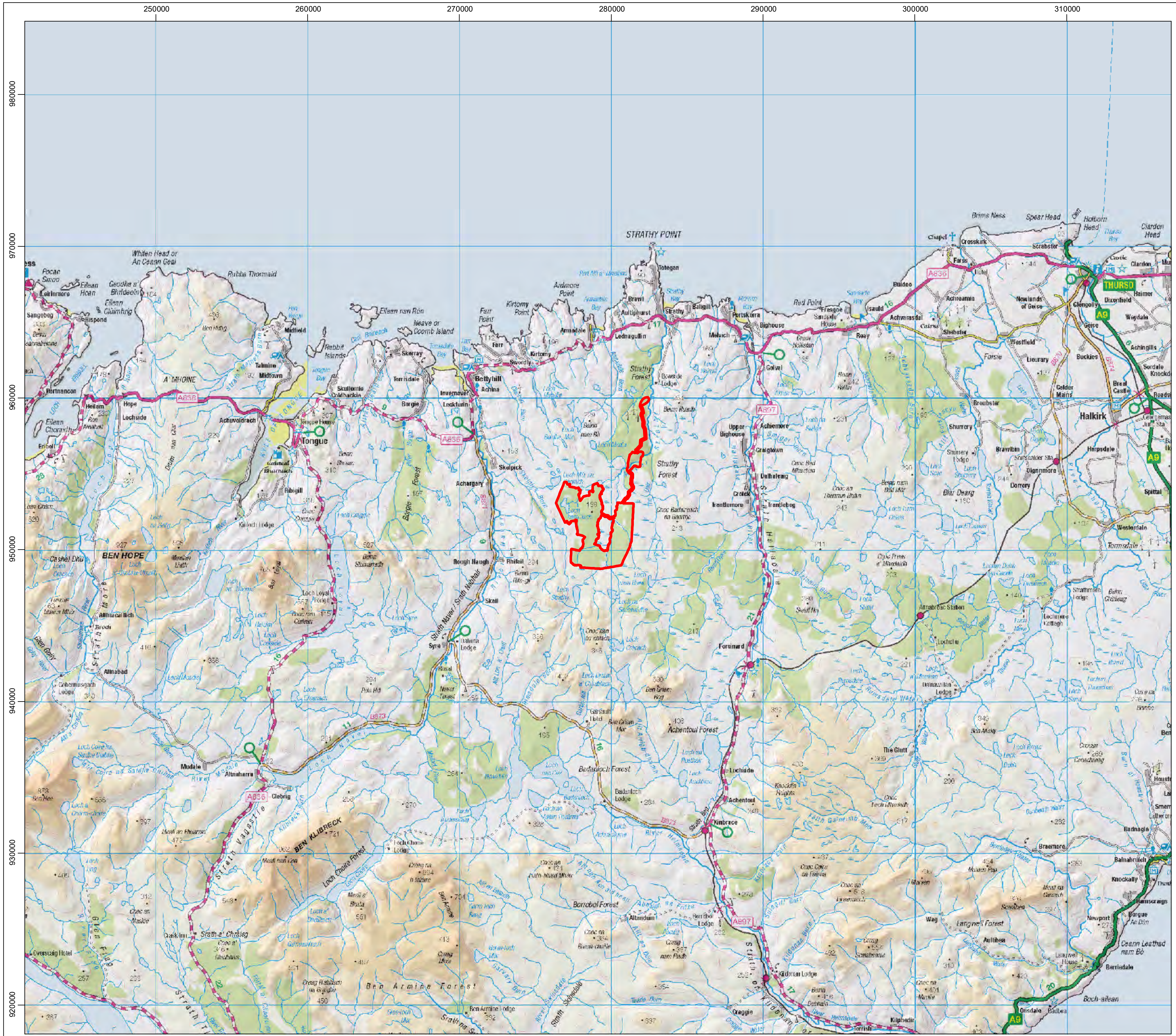
7.0 Conclusion

In summary, the borrow pits have been assessed as being capable of supplying all of the aggregate required for the Proposed Varied Development excluding the concrete for the turbine bases and a surface road dressing. The locations and methods of working would be managed to cause minimal impact to the ground conditions and water environment.

An approximate volume of excavated materials has been calculated for each of the proposed borrow pit locations, these volumes are based on initial calculations based on assumptions for the Proposed Varied Development layout and peat depth data averaged across discrete areas of the development. Such areas can still vary over a small scale and therefore local topographic changes in the bedrock profile may impact the total accuracy of the volume calculation. These initial calculations would be verified by detailed intrusive investigation at the proposed locations, post-consent. Calculations do not take into consideration the 'winning' of material along the route.

FIGURE 2.2.1

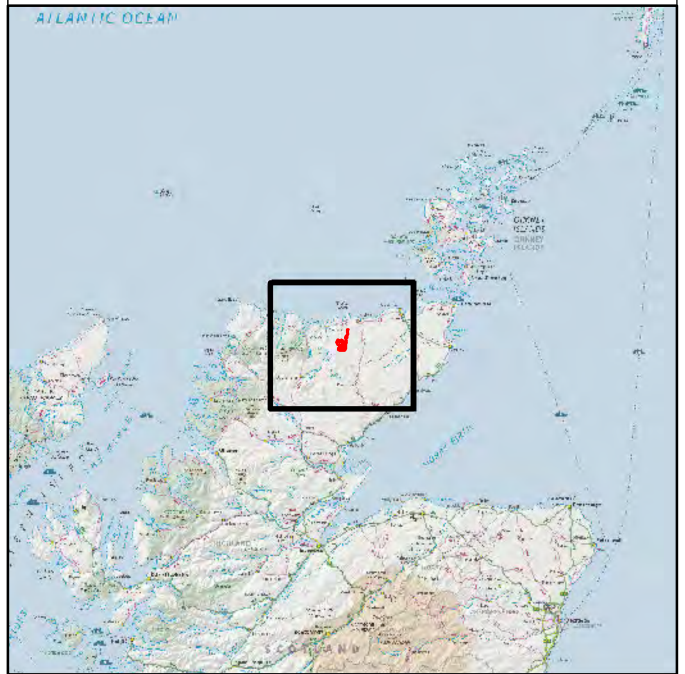
Site Location



File ref: P:\00660 - SSE\00070 Strathy South Wind Farm\Tech\GIS\Dwgs\Wking\2020 Design Freeze\Technical Appendix 2.2 Borrow Pit\428.00660.00070.19.10.7.01.0 Site Location.mxd

Legend

Site Boundary



0 5 10 km

N

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Project Name

STRATHY SOUTH

Drawing Title

SITE LOCATION

Rev	Date	Remarks	Drwn	Chkd
R0	14/02/2020	First issue	NG	DN

Drawing Number

FIGURE 2.2.1

Scale	Plot Size	Datum	Projection
1:250,000	A3	OSGB36	BNG

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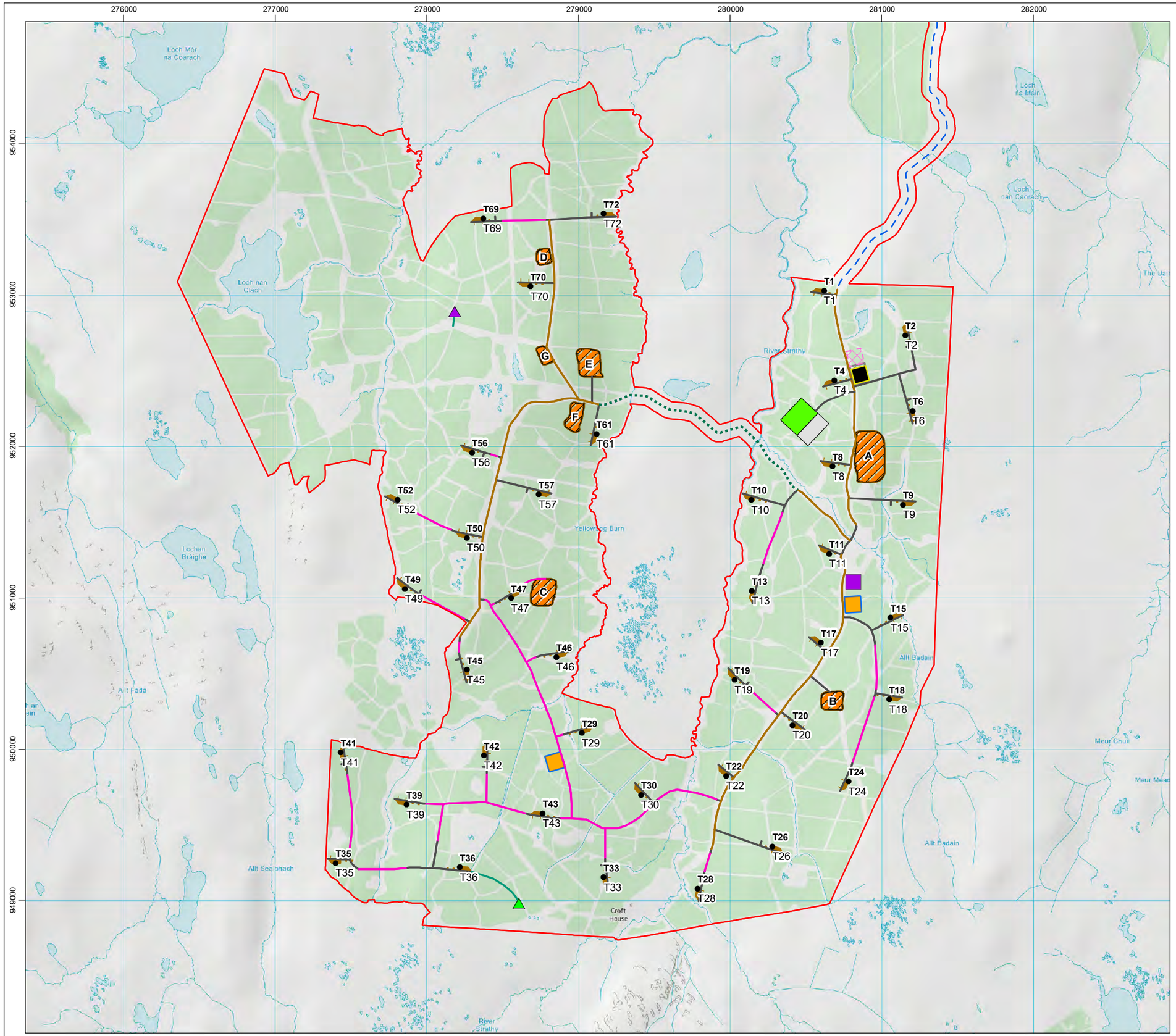
sse Renewables

FIGURE 2.2.2

Site Layout



Legend

- Site Boundary
- Turbines
- LiDAR A
- LiDAR B
- Common Access Route
- Existing Yellow Bog Track, Surfacing to be Upgraded and Minor Localised Widening
- LiDAR Track

Access Track

- Cut
- Floating
- Upgrade
- Borrow Pit
- Laydown Area
- Temporary Laydown Area
- Construction Compound
- Substation
- Batching Plant
- Hardstanding

0 0.5 1 km

N

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Project Name

STRATHY SOUTH

Drawing Title

SITE LAYOUT

Rev	Date	Remarks	Drwn	Chkd
R0	06/01/2020	First issue	NG	DN

Drawing Number

FIGURE 2.2.2

Scale	Plot Size	Datum	Projection
1:25,000	A3	OSGB36	BNG

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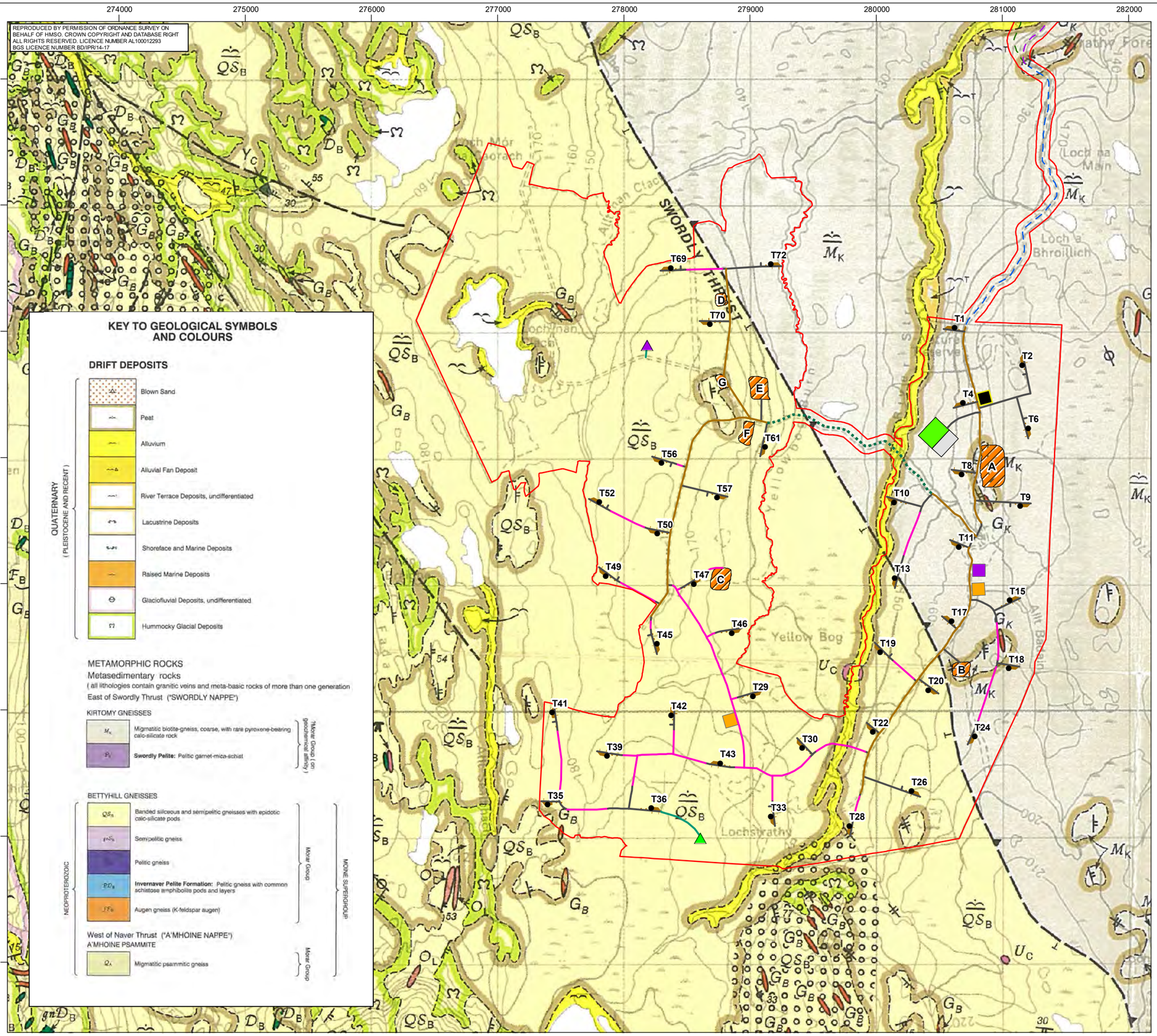
File ref: P:\00660 - SSE\00070 Strathy South Wind Farm\Tech\GIS\Dwgs\Wking\2020 Design Freeze\Technical Appendix 2.2 Borrow Pit\428.00660.00070.19.10.7.02.0 Site Layout.mxd

FIGURE 2.2.3

Superficial and Bedrock Geology



KEY TO GEOLOGICAL SYMBOLS AND COLOURS

DRIFT DEPOSITS

QUATERNARY (PLEISTOCENE AND RECENT)

- Blown Sand
- Peat
- Alluvium
- Alluvial Fan Deposit
- River Terrace Deposits, undifferentiated
- Lacustrine Deposits
- Shoreface and Marine Deposits
- Raised Marine Deposits
- Glaciofluvial Deposits, undifferentiated
- Hummocky Glacial Deposits

METAMORPHIC ROCKS

Metasedimentary rocks

(all lithologies contain granitic veins and meta-basic rocks of more than one generation

East of Swordly Thrust ("SWORDLY NAPPE")

KIRTOMY GNEISSES

- Migmatitic biotite-gneiss, coarse, with rare pyroxene-bearing calc-silicate rock
- **Swordly Pelite:** Pelitic garnet-mica-schist

"Morar Group (on geochemical affinity)

BETTYHILL GNEISSES

NEOPROTEROZOIC

- Banded siliceous and semipelitic gneisses with epidotic calc-silicate pods
- Semipelitic gneiss
- Pelitic gneiss
- **Invernaver Pelite Formation:** Pelitic gneiss with common schistose amphibolite pods and layers
- Augen gneiss (K-feldspar augen)

Morar Group

MOINE SUPERGROUP

West of Naver Thrust ("A'MHOINE NAPPE")

A'MHOINE PSAMMITE

- Migmatitic psammitic gneiss

Morar Group

Legend

- Site Boundary
- Turbines
- LiDAR A
- LiDAR B
- Preferred Access Route
- Alternative Access Route
- Common Access Route
- Existing Yellow Bog Track, Surfacing to be Upgraded and Minor Localised Widening
- LiDAR Track

Access Track

- Cut
- Floating
- Upgrade
- Borrow Pit
- Laydown Area
- Temporary Laydown Area
- Construction Compound
- Substation
- Batching Plant
- Hardstanding

0 0.5 1 km

N

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Project Name

STRATHY SOUTH

Drawing Title

SUPERFICIAL AND BEDROCK GEOLOGY

Rev	Date	Remarks	Drwn	Chkd
R0	14/02/2020	First issue	NG	DN

Drawing Number

FIGURE 2.2.3

Scale	Plot Size	Datum	Projection
1:30,000	A3	OSGB36	BNG

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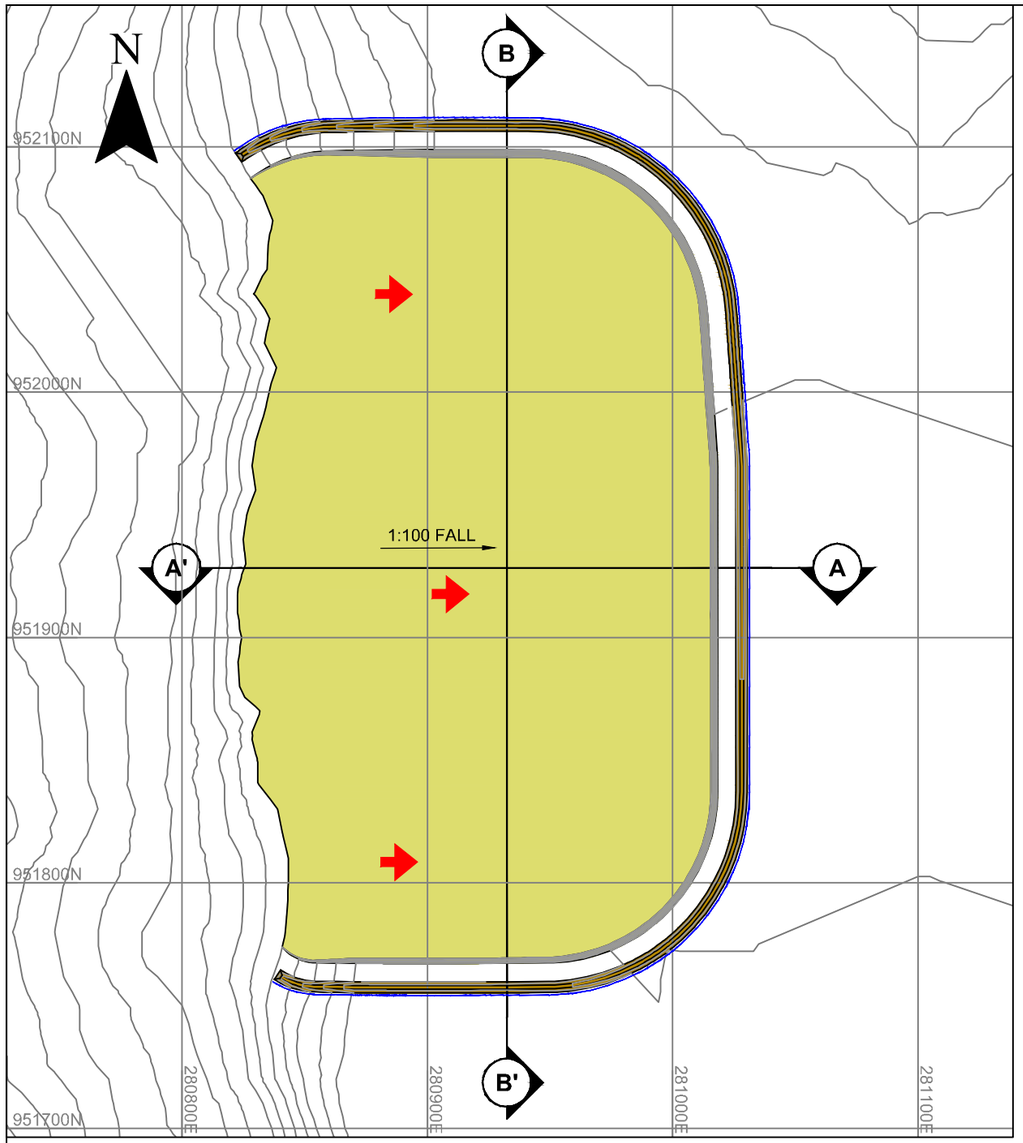
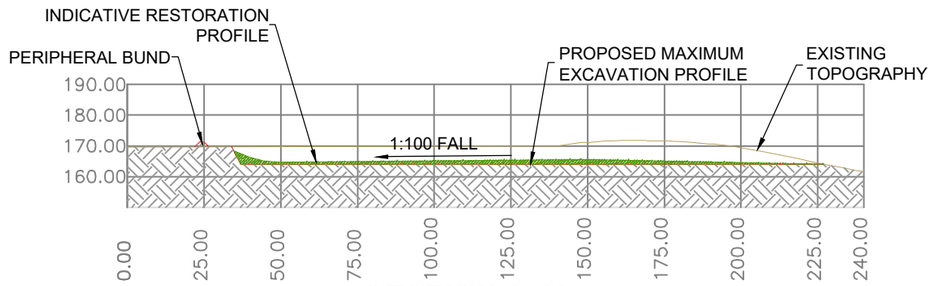
FIGURE 2.2.4

Borrow Pit Layout (a-g)

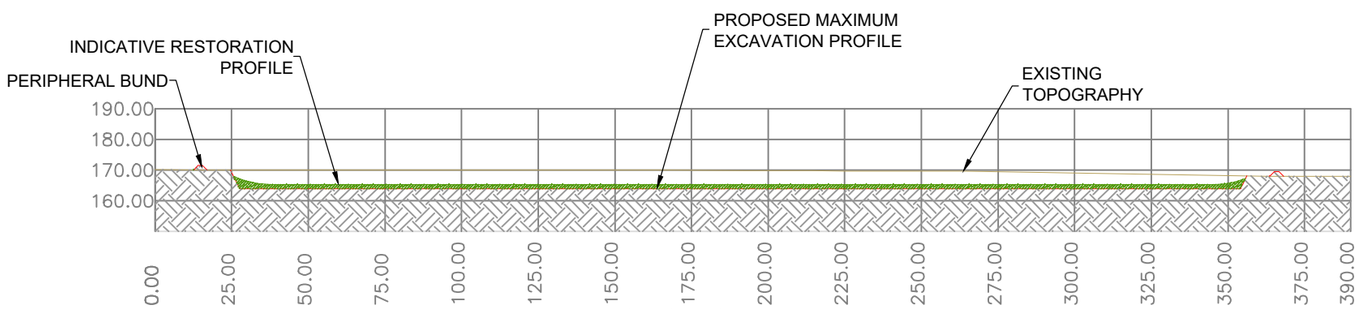


PLAN
SCALE 1:2500



SECTION A-A'
SCALE: 1:2000

TOTAL EXCAVATION VOLUME:	296,631m^3
OVERBURDEN VOLUME:	46,019m^3
NET STONE VOLUME:	250,612m^3
PERIPHERAL BUND FILL:	2,979m^3
NET STONE TONNAGE:	501,224T
EXCAVATION AREA:	58,999m^2
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 6.25m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E: 280932 N: 951928



SECTION B-B'
SCALE: 1:2000

0 20 40 60 80m 120 160 200
Metres 1:2000

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 0.78m IN THICKNESS COMPRISING PEATY SOIL AND PEAT.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT A DESIGN

FIG 2.2.4a

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4a.0.Borrow_Pit_A.dwg

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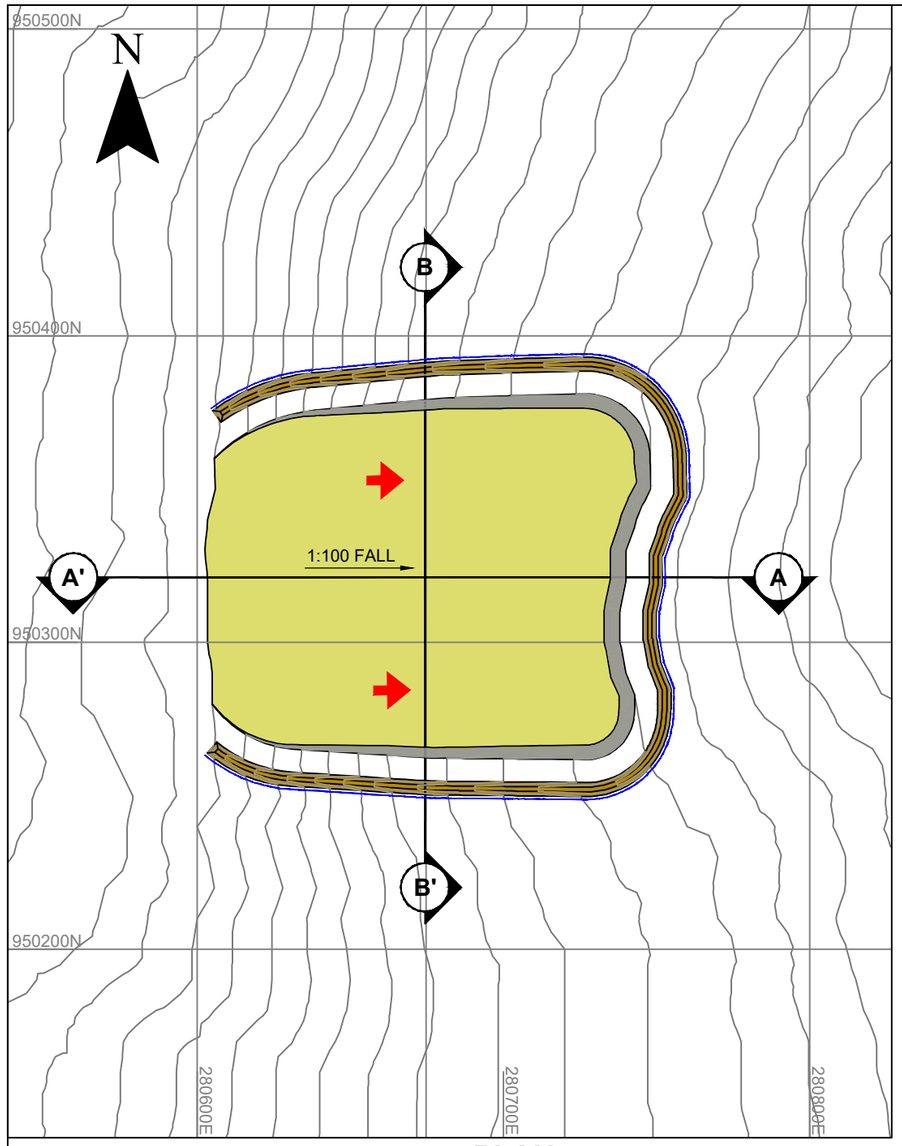
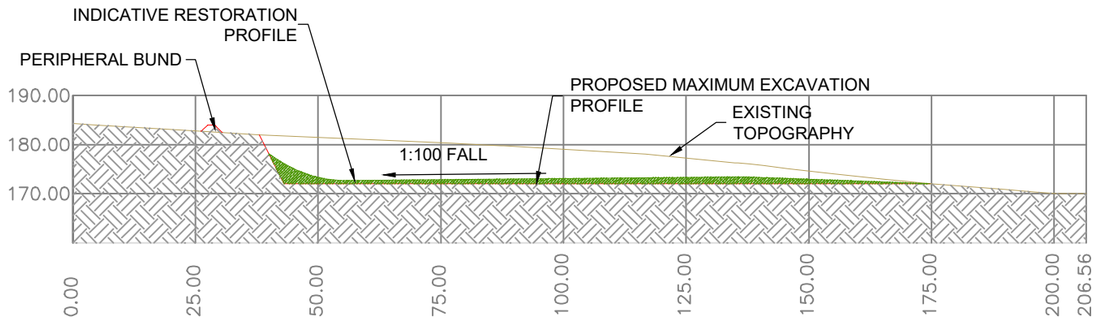
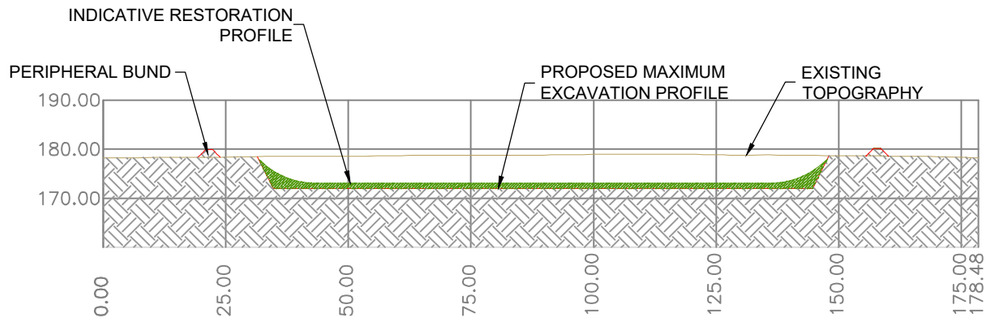


PLAN
SCALE 1:2000



SECTION A-A'
SCALE: 1:1250

TOTAL EXCAVATION VOLUME:	89,929m^3
OVERBURDEN VOLUME:	4,496m^3
NET STONE VOLUME:	85,433m^3
PERIPHERAL BUND FILL:	1,873m^3
NET STONE TONNAGE:	170,866T
EXCAVATION AREA:	15,505m^2
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 10m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E: 280675 N: 950321



SECTION B-B'
SCALE: 1:1250

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 0.29m IN THICKNESS COMPRISING PEATY SOIL AND PEAT.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT B DESIGN

FIG 2.2.4b

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4b.0.Borrow_Pit_B.dwg

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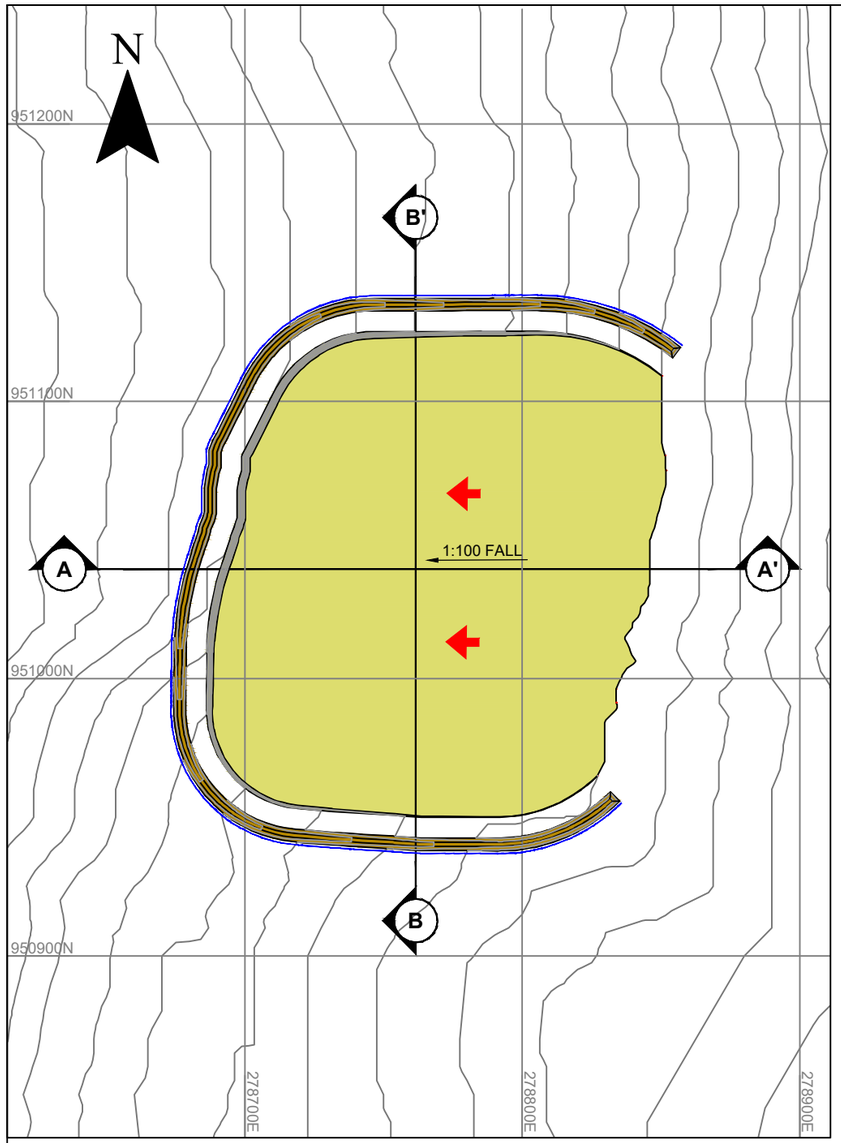
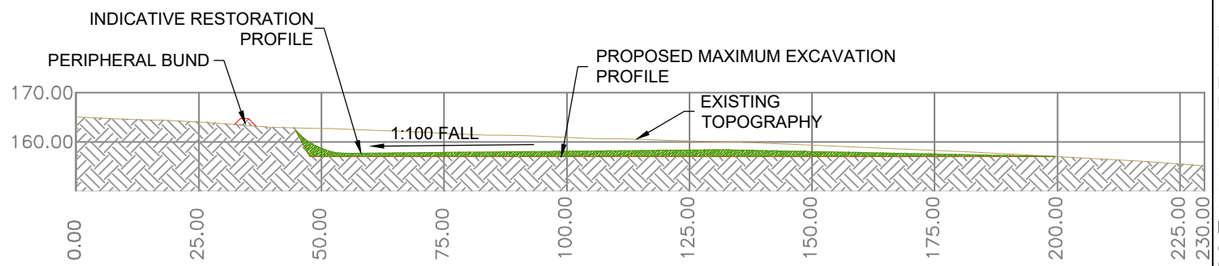
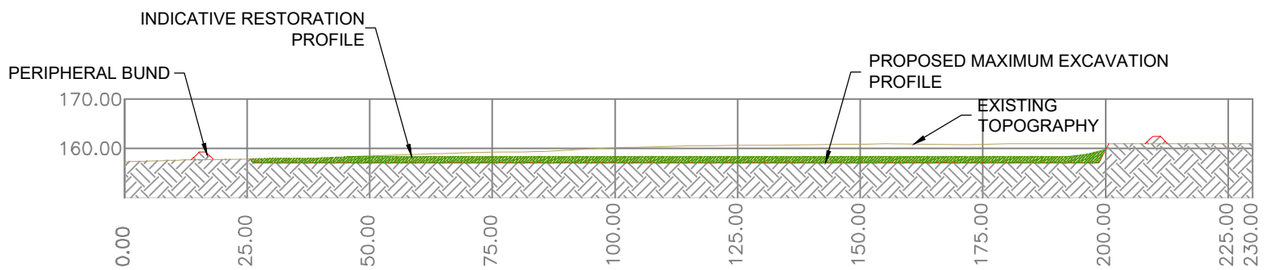


PLAN
SCALE 1:2000



SECTION A-A'
SCALE: 1:1250

TOTAL EXCAVATION VOLUME:	66,126m^3
OVERBURDEN VOLUME:	9,441m^3
NET STONE VOLUME:	56,685m^3
PERIPHERAL BUND FILL:	2,109m^3
NET STONE TONNAGE:	113,370T
EXCAVATION AREA:	24,846m^2
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 6m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E: 278762 N: 951039



SECTION B-B'
SCALE: 1:1250

0 20 40 60 80m 120 160 200

Metres 1:2000

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 0.38m IN THICKNESS COMPRISING PEATY SOIL AND PEAT.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT C DESIGN

FIG 2.2.4c

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4c.0.Borrow_Pit_C.dwg

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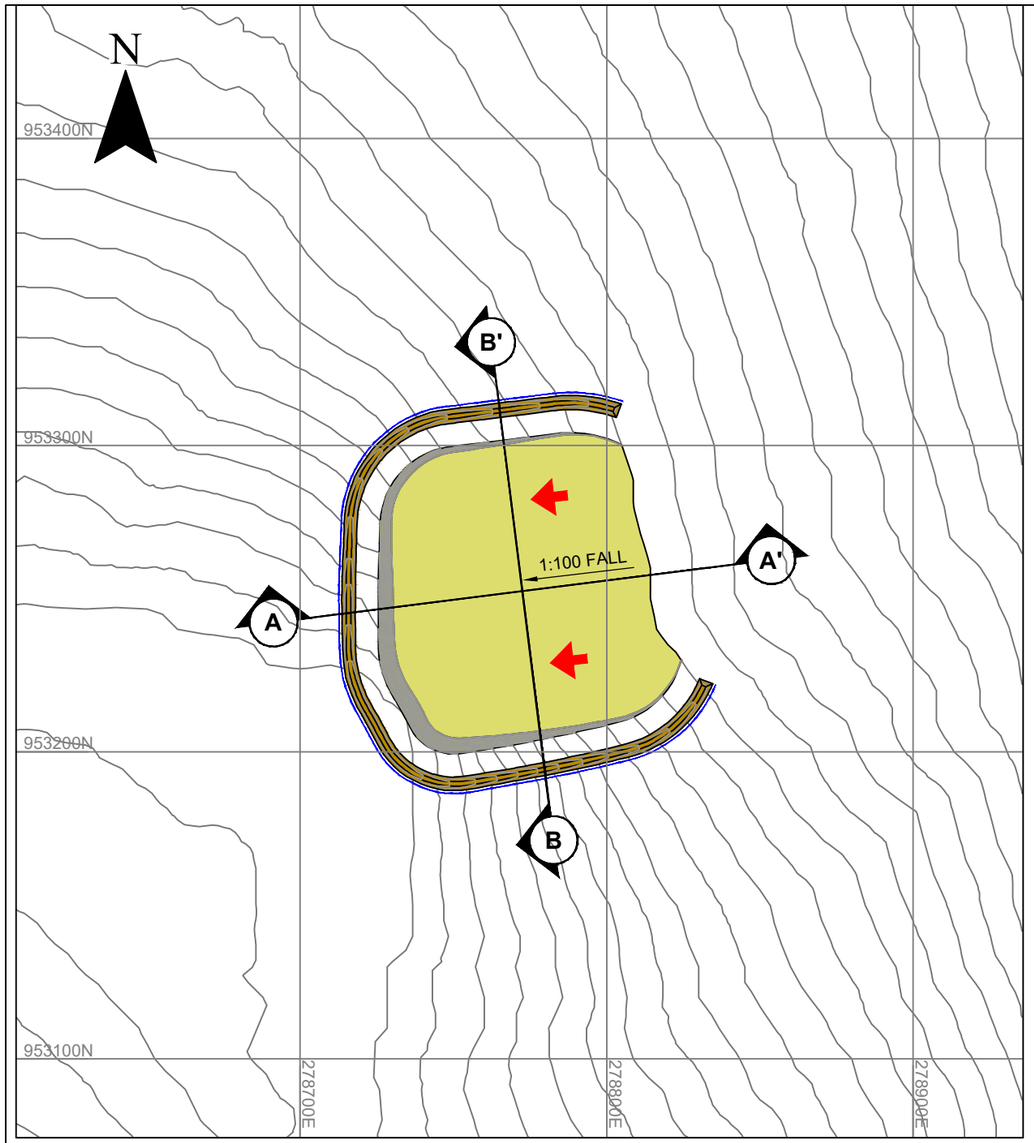
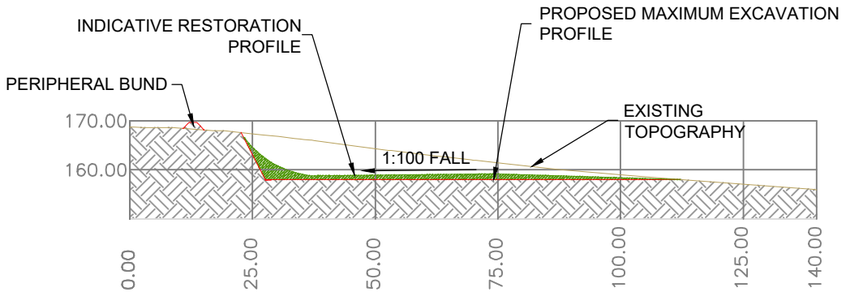
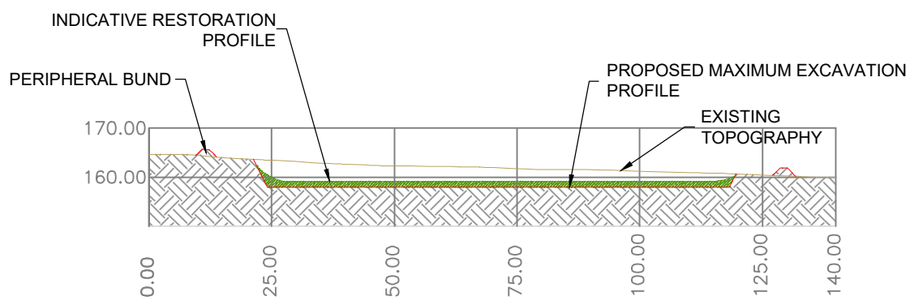


PLAN
SCALE 1:2000



SECTION A-A'
SCALE: 1:1250

TOTAL EXCAVATION VOLUME:	33,753m^3
OVERBURDEN VOLUME:	2,805m^3
NET STONE VOLUME:	30,948m^3
PERIPHERAL BUND FILL:	1,295m^3
NET STONE TONNAGE:	61,896T
EXCAVATION AREA:	8,249m^2
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 12m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E: 278772 N: 953252



SECTION B-B'
SCALE: 1:1250

0 20 40 60 80m 120 160 200
Metres 1:2000

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 0.34m IN THICKNESS COMPRISING PEATY SOIL AND PEAT.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT D DESIGN

FIG 2.2.4d

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4d.0.Borrow_Pit_D.dwg

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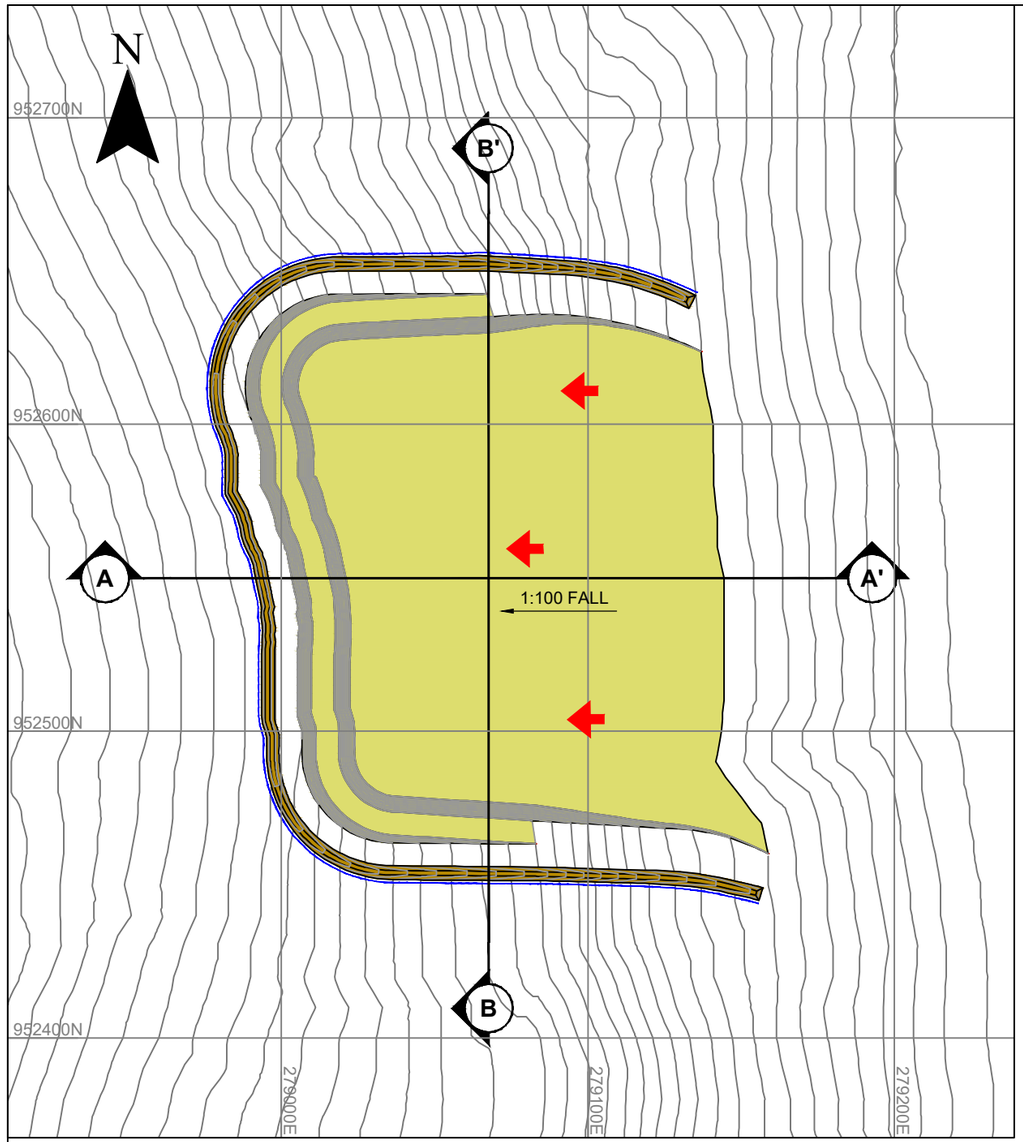
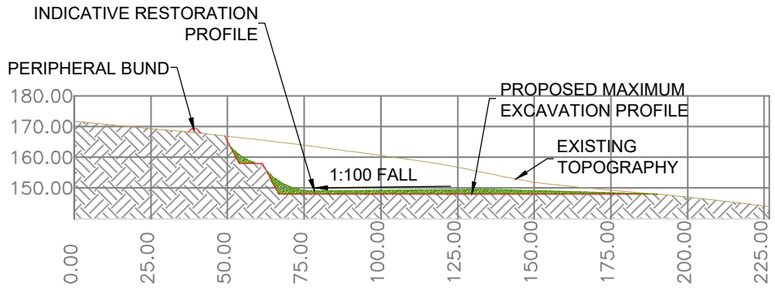
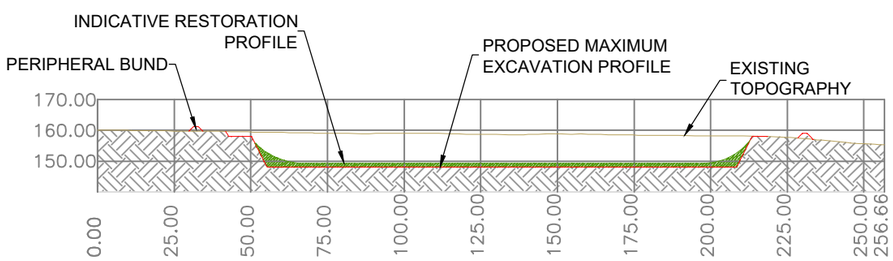


PLAN
SCALE 1:2000



SECTION A-A'
SCALE: 1:2000

TOTAL EXCAVATION VOLUME:	190,024m^3
OVERBURDEN VOLUME:	30,194m^3
NET STONE VOLUME:	159,830m^3
PERIPHERAL BUND FILL:	2,023m^3
NET STONE TONNAGE:	319,660T
EXCAVATION AREA:	24,350m^2
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 10m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E: 279068 N: 952550



SECTION B-B'
SCALE: 1:2000

0 20 40 60 80m 120 160 200
Metres 1:2000

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 1.24m IN THICKNESS COMPRISING PEATY SOIL AND PEAT.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT E DESIGN

FIG 2.2.4e

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4e.0.Borrow_Pit_E.dwg

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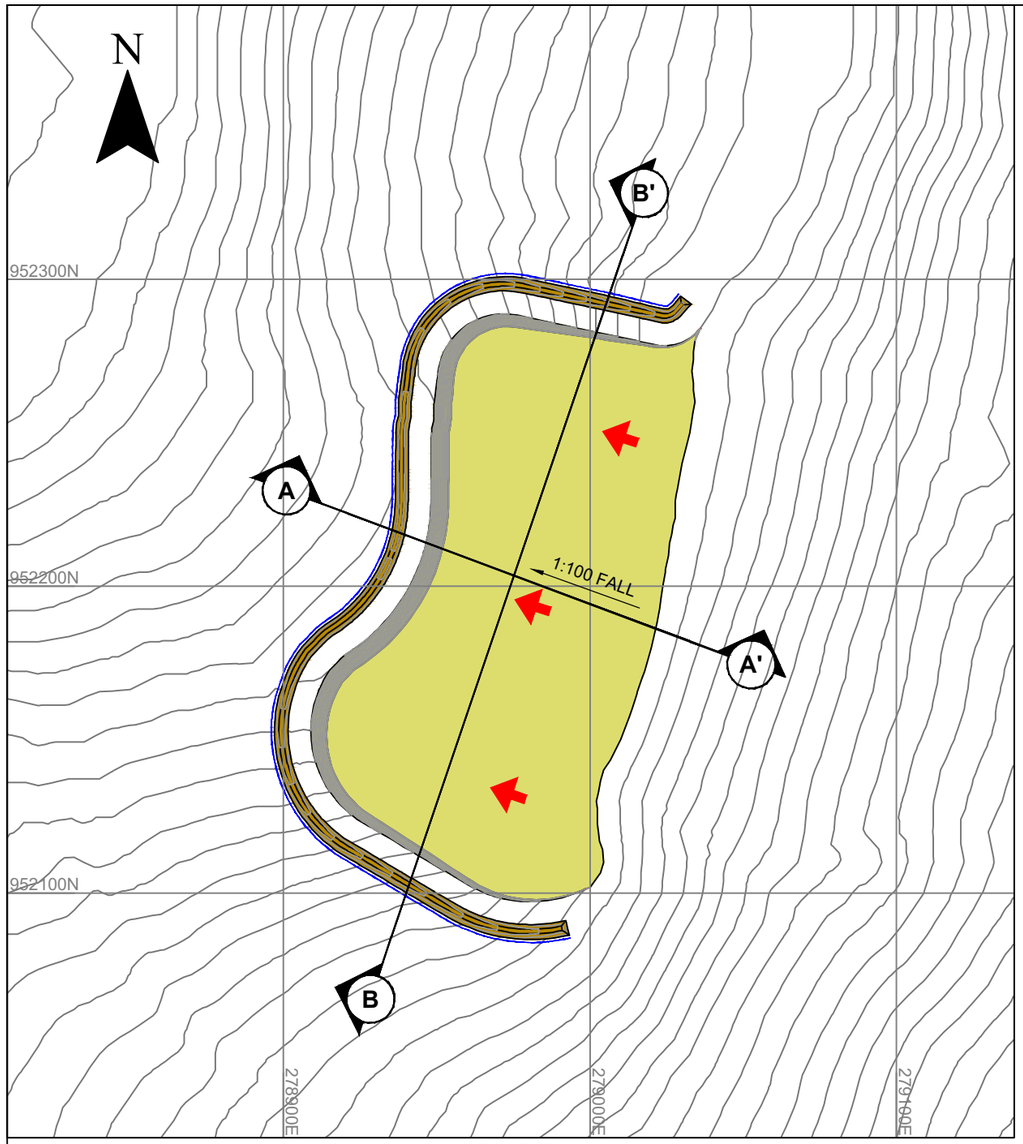
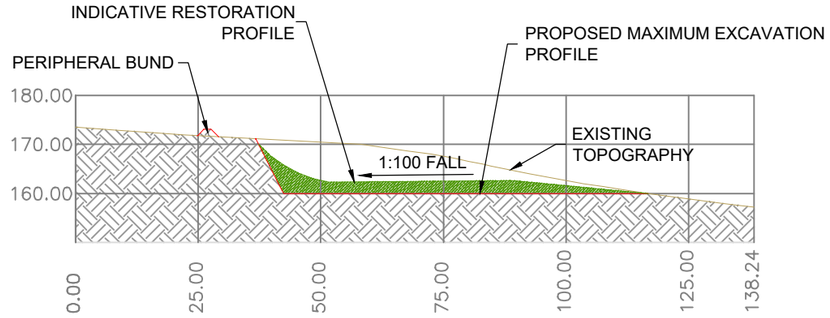
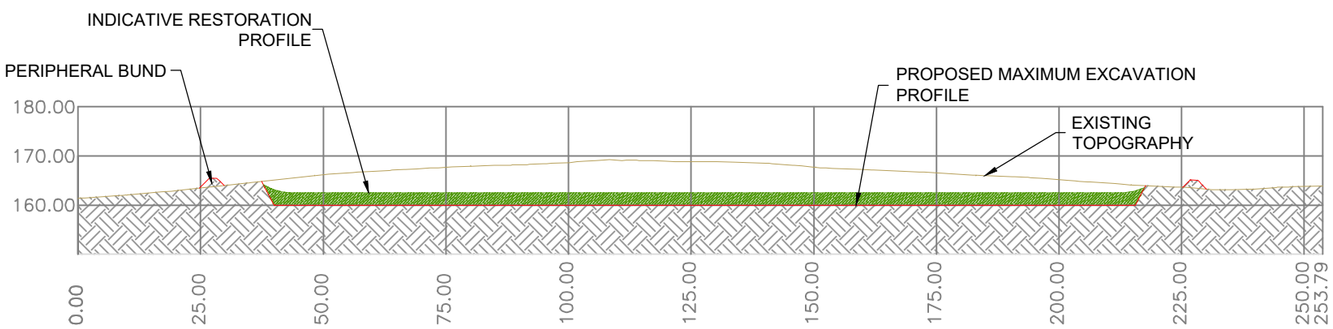


PLAN
SCALE 1:2000



SECTION A-A'
SCALE: 1:1250

TOTAL EXCAVATION VOLUME:	86,052m^3
OVERBURDEN VOLUME:	6,813m^3
NET STONE VOLUME:	79,239m^3
PERIPHERAL BUND FILL:	1,618m^3
NET STONE TONNAGE:	158,478T
EXCAVATION AREA:	15,484m^2
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 10.25m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E: 278971 N: 952196



SECTION B-B'
SCALE: 1:1250

0 20 40 60 80m 120 160 200

Metres 1:2000

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 0.44m IN THICKNESS COMPRISING PEATY SOIL AND PEAT.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT F DESIGN

FIG 2.2.4f

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4f.0.Borrow_Pit_F.dwg

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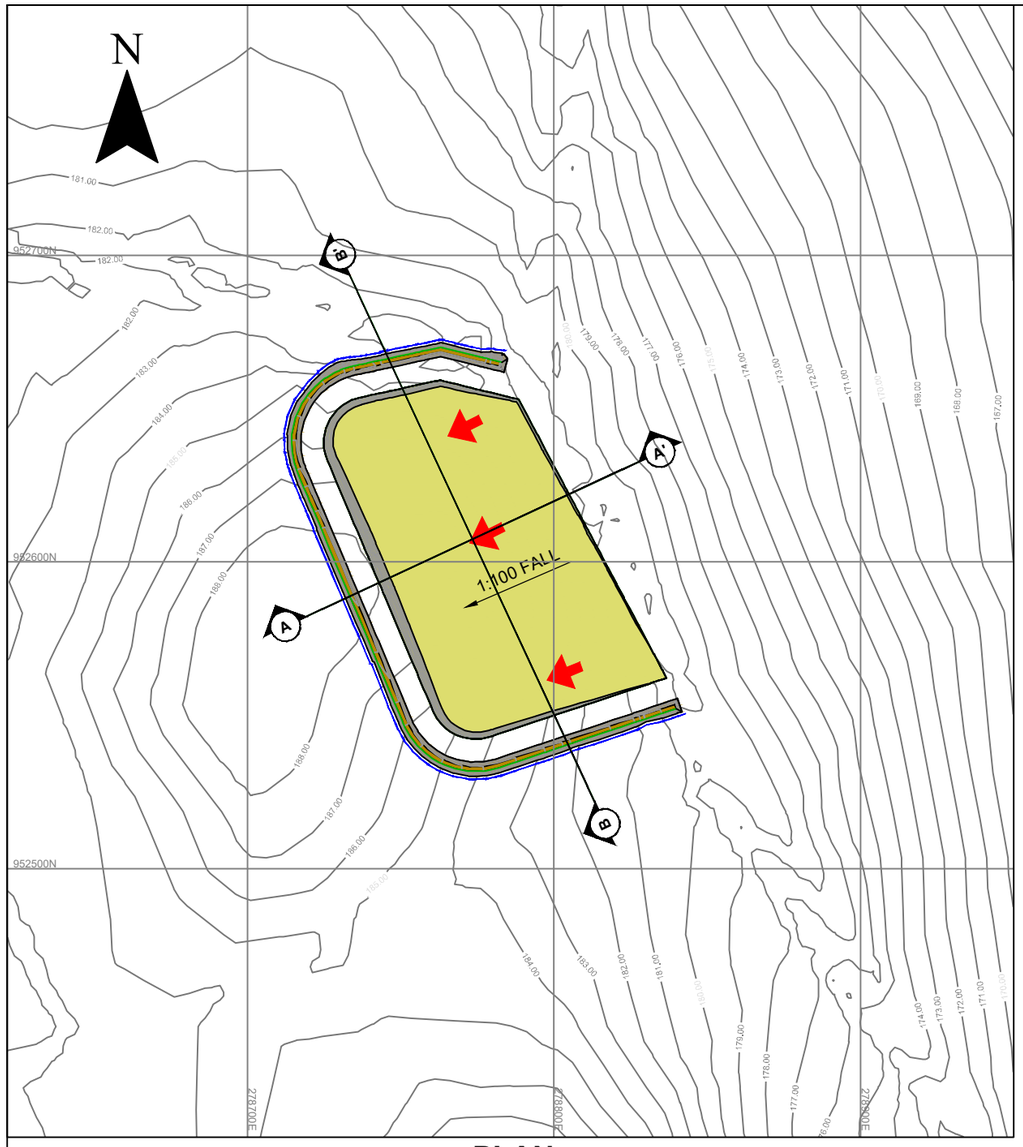
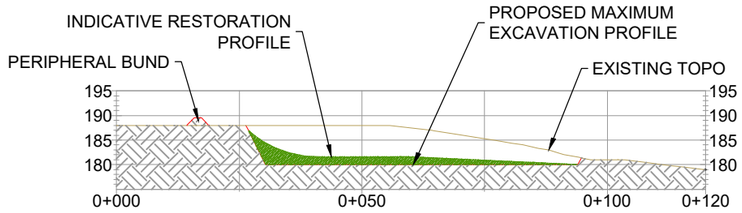
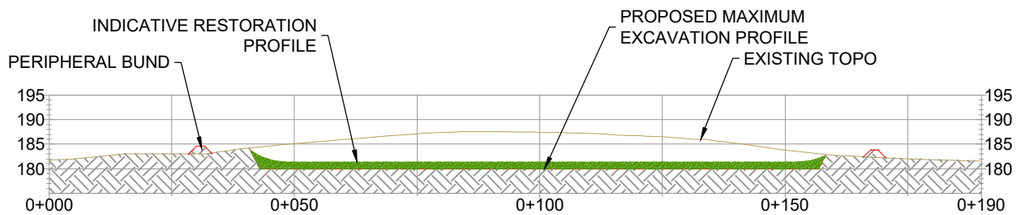


PLAN
SCALE 1:1250



SECTION A-A'
SCALE: 1:1250

TOTAL EXCAVATION VOLUME:	39,075m^3
OVERBURDEN VOLUME:	3,930m^3
NET STONE VOLUME:	35,145m^3
PERIPHERAL BUND FILL:	1,287m^3
NET STONE TONNAGE:	70,290T
EXCAVATION AREA:	7,860m²
EXCAVATION METHOD REQUIRED:	DRILLING AND BLASTING
INFERRED DESIGN PARAMETERS:	63 DEGREE FACES THROUGH COMPETENT ROCK MAXIMUM FACE HEIGHT OF 8.5m FINAL BENCH WIDTH OF 7.5m 1.5m HIGH PERIPHERAL BUND
COORDINATES FOR CENTRE OF BORROW PIT:	E:278774 N 952611



SECTION B-B'
SCALE: 1:1250

0 20 40 60 80m 120 160 200

Metres 1:2000

NOTES

1. OVERBURDEN ASSUMED TO BE CIRCA 0.5m IN THICKNESS COMPRISING PEATY SOIL.

2. INITIAL STRIPPED OVERBURDEN TO BE PLACED IN PERIPHERAL BUND, WITH SUBSEQUENT OVERBURDEN AND WASTE MATERIALS TO BE STOCKPILED WITHIN FLAT BASAL AREA OF BORROW PIT PRIOR TO BEING USED IN RESTORATION.

3. DESIGN PARAMETERS ARE INDICATIVE AND SHOULD BE REFINED BASED UPON FINDINGS OF GROUND INVESTIGATIONS AND OR INITIAL EXCAVATIONS, TAKING INTO ACCOUNT GROUND CONDITIONS AND HYDROLOGICAL ISSUES.

4. ASSUMES INSITU CONVERSION FACTOR OF 2 TONNES PER m³.

LEGEND

- BENCH/BASE OF EXCAVATION
- EXCAVATION BATTER
- PERIPHERAL BUND
- GENERAL WORKING DIRECTION
- INDICATIVE SURFACE WATER DRAIN (DIVERTING SURFACE WATER TO PREVENT INGRESS INTO BORROW PIT)
- CONTOURS

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STRATHY SOUTH WIND FARM

BORROW PIT APPRAISAL

BORROW PIT G DESIGN

FIG 2.2.4g

Scale: AS SHOWN @ A3

Date: FEBRUARY 2020

Apr2020__00660.00070.19.Fig 2.2.4g.0 Borrow_Pit_G.dwg

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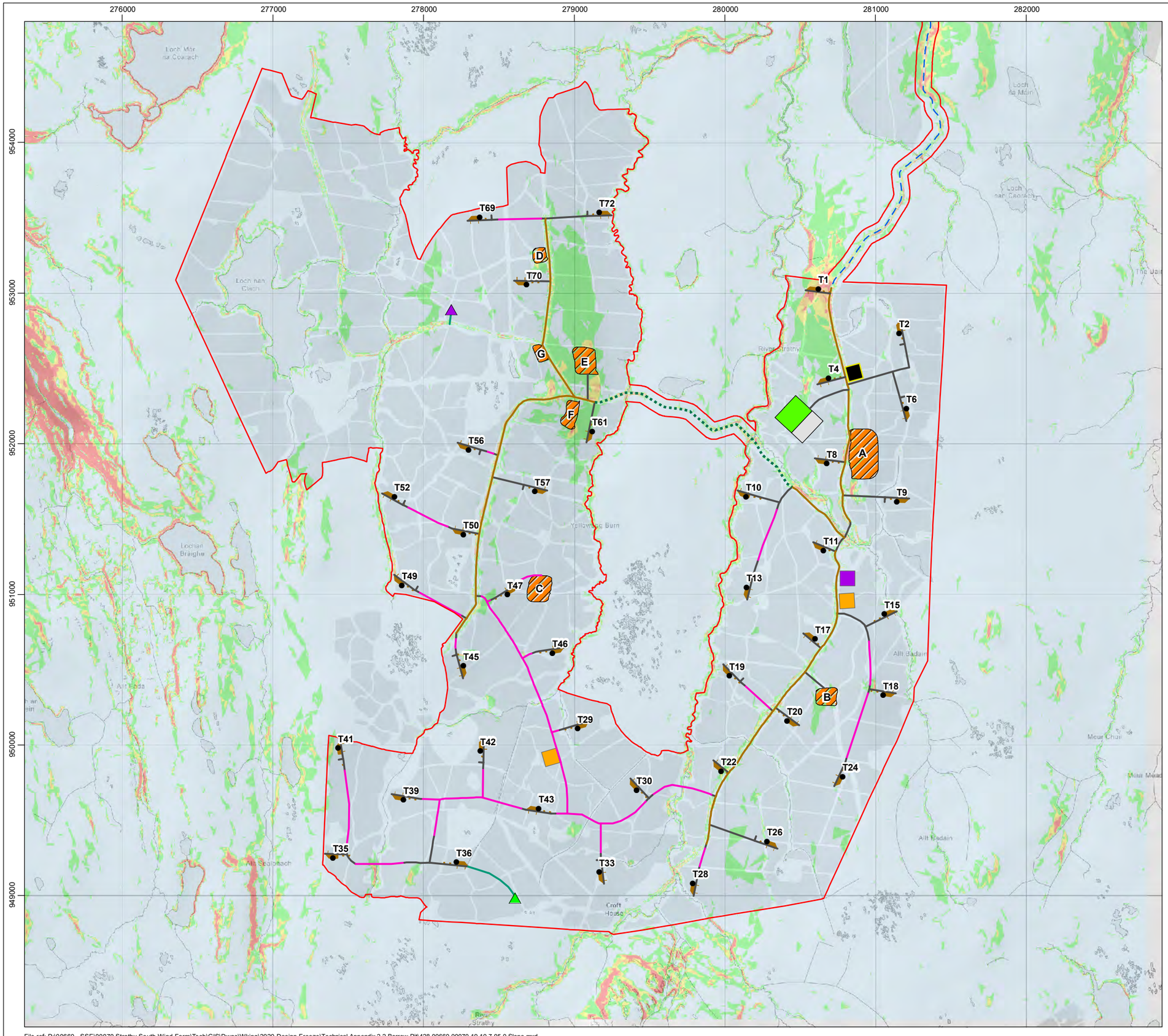
FIGURE 2.2.5

Slope



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Legend

- Site Boundary
- Turbines
- LiDAR A
- LiDAR B
- Common Access Route
- Existing Yellow Bog Track, Surfacing to be Upgraded and Minor Localised Widening
- LiDAR Track

Access Track

- Cut
- Floating
- Upgrade
- Borrow Pit
- Laydown Area
- Temporary Laydown Area
- Construction Compound
- Substation
- Batching Plant
- Hardstanding

Slope (Degrees)

- 0 - 5
- 5 - 8
- 8 - 10
- 10 - 12
- >12

0 0.5 1 km

N

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Project Name

STRATHY SOUTH

Drawing Title

SLOPE

Rev	Date	Remarks	Drwn	Chkd
R0	12/12/2019	First issue	NG	DN

Drawing Number

FIGURE 2.2.5

Scale	Plot Size	Datum	Projection
1:25,000	A3	OSGB36	BNG

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FIGURE 2.2.6

Peat Depth

Legend

- Site Boundary
- Turbines
- LiDAR A
- LiDAR B
- Common Access Route
- Existing Yellow Bog Track, Surfacing to be Upgraded and Minor Localised Widening
- LiDAR Track
- Peat Probe

Access Track

- Cut
- Floating
- Upgrade
- Borrow Pit
- Laydown Area
- Temporary Laydown Area
- Construction Compound
- Substation
- Batching Plant
- Hardstanding

Peat Depths (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- > 3

0 0.5 1 km

N

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Project Name

STRATHY SOUTH

Drawing Title

PEAT DEPTHS

Rev	Date	Remarks	Drwn	Chkd
R0	14/02/2020	First issue	NG	DN

Drawing Number

FIGURE 2.2.6

Scale	Plot Size	Datum	Projection
1:25,000	A3	OSGB36	BNG

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APPENDICES

APPENDIX A

Materials Calculator

Infrastructure	Length m	As built surface width m	Construction width m	As built area m2	Depth m	Number	Volume m3	Final Volume m3	Notes:
Site Track (Cut)	12290	7	8	98320	0.6	1	58992	58992	Assumes 8m width
Site Track (Existing/Upgrade)	7670	2	3	23010	0.3	1	4602	4602	Assumes 3m width
Site Track (Floated)	7650	7	8	61200	0.8	1	48960	48960	Assumes 8m width
Access Track (including alternative bridge crossing of River Strathy) (Existing/Upgrade)	3168	2	3	6336	0.3	1	2851.2	2851.2	Assumes 3m width
Access Track (including alternative bridge crossing of River Strathy) (Floated)	1886	7	8	13202	0.8	1	12070.4	12070.4	Assumes worst case scenario for aggregate requirements (floated)
Access Track to LiDAR (Cut)	240	4	4	960	0.6	1	576	576	Assumes 4m width
Access Track to LiDAR (Floated)	250	5	6	1500	0.6	1	900	900	Assumes 5m width on surface with 6m average at base
Passing Places	20	3	3	60	0.6	32	1152	1152	
Turbine Bases - formation only	30	30	-	900	0.3	39	10530	10530	Assume all concrete imported
Fill above Turbine Bases	32	32	-	1024	3	39	119808	86268	Less volume of bases 39*860m3 =33,540m3
Crane Pads	90	30	-	2700	1	39	105300	105300	Volumes supplied by SSE
Blade laydown and ancillaries	20	4	-	655	0.5	39	1560	1560	Volumes supplied by SSE
Substation	200	150	-	30000	1	1	30000	30000	
Substation Temporary Laydown	200	100		20000	1	1	20000	20000	
Concrete Batching Plant	100	100	-	10000	0.5	1	5000	5000	
Laydown Area	100	100	-	10000	0.5	2	10000	10000	
Construction Compound	150	50	-	7500	0.5	1	3750	3750	
TOTAL REQUIREMENT							436052	402512	All volumes measurements in m3, based on turbine requirements provided by SSE

Potential Volume of Rock to be sourced on site		
BP A	250,612	
BP B	85,433	
BP C	56,685	
BP D	30,948	
BP E	159,830	
BP F	79,239	
BP G	35,145	
Total Volume from Site	697,892	
Import requirements (shortfall)	-295380	No import requirements (excluding concrete for turbine base and surface road dressing)
plus 10% contingency	-324918	

APPENDIX B

Borrow Pit Photographs

Photograph 1: Borrow Pit A

Photograph 2: Borrow Pit A

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TA 2.2: Appendix B

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Project No. : 428.00660.00070

Date: April 2020

Photograph 3: Borrow Pit A

Photograph 4: Borrow Pit A

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Photograph 5: Borrow Pit B

Photograph 6: Borrow Pit B

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Photograph 7: Borrow Pit B

Photograph 8: Borrow Pit B

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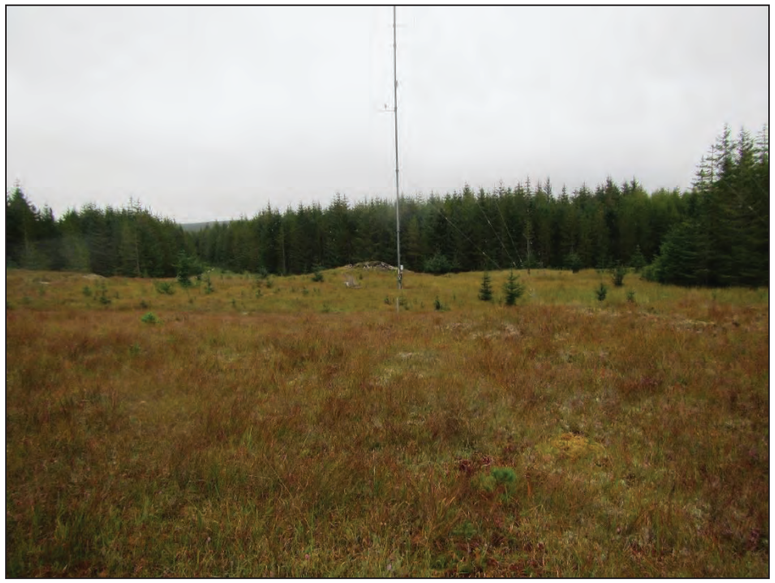

Photograph 9: Borrow Pit C

Photograph 10: Borrow Pit C

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Photograph 11: Borrow Pit C

Photograph 12: Borrow Pit C

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Photograph 13: Borrow Pit D

Photograph 14: Borrow Pit D

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Photograph 15: Borrow Pit E

Photograph 16: Borrow Pit E

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Photograph 17: Borrow Pit F

Photograph 18: Borrow Pit G

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Photograph 19: Borrow Pit G

Photograph 20 : Borrow Pit G

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Photograph 21: Borrow Pit G

END OF PHOTOGRAPHS

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