Technical Appendix 3.2: Borrow Pit Assessment

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1.0 Introduction

1.1 Introduction

This Borrow Pit Assessment contains an initial review of the site to identify possible locations for the temporary extraction of rock to supply the Proposed Development with crushed rock for use in construction. It is anticipated that most of the extracted rock would be utilised for construction of access roads, crane hardstandings and compounds.

An outline design has been completed for the Proposed Development's infrastructure. This design estimates that the Proposed Development would require approximately 54,152 m³ of crushed rock for the construction of access roads, crane hardstandings, temporary construction compounds, substation compounds and structural rock for turbine foundations. Three borrow pit areas have been identified which are estimated to yield approximately 61,200 m³ of rock for use in construction.

The geology of the site in general was assessed from site surveys and desktop studies. No intrusive geotechnical investigations have been undertaken to assess geology at the locations of the proposed extraction areas.

1.2 Relevant Legislation

National Planning Framework 4 (NPF4) is the national spatial strategy for Scotland and sets out national planning policy. Policy 33 covers mineral extraction and borrow pits and outlines a range of criteria which must be met for borrow pits to be supported. The policy criteria are addressed in Table 1.

Policy Section	Criteria	Response
d)	Development proposals for the sustainable extraction of minerals will only be supported where they:	
d) i.	will not result in significant adverse impacts on biodiversity, geodiversity and the natural environment, sensitive habitats and the historic environment, as well as landscape and visual impacts;	 As detailled in this assessment, ecological, cultural heritage, habitats, peat and visual impact were all considered in the borrow pit selection process.
d) ii.	 provide an adequate buffer zone between sites and settlements taking account of the specific circumstances of individual proposals, including size, duration, location, method of working, topography, and the characteristics of the various environmental effects likely to arise; 	
d) iii.	can demonstrate that there are no significant adverse impacts (including cumulative impact) on any nearby homes, local communities and known sensitive receptors and designations;	 The closest residence to the Proposed Development, is approximately 1 km away from the nearest borrow pit. This is considered a suitable buffer distance to mitigate any environmental impacts.
d) iv.	demonstrate acceptable levels (including cumulative impact) of noise, dust, vibration and potential pollution of land, air and water;	 Construction noise impact is assessed within Chapter 13 of the EIA Report. As demonstrated in this assessment, there would be appropriate mitigation in place to mange dust, vibration and pollution.
d) v.	minimise transport impacts through the number and length of lorry trips and by using rail or water transport wherever practical;	 Winning rock on-site results in a significant reduction in off-site lorry movements, as material does not need to be imported from local quarries.
d) vi.	have appropriate mitigation plans in place for any adverse impacts;	 Outline mitigation measures are described in this assessment and outlined in the outline CEMP, Technical Appendix 3.1. Measures will be further developed in the detailled CEMP.
d) vii.	include schemes for a high standard of restoration and aftercare and commitment that such work is undertaken at the earliest opportunity	 Following an intrusive site investigation, detailled borrow pit working plans and restoration plans will be developed. Following completion of rock

Table 1 – NPF4 Policy 33 Criteria



Policy Section	Criteria	Response
		extraction, the borrow pits will be restored in a timely manner.
e)	Development proposals for borrow pits will only be supported where:	
e) i.	the proposal is tied to a specific project and is time-limited;	 Borrow pits would only be used to extract materials required for the construction of the Proposed Development. This is time-limited to the construction phase of the Proposed Development.
e) ii.	the proposal complies with the above mineral extraction criteria taking into account the temporary nature of the development; and	 See part d) responses above
e) iii.	appropriate restoration proposals are enforceable.	 It is expected that a planning conditon would be in place which commits the Applicant to restore the borrow pits within a certain timeframe.

2.0 Scope

2.1 Aims of Assessment

This Borrow Pit Assessment has been prepared to identify potential sources of rock within the site required for the construction of the Proposed Development.

The purpose of the assessment is to:

- assess potential areas for the extraction of rock;
- provide an estimate of the available aggregate from the source location;
- identify overlying superficial soils;
- identify underlying rock types; and
- detail management techniques for the extraction of rock and associated measures to protect the local environment and comply with relevent planning policy.

The criteria used to identify locations for borrow pits took into consideration topography, anticipated rock quality, environmental and physical constraints and proximity to construction areas. The criteria adopted is discussed in more detail later in this assessment.

At this stage, the final quantities required to construct the Proposed Development remain approximated. The final extent and estimate of material to be won at the borrow pit search areas would be confirmed following completion of an intrusive ground investigation exercise which would be undertaken if consent is granted for the Proposed Development.

2.2 Information Sources

The quality of rock anticipated at the locations proposed for the borrow pits discussed in this Technical Appendix have been assessed using the following information sources.

- British Geological Survey (BGS) Bedrock Geology Map 1:50,000.
- British Geological Survey (BGS) Superficial Deposits Map 1:50,000.
- British Geological Survey (BGS) Linear Features Map 1:50,000.
- Site walkover in November 2023.

3.0 Site Description

3.1 Geography, Topography and Land Use

The Proposed Development is located within a site area of approximately 350 ha. The hilly ground comprises smooth rounded hills and an undulating landform with some sharp incisions from



watercourses. The Proposed Development infrastructure would be located between 270 m and 455 m Above Ordnance Datum (AOD).

The site is rural in setting and predominantly contains commercial forestry of varying age and felling status. A network of existing forestry tracks is present on site. There are various minor watercourses on site including Glenmuck Burn, Hallow Burn and Gala Burn. A small un-named waterbody is present between Weird Law and Glenmuck Height and there is also a small waterbody on the floor of the Tweed Valley.

3.2 Geology

Superficial Geology

The British Geological Survey (BGS) superficial geology map has limited superficial geology data for the area. The area around proposed Turbine 3 is noted to contain sedimentary deposits comprising coarse to fine grained materials, weathered to form layers of accumulated material. The watercourses are noted to contain glacial sedimentary deposits.

A comprehensive program of peat depth probing has been completed and has included a Phase I and Phase II peat survey, details of which are incorporated within Technical Appendix 10.1. The peat survey confirmed that most of the Proposed Development's infrastructure is located on peat less than 0.5 m in depth. A localised pocket of deeper peat was recorded, associated with the Glenmuck Bog, with depths of up to 7 m recorded. This area was avoided in the design of the Proposed Development.

Bedrock Geology

The BGS bedrock geology map indicates that the site is underlain by metamorphic bedrock (metasandstone and metamudstone), from the Shinnel formation in the northern portion of the site and Mindork formation in the south. The two formations are separated by a thrust fault.

4.0 Criteria for Borrow Pit Selection

The following section discusses the criteria used to select the site's borrow pit search areas.

Avoiding Areas of Peat

Good practice advises that infrastructure should avoid areas of peat. As detailed above, peat deposits across the site are generally less than 0.5 m. Peat depths greater than 1 m in depth were avoided during the borrow pit search areas selection process where possible.

Habitat

The presence of sensitive habitats was taken into consideration during the selection of borrow pit search areas. Results from a national vegetation classification (NVC) survey and other ecological and ornithological surveys were reviewed prior to selecting the borrow pit search areas.

Cultural Heritage

Cultural heritage features identified as part of the EIA have been mapped with appropriate buffers applied. These areas have been avoided during the borrow pit search area selection process.

Watercourses

The risks associated with polluting adjacent watercourses from both silt run-off and fuel and hydraulic oils was taken into consideration during the selection of borrow pits. Watercourse buffers of 50 m were maintained for the selection of borrow pits.

The watercourses on-site all run to the River Tweed, which is a Special Area of Conservation (SAC) and Site of Scientific Interest (SSSI). This gives an enhanced focus on site selection to minimise the potential for run-off pollution.

Topography

To minimise the footprint of the excavation for borrow pits, steeply sloping ground is preferred. This reduces the likely extent of overburden required to be excavated to access the bedrock beneath. Therefore, there is reduced susceptibility of the open excavation to surface water run-off.

Quality of Rock

Visual inspection of exposed rock on-site were undertaken as these can give an indication that it is of good quality for construction. For example, should the rock be observed as having little evidence of weathering and the rock is generally blocky and seen to be outcropping close to the surface, these would



all be good indications of borrow pit suitability. Testing will be undertaken as part of the intrusive site investigation works to determine the mechanical properties of the rock.

Haul Distances

Anticipated haul distances were taken into consideration during the selection process for borrow pits. Reducing haul distances between borrow pits and final placement has the following benefits:

- reduces volume of site traffic/number of haul vehicles and hence air pollution;
- reduces H&S risk; and
- reduces tracking of vehicles in periods of wet weather when plant movements should be kept to a minimum.

5.0 Borrow Pits Selected

The selection criteria summarised above was used in conjunction with a site visit to undertake visual inspections. This resulted in the identification of three borrow pit search areas as shown on Figure 3.2. The data sheet for each borrow pit search area is shown on Figures 3.2.1 to 3.2.3.

The selected locations are summarised as follows.

5.1 Borrow Pit Search Area A (BP-A)

BP-A is in the southern part of the of the site approximately 350 m from the site entrance. The topography is steeply sloping and considered suitable for a borrow pit. The site walkover identified weathered rock exposed, which indicates reasonable quality rock should be available. The location of this borrow pit search area is conveniently adjacent to the existing track and has been selected to provide a source of stone for access track upgrades and the construction of the compounds and substation areas close to the site entrance. Peat probing indicated a maximum peat depth of 0.2 m, the nearest waterbody is over 100 m away and cultural heritage assets are also over 100 m away. To mitigate visual impacts, the borrow pit is likely to be screened by adjacent forestry. Photograph 1 shows the location of BP-A. The proposed borrow pit profile is shown on Figure 3.2.1.



Photograph 1 – Borrow Pit Search Area A Location

5.2 Borrow Pit Search Area B (BP-B)

BP-B is located on the main proposed access track through the site. The topography is steeply sloping and considered suitable for a borrow pit. The site walkover identified weathered rock exposed, which indicates reasonable quality rock should be available. The location of this borrow pit search area is conveniently adjacent to the existing track and has been selected to provide a source of stone for access track upgrades and the construction of crane hardstandings in the western part of the site. Peat probing indicated a maximum peat depth of 0.2 m, the nearest waterbody is over 280 m away and cultural heritage assets are also over 150 m away. To mitigate visual impacts, the borrow pit is likely to be



screened by adjacent forestry. Photograph 2 shows the location of BP-B. The proposed borrow pit profile is shown on Figure 3.2.2.



Photograph 2 – Borrow Pit Search Area B Location

5.3 Borrow Pit C Search Area (BP-C)

BP-C is located in an elevated location approximately in the centre of the proposed turbines. The topography is steeply sloping and considered suitable for a borrow pit. The site walkover identified exposed weathered rock exposed, which indicates reasonable quality rock should be available. The location of this borrow pit search area is conveniently adjacent to the existing track and has been selected to provide a source of stone for access track upgrades and the construction of crane hardstandings in the eastern part of the site. Peat probing indicated a general peat depth of 0.2 m, with localised probe depths of up to 1.3 m. The nearest watercourse (Glenbow Burn) is approximately 50 m to the north (on the opposite side of the existing forestry track) and cultural heritage assets are located approximately 500 m away to the north and east. The slope where BP-C is proposed is angled away from receptors on the A701 corridor, which would ensure that it is screened by the natural topography. Photograph 3 shows the location of BP-C. The proposed borrow pit profile is shown on Figure 3.2.3.



Photograph 3 – Borrow Pit Search Area C Location



5.4 Borrow Pit Micrositing

Given that intrusive site investigation has not been undertaken at this stage, there remains uncertainty about the optimum location for a borrow pit which would maximise yield and quality of rock. To allow for flexibility in borrow pit placement, a 100 m micrositing allowance is sought as part of the consent. When micrositing borrow pits, it shall be ensured that they are located at least 50 m from watercourses, and cultural heritage assets. The Environmental/ Ecological Clerk of Works (ECoW) would be consulted on micrositing to review acceptability of impact on peat, ecology, ornithology and habitats.

6.0 **Construction Requirements**

6.1 Rock Volume Requirements

A summary of the indicative volumes of rock required is provided in Table 2.

Table 2 – Rock Volume Requirements

Infrastructure Item	Volume (m ³)
Access track (new)	4,601
Access track (upgrade)	6,669
Turbine formation	2,815
Crane hardstandings	22,595
Laybys	593
Construction Compounds	3,480
Substation Compound	8,400
Grid / BESS Compound	5,000
Total	54,152

A total volume of aggregate required for the construction of the Proposed Development would be expected to be approximately 54,152 m³. The borrow pits have been sized to be able to meet this demand for material, as detailed in Table 3. Note, these figures do not include the aggregate required for concrete production as concrete aggregate would be produced off-site and concrete transported as ready-mix from a local supplier.

6.2 Borrow Pit Yields

As can be seen in Table 3, the potential borrow pits have been sized to yield a potential 61,200 m³ of rock in total. This is greater than the likely demands to include a factor of safety of approximately 13 %. Note that rock would not be extracted beyond what would be required to meet the needs of the Proposed Development's infrastructure construction.

Borrow Pit	Grid Reference	Dimensions (WxLxH, m)	Yield Volume (m ³)*
BP-A	308137,623522	200 x 30 x 8	20,400
BP-B	307931,623638	200 x 30 x 8	20,400
BPC	308021,624420	100 x 60 x 8	20,400
Total			61,200

Table 3 - Borrow Pit Yields

*Yield volumes in Table 3 assume an 85 % recovery rate to allow for overburden and the presence of any unsuitable material.

Additional Sources of Rock

As shown above, the three proposed borrow pit search areas on-site have the capacity to supply all required rock for the Proposed Development's construction. There are other potential sources of rock which are expected to be available on-site.

Rock is likely to be recovered from turbine excavation works. Each turbine foundation would require an excavation of approximately 4 m in depth and a diameter of up to 30 m. This could yield approximately 8,866 m³ of additional rock which could be used for infrastructure construction.

Should additional sources of rock be utilised, the volume of rock extracted from the borrow pits would be reduced accordingly.



6.3 Construction Methods

The requirement to produce various grades of aggregate for different use i.e. bulk fill, track sub-base, track capping etc would necessitate the use of specialist crushing and grading mobile plant. The operation to extract stone from the proposed locations is summarised as follows.

Preparation Works

Initial site investigation works would be undertaken prior to commencement of construction activities. The site investigation would determine the quantity and suitability of rock at each of the proposed borrow pit search area locations. As part of the site investigation, there would be in-situ testing carried out in the boreholes, and samples taken off-site for lab testing. Detailed designs for each of the borrow pits would be developed following review of the site investigation results.

Preparatory works associated with each of the borrow pits would commence at the start of construction for the Proposed Development. Borrow pits would be worked in accordance with the principles in Quarries Regulations 1999, where relevant.

On commencement of borrow pit development, soils and overburden materials would be stripped from the area and stored in a bund as described below.

Drainage

Prior to commencement of activities associated with the development of the borrow pits, a detailed drainage system incorporating adequate mitigation measures would be installed to prevent silt pollution around the perimeter of each borrow pit. This detail would be incorporated within the Project Construction Method Statement and Construction Environmental Management Plan (CEMP), which are expected to be required by conditions attached to any consent.

Under the Scottish Environment Protection Agency (SEPA) Licence system the contractor would be required to obtain a Site Run-off Licence prior to works commencing. This process would ensure that the mitigation measures proposed meet the required level of detail expected by SEPA. Contractors would also be required to follow the requirements of General Binding Rule (GBR) 10C.

Mitigation may include (but not be limited to) the following measures.

- Overburden/loose soil would be stabilised and sheeted (should it be required). Mound heights would not exceed 3 m.
- The floor of any excavation would be sloped into the hill, to provide attenuation of any accumulated run-off. Sump points would be formed to allow settlement of suspended solids prior to dispersion by pump to vegetated areas away from local watercourses.
- In addition, the following pollution prevention measures would be implemented to minimise any pollution risk that may arise through the increased surface run-off and sediment mobilisation likely to be generated by each extraction area.
 - Installation of vegetated cut-off drains, peripheral bunds and ditches around the working areas. These would intercept uncontaminated surface run-off and divert it around the works ensuring that un-contaminated surface water does not become laden with silt.
 - Installation of swales to collect run-off placed on the downslope of borrow pits and overburden areas to collect potentially silty run-off.
 - Silt traps, silt fences and/or straw bales would be used in conjunction with swales, if required, to capture suspended solids generated during the operation of the extraction areas and to minimise the spread of run-off to the wider environment.
 - Water discharge from sediment ponds would be directed to rough surface vegetation and kept away from direct discharge to watercourses.

Soils and Overburden Storage

Following the installation of the drainage system, topsoils and overburden would be stripped from the work area. Materials would be excavated separately and stockpiled adjacent to the borrow pit working areas. Stripped materials would be placed to provide a natural bunded barrier, which would help to prevent public access to the borrow pit and prevent surface run-off from entering the borrow pit from surrounding land. Temporary fencing would be used to provide an additional physical barrier to prevent unauthorised public access whilst the borrow pit is active. Additional overburden material not placed in the peripheral bund would be temporarily stored in an overburden area, located immediately adjacent to



the working area. All soils would be stored in accordance with British Standard (BS) BS8601:2013 and BS 3882:2015.

Any peat encountered within the proposed borrow pit working area would be extracted and stockpiled in a dedicated area agreed with the Environmental / Ecological Clerk of Works (ECoW). Peat management would be undertaken in accordance with a Peat Management Plan (PMP) (an outline of which is provided in Technical Appendix 10.2).

Rock Extraction and Processing

On completion of stripping soils and overburden from the footprint of the borrow pit, rock extraction activities would commence. This is likely to involve a combination of blasting and mechanical crushing.

Where blasting is required, it is proposed that a lightweight crawler mounted blast hole drill rig is deployed with associated compressor. On completion of blasting, stone would be taken to mobile mechanical stone crushers for subsequent processing. The final plant arrangement would be dependent on the phasing of the borrow pit development and the anticipated volumes of rock to be extracted at each location.

Plant located at each of the borrow pits would be equipped with appropriate spill kits to address fuel/oil spillage should an incident occur. Fuelling of plant would be undertaken at predetermined locations agreed with the project ECoW.

Dust, Noise and Vibration

The crushing and grading of rock has the potential to generate dust. To mitigate this, the plant would be required to be fitted with a mister, which would suppress any dust generated.

The Principal Contractor would be required to develop a blasting management plan which would detail how vibration and noise from blasting operations would be managed.

6.4 Borrow Pit Restoration

Following completion of stone extraction and as part of the site restoration, the borrow pits would be restored. To do this, the borrow pit excavation edges would be softened so that they visually blend into the adjacent landscape. Borrow pit faces would be battered to an agreed angle and stored topsoil would be placed on them. The topsoil would support the landscaping and also promote revegetation.

The floor of the borrow pit would be ripped to break up the solid rock material prior to topsoil being placed over it. The site soils would contain a natural seedbank which should lead to natural vegetation establishing over time. Should additional seeding be required; this would be assessed by the ECoW.

7.0 Conclusion

The Proposed Development would have a requirement for approximately 54,152 m³ of construction rock material, mainly for the construction of access roads, crane hardstandings and construction compounds.

A desktop study and site walkover were carried out to identify potential sources of construction rock and suitable areas for rock extraction within the site to provide enough material for the project.

Taking into consideration the existing environment, the geology of the area and the layout of the Proposed Development, three locations were identified for borrow pit search areas. Key considerations in the selection process were rock quality and quantity, sustainability, haul distance, cost effectiveness and potential environmental impacts.

Intrusive investigation is required on all three identified borrow pit search areas to determine the extent of rock, rock type and suitability for use as rock fill for the construction of access road, crane hardstandings and compounds.

Based on initial calculations it is expected that there would be sufficient material acquired on-site to match the construction requirements, with the three borrow pits expected to yield 61,200 m³ of rock.



8.0 **References**

Scottish Government. (2023). *National Planning Framework 4 (NPF4)*. Available at: <u>https://www.gov.scot/publications/national-planning-framework-4/</u>. Accessed on: 19 June 2024.

British Geological Survey (BGS) *Bedrock Geology Map 1:50,000.* Available at: <u>https://www.bgs.ac.uk/datasets/bgs-geology-50k-digmapgb/.</u> Accessed on: 19 June 2024.

British Geological Survey (BGS) Superficial Deposits Map 1:50,000. Available at: <u>https://www.bgs.ac.uk/technologies/web-map-services-wms/web-map-services-geology-50k/.</u> Accessed on: 13 May 2024.

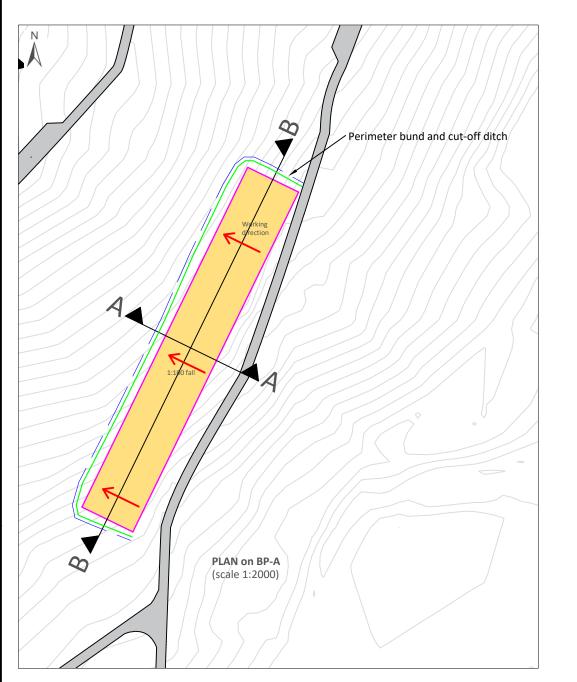
British Geological Survey (BGS) *Linear Features Map 1:50,000.* Available at: <u>https://www.bgs.ac.uk/technologies/web-map-services-wms/web-map-services-geology-50k/.</u> Accessed on: 13 May 2024.

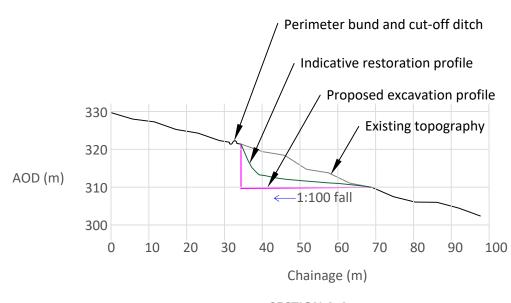
Scottish Government. (2011). Water Environment (Controlled Activities) Regulations (CAR) 2011 (and amendments of 2013, 2017 and 2021). Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made. Accessed on: 13 May 2024.

NetRegs (2024) *Guidance for Pollution Prevention (GPP)* documents. Available at: <u>https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/</u>, Accessed on: 13 May 2024.

The UK Government (1999) *The Quarries Regulations 1999*. Available at: <u>https://www.legislation.gov.uk/uksi/1999/2024/contents/made</u>. Accessed on: 19 June 2024.

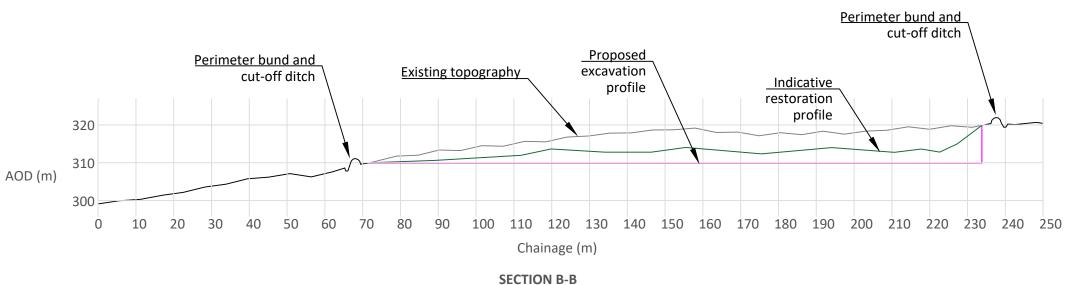






SECTION A-A (scale 1:1000)

Borrow Pit	Grid Reference	Dimensions (WxLxH, m)	Yield Volume (m ³)*
BP-A	308137,623522	200 x 30 x 8	20,400



(scale 1:1000)

0

Statkraft

General notes:

- 1. Subject to detailed desing following intrusive ground investigation
- 2. Overburden of shallow peat 0.1m 0.2m in depth recorded.
- 3. Yield anticipated to be 85% of useable volume to account for overburden and weathered rock

Scale: as shown @ A3

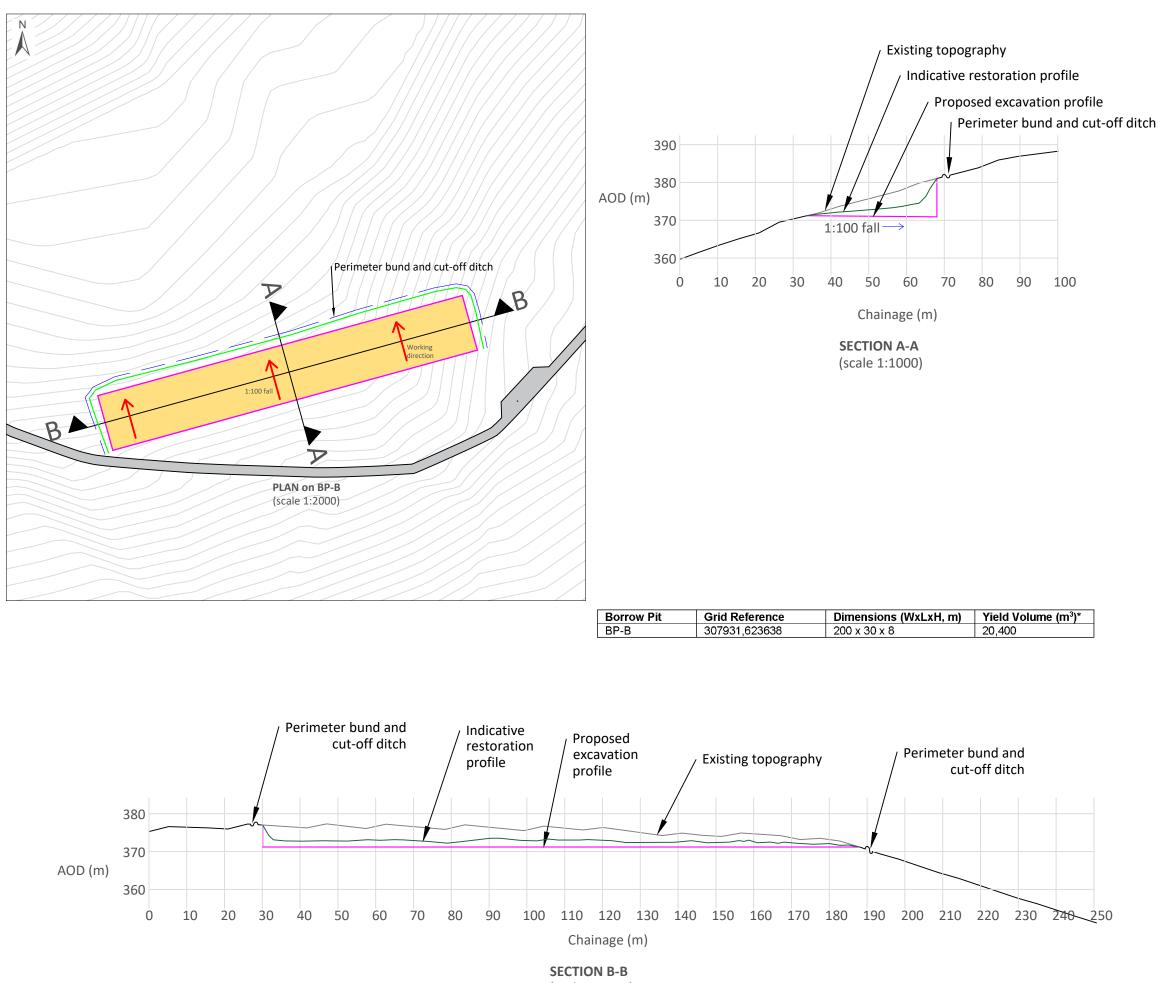
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Figure 3.2.1

Borrow Pit A

Oliver Forest Wind Farm

Environmental Impact Assessment Report



(scale 1:1000)

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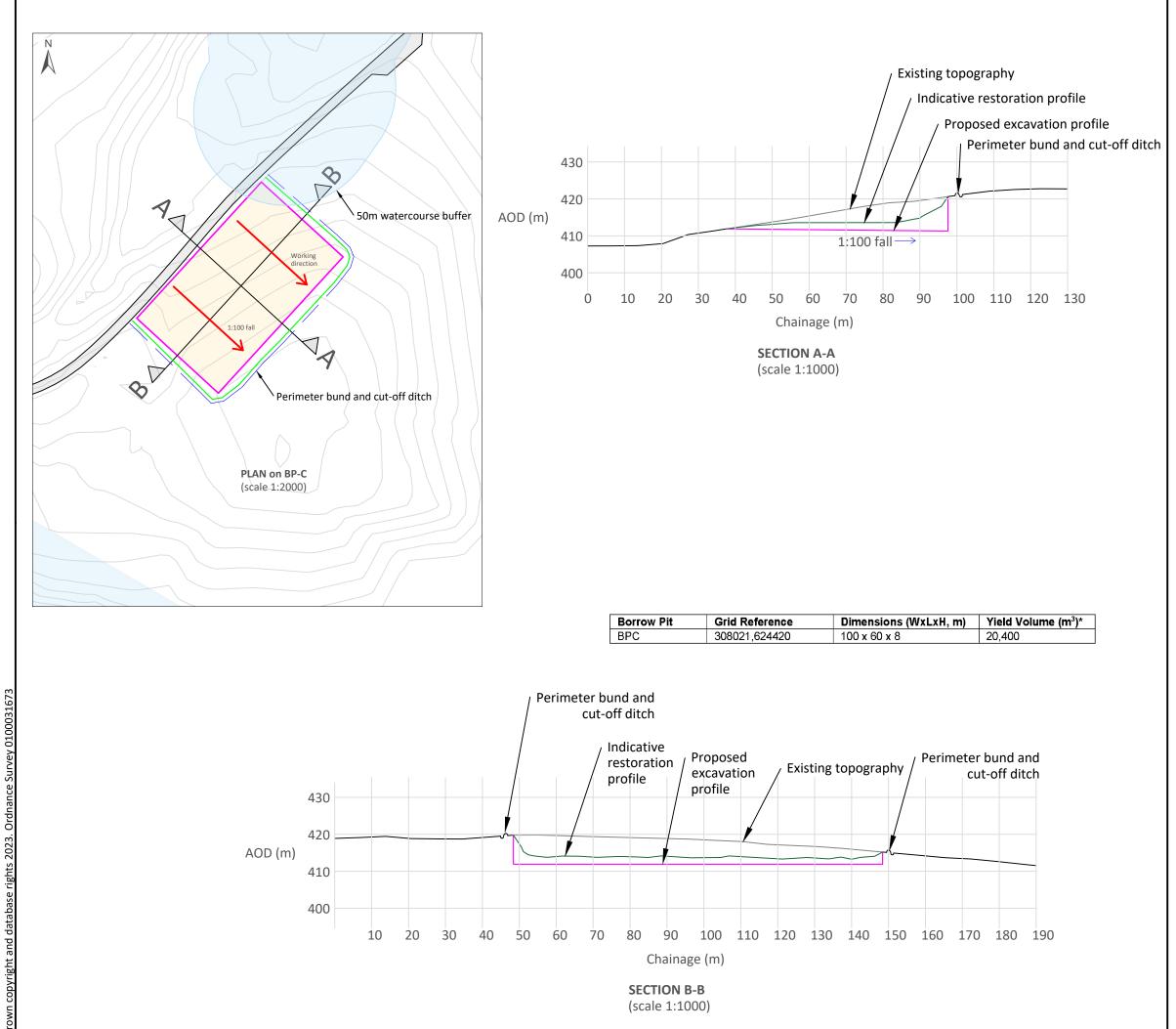
General notes:

- 1. Subject to detailed desing following intrusive ground investigation
- 2. Overburden of shallow peat 0.1m 0.2m in depth recorded.
- 3. Yield anticipated to be 85% of useable volume to account for overburden and weathered rock

Scale: as shown @ A3

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Figure 3.2.2	
Borrow Pit B	
Oliver Forest Wind Farm	
Environmental Impact Assessment Report	



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General notes:

- 1. Subject to detailed desing following intrusive ground investigation
- 2. Overburden of shallow peat 0.1m -0.2m in depth recorded, locally up to 1.3m.
- 3. Yield anticipated to be 85% of useable volume to account for overburden and weathered rock

Scale: as shown @ A3

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Figure 3.2.3

Borrow Pit C

Oliver Forest Wind Farm

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