ARECLEOCH WINDFARM EXTENSION

SLR Ref: 405.00481.00049

Technical Appendix 10.5: Borrow Pit Screening Assessment Prepared for: ScottishPower Renewables



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1.0 Introduction

SLR Consulting Ltd (SLR) was commissioned by ScottishPower Renewables Ltd, to undertake a Borrow Pit Screening Assessment for the Arecleoch Windfarm Extension (the proposed Development). The proposed Development is located on Scottish Forestry land approximately 3 km south west of Barrhill in South Ayrshire, centred on NGR NX 19194 80689. The majority of the Site is located within the South Ayrshire Council (SAC) area. The entrance to the Site is within the Dumfries and Galloway Council (D&GC) area.

The proposed Development would comprise a 13 turbine windfarm with associated infrastructure including borrow pits, substation and tracks.

Access tracks would be required to facilitate access to the above ground components of the proposed Development, as shown on Figure 10.5.1. It is proposed that existing public roads and forestry tracks would be utilised where possible. However, there would be a requirement for some of these tracks to be upgraded, as well as the construction of new tracks. Borrow pits are required to provide aggregate to supply sufficient rock to construct suitable access tracks.

There are six proposed borrow pit locations that have been selected because of their morphology, accessibility, orientation and the expected proximity of suitable rock close to surface. The borrow pits are in areas where the peat coverage is minimal and where bedrock outcrops and potential aggregate reserves are known to occur near the surface. Four of the borrow pits exist and have been used for previous projects including Arecleoch and Killgallioch.

This report is based on a desk based assessment of six potential borrow pits, supported by a Site visit by an experienced engineering geologist. The desk based assessment has involved review of all geological plans, including historic geological plans, topographic and slope plans and review of available memoirs. The Site visit was used to confirm peat coverage and identify bedrock outcrops. Prior to construction, Site investigations would be carried out to determine the suitability of the geology and rock, at the proposed borrow pits locations.

1.1 Scope of this Report

This report provides an initial screening assessment of the potential borrow pits, which would be necessary to provide the aggregate required to construct the access tracks and associated windfarm infrastructure to the proposed Development.

The work undertaken to date has involved review of geological plans, including historic geological plans, aerial photography, OS mapping, topographic and slope plans (Figure 10.5.5). The study has also been informed by a detailed peat probing programme and Site visits by experienced engineering geologists and hydrogeologists between September 2018 and March 2019.

As a consequence of intrusive Site investigations and additional work that would be undertaken at the detailed design stage, the actual borrow pit locations and extents presented in this report may be revised.

1.2 Sources of Information

The following sources of information have been reviewed and assessed:

- British Geological Survey (BGS) online map viewer and Geoindex¹;
- British Geological Survey Sheets 8W Solid and Drift (1995), Carrick;
- British Geological Survey Memoirs, Geology of the Carrick and Loch Doon District;
- Scotland's Environment website²;
- The Macaulay Institute for Soil Research Soil Survey of Scotland Sheet 36 South West Scotland, Land Capability for Agriculture Map. 1:250,000 scale, 1982;
- Aerial Photography; •
- Historical OS Mapping;
- Phase 1, National Vegetation Classification and Groundwater Dependent Terrestrial Ecosystems surveys undertaken as part of the EIA Report for the proposed Development (see Technical Appendix 8.1 and Figure 8.3 a-i); and
- Peat depth probing and review of rock exposures onsite.



¹ British Geological Survey (BGS) Online Viewer/Geoindex website

http://mapapps.bgs.ac.uk/geologyofbritain/home.html: http://www.bgs.ac.uk/geoindex/

² Scotland's Environment Website www.environment.scotland.gov.uk

1.3 Site Location and Description

The Site occupies an area of upland moorland plateau covered with extensive commercial forestry located to the north and south near the proposed entrance of the Site.

The elevation of the Site ranges from around 146 m AOD at the location close to the Site entrance near Arnimean to 230 m AOD at Shiel Hill on the north eastern boundary of the Site.

The topography is fairly flat across the turbine layout, with the Site falling away towards the north and east towards the Duisk River at Barrhill.

There have been several design iterations, a design freeze was agreed upon in April 2019. This assessment is based on the latest and final design iteration. A general view of the Site conditions are shown within Figure 10.5.1.

Geological Setting 1.4

1.4.1 Superficial Geology

The principal soil type underlying the Site is peat with areas of peaty gleys and brown soils along many of the watercourse valleys. Rare units of peaty gleyed podzols exist within the application boundary, most notably at the watercourse crossing of Cross Water (WX01). Mineral gleys and Brown soils have been recorded along the existing access track to the A714, west of Barrhill. Along the larger watercourses at lower altitudes (Water of Tig and River Cree) alluvial soils are observed within and along watercourses.

British Geological Survey mapping shows the Site to be almost entirely underlain by peat, with alluvium mapped around the Water of Tig, Pollingowan Burn and River Cree. Hummocky features are identified as glacial till with superficial deposits absent on some hill tops.

The Superficial geology of the Site is detailed in Figure 10.5.2.

1.4.2 Solid Geology

The geology of the Site comprises Ordovician age sedimentary rocks of the Barrhill Group.

The Site is almost entirely underlain by greywacke of the Kirkcolm Formation with narrow bands of the Galdenoch Formation. All of the proposed turbines are underlain by the Kirkcolm Formation. Faulting within the region is generally on a south west – north east trend. There are two minor faults mapped within the application site, cross-cutting the proposed access track, the Glen App Fault is present outside the application boundary, to the north west. The fault is defined by a change in lithology, to the younger Dalreoch Formation.

The solid geology of the Site is shown in Figure 3. Details of the geological units present onsite and immediately adjacent to Site are detailed in Table 1-1.

Although not quarried commercially in the district the wackes are known to have excellent physical properties for use as a roadstone. The major user and producer of bulk minerals is Forestry and Land Scotland who work many of these borrow pits for private forestry tracks.

Table 1-1: Solid Geology Summary

Age	Stratigraphic Group	Unit	De
Ordovician (458 – 449 Ma)	Barrhill Group (Leadhills Supergroup)	Galdenoch Formation	Sandstone/Siltstone turbidite sequence of the application boundary.
Ordovician (458 – 449 Ma)	Barrhill Group (Leadhills Supergroup)	Kirkcolm Formation	Massive wacke and siltstone turbidite se
Ordovician (458 – 449 Ma)	Tappins Group (Leadhills Supergroup)	Dalreoch Formation	Sandy and pebbly greywackes.

1.4.3 Mining and Quarrying

There have been no historic mining or quarrying activities within the Site, with the exception of the rock extracted on the Site as part of the borrow pits for the original Arecleoch Windfarm Site and for forestry activities around the Site.

1.4.4 Hydrogeology

The solid geology underlying the Site is classified as a low productivity aquifer, where flow is virtually through fractures and discontinuities. Small amounts of groundwater may be present in the near surface weathered zone and within secondary fractures.

scription

comprising predominately greywacke within

quence.



2.0 Aggregate Requirements

The proposed turbine sites and their subsequent maintenance would require the construction of a purpose built network of access 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.

The total length of permanent new access track is estimated to be approximately 5.05 km, with over 14 km of existing track to be upgraded. The typical cross sectional area of track with respect to imported construction materials has been estimated to be 3.5 m² per linear metre, which is based upon an estimated carriage width of 5-7m and an average thickness of 0.5-1.0m.

The indicative volumes of rock required for Site infrastructure are summarised in Table 2-1 and based on a materials calculator (Annex A).

Proposed Infrastructure	Volume of Aggregate Required
Access Tracks (new)	28,028m ³
Access Track Existing Upgrade	14,300m ³
Existing Access Track (Maintenance)	5000 m ³
Turbine Bases – formation only	3400 m ³
Access Track to Met Mast	32 m ³
Access Track to Borrow Pits	288 m ³
Turbine Bases – Formation only	1560 m ³
Fill Above Turbine Bases	22,126 m ³
Crane Pads	27,274 m ³
Turning Heads	2730 m ³
Substation 1	7500 m ³
Anemometer mast (1 No.)	625 m ³
Additional Laydown	5000 m ³
Construction Compound 1	3750 m ³
Total	122,413m ³

Table 2-1: Aggregate Requirement Summary

3.0 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 is at this stage still subject to geotechnical testing.



4.0 Potential Borrow Pits

Introduction 4.1

There has been no active mining or quarrying activities within the Site boundary (see Figure 10.5.1), though there has been borrow pit extraction within the forestry site and for the original Arecleoch Windfarm (Photograph 4-1). Large volumes of rock also appear to have been extracted from borrow pit BP4 which provides a guide to the extraction potential of adjacent sites.



Photograph 4-1: Forestry Borrow Pit 6 (E 221550 N 571500) used by Forestry and Land Scotland

4.2 Assessment Approach

Following a high level review of environmental constraints and consideration of proximity to the required Site infrastructure, suitable search areas were selected from which a borrow pit could be developed. The original search areas were not definitive, but covered a general area, within which SLR has selected appropriate sites, taking into consideration; environmental constraints, presence of rock, slope morphology, hydrology and potential size.

A total of 6 potential borrow pit areas have been identified, selected from a number of initial search areas. Each area has been assessed in the sections below.

The assessment has been completed through a desk based review of geological maps, aerial photography and topographical data and is supported by evidence gathered during a peat probing survey initially completed in November 2018 and February 2019. The siting of the potential borrow pit areas has also taken into consideration potential environmental constraints, including:

- the water environment;
- flood risk;
- sensitive habitats;
- protected species (including birds); •
- Ground Water Dependent Terrestrial Ecosystems (GWDTE); •
- landscape and Visual; •
- land use and recreation; and •
- cultural heritage.



Commentary on Material requirements in relation to each borrow pit area is included in Annex A.

The potential borrow pit locations have been predominantly selected due to their geological setting. Other factors included potential environmental impacts, morphology, accessibility from the Site or existing roads, orientation and the expected proximity of rock to the surface. The potential borrow pit locations are in areas where the superficial coverage is minimal and where bedrock is known to be near to surface (see Figure 10.5.6). This has been confirmed by peat probing and visual inspection.

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 no other rock or materials would be found onsite during construction. In the event that such rock was available the amount extracted from the borrow pits would be reduced.

Calculations of volumes of aggregate are estimates only and will require more detailed quantification at a later stage. Once potential borrow pits have been selected, detailed ground investigation and geotechnical testing would be required to confirm the assumptions made during this assessment and to assess the suitability and volume of potential aggregate reserves.

The intention of this assessment is to identify larger extraction volumes than is necessary for the proposed Development. This is to confirm that sufficient volumes of suitable aggregate can be sourced onsite, allowing for the fact that detailed ground investigation may identify unsuitable aggregate in some of the potential borrow pits.

The approximate aggregate volumes were calculated by taking the dimensions of the potential borrow pit area and multiplying by the probable height of the excavation (based on the elevation difference between the highest and lowest points of the potential borrow pit). This number was then multiplied by 0.4, taking into account approximately 10% for overburden materials. For example, for BP1 the dimensions (100m x 80m) have been multiplied by the height of the excavation (15m). This gives 120,000 m³, which is then multiplied by 0.4, equalling an estimated volume of 48,000 m³.

At this stage a detailed design and modelling exercise has not been undertaken and would be required to provide a more accurate estimate as well as to assess the suitability of rock and detail aspects such as bulking factor (75-80) % bulking would be a typical increase for greywacke bedrock).

4.3 Selection of Potential Borrow Pits

A total of six potential search areas have been selected as possible borrow pit locations. Each location will be reviewed in the sections below.

4.3.1 Borrow Pit BP1

Borrow pit BP1 is located within the forested area to the south of the proposed access track near Turbine 6 at approximately NGR NX 218661, 580923 shown on Figure 10.5.9a. The potential borrow pit is an extension to an existing borrow pit and adjacent to the existing track that is to be used as part of the proposed Development.

The underlying geology in this area is the Kirkholm Formation, comprising massive wacke and siltsone turbidite sequences.

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

Characteristics		
Site Dimensions (plan area)	Approximately 80 x 100	
Excavation Area*	Approximately 8,800 m ²	
Height of Excavation	Approximately 6 m	
Gradient and elevation	Slope increases to the southeast from an elevation of approximately 196 m AOD to a maxi of approximately 209 m AOD.	
Details of Extraction	Combination of ripping and blasting	
Overburden Type and Approximate Depth to Rock	Soil/weathered rock (no peat)	
Extent of Aggregate Extraction	Approximately 48,000 m ³	
Aggregate Composition	Kirkcolm Formation Massive wacke and siltstone turbidite sequence	

Table 4-1: Borrow Pit – BP1

*Assumes 10% additional land take for access tracks and any Site preparation areas.





4.3.2 Borrow Pit BP2

Borrow pit BP2 is located within the forested area to the south of the proposed access track at approximately NGR NH 226559, 577653 shown on **Figure 10.5.9b**. The potential borrow pit would be located a short distance from the existing access track.

The underlying geology in this area is the Kirkholm Formation, comprising massive wacke and siltsone turbidite sequences.

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

	Characteristics
Site Dimensions (plan area)	Approximately 100 x 20 and 40x70 m developed on either side of existing bo
Excavation Area*	Approximately 5,280 m ²
Height of Excavation	Approximately 5 m
Gradient and elevation	Slope increases to the west from an elevation of approximately 135 m AOD to a maxin approximately 152 m AOD.
Details of Extraction	Combination of ripping and blasting
Overburden Type and Approximate Depth to Rock	Soil/weathered rock (no peat) <0.3 m
Extent of Aggregate Extraction	Approximately 24,000 m ³
Aggregate Composition	Kirkcolm Formation Massive wacke and siltstone turbidite sequence

Table 4-2: Borrow Pit – BP2

*Assumes 10% additional land take for access tracks and any Site preparation areas.

row pit
um elevation of





Photograph 4-2: Borrow Pit BP2 (Direction of View – south)







Photograph 4-3: Bedrock outcropping at Borrow Pit BP2

4.3.3 Borrow Pit BP3

Borrow pit BP3 is located within the forested area to the south of the proposed access track at approximately NGR NH 224618, 577001 shown on Figure 10.5.9c. The potential borrow pit is an extension to an existing borrow pit and adjacent to the existing track that is to be used as part of the proposed Development.

The underlying geology in this area is the Kirkholm Formation, comprising massive wacke and siltsone turbidite sequences.

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

Characteristics		
Site Dimensions (plan area)	Approximately 80 x 100 m	
Excavation Area*	Approximately 8,800 m ²	
Height of Excavation	Approximately 10 m	
Gradient and elevation	Slope increases to the south east from an elevation of approximately 169 m AC maximum elevation of approximately 179 m AOD.	
Details of Extraction	Combination of ripping and blasting	

Table 4-3: Borrow Pit – BP3





	Characteristics
Overburden Type and Approximate Depth to Rock	Soil/weathered rock (no peat) <1m
Extent of Aggregate Extraction	Approximately 32,000 m ³
Aggregate Composition	Kirkcolm Formation Massive wacke and siltstone turbidite sequence

*Assumes 10% additional land take for access tracks and any Site preparation areas.

Photograph 4-4: Borrow Pit BP3 (Direction of View – east)







Photograph 4-5: View towards Borrow Pit BP3 (Direction of View – south east)



4.3.4 Borrow Pit BP4

Borrow pit BP4 is located on the existing access track, within the forested area, at approximately NGR NH 220787, 580811 shown on Figure 10.5.9d. The proposed borrow pit is an extension to an existing borrow pit, immediately to the north of the proposed access track. Due to the anticipated high volumes of bedrock close to surface, it would be possible to extend this borrow pit in width and gain large volumes of aggregate.

The underlying geology in this area is the Kirkholm Formation, comprising massive wacke and siltsone turbidite sequences.

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

	Characteristics
Site Dimensions	Approximately 80 x 40 and 70x70 m developed on north west and north of existing
Excavation Area*	Approximately 8,910 m ²
Height of Excavation	Approximately 6 m
Gradient and elevation	Slope increases to the north west from an elevation of approximately 186 m AOD to elevation of approximately 194 m AOD.
Details of Extraction	Combination of ripping and blasting
Overburden Type and Approximate Depth to Rock	Very limited, average soils depth <0.5 m
Extent of Aggregate Extraction	Approximately 29,400 m ³

Table 4-4: Borrow Pit – BP4





Characteristics	
Aggregate Composition	Kirkcolm Formation Massive wacke and siltstone turbidite sequence

*Assumes 10% additional land take for access tracks and any Site preparation areas.

Photograph 4-6: Borrow Pit BP4 (Direction of View – North)









Photograph 4-7: Bedrock outcropping at Borrow Pit BP4 (Direction of View – West)

4.3.5 Borrow Pit BP5

Borrow pit BP5 is located within the forested area at the north of the proposed access track at approximately NGR NH 219901, 580861 shown on **Figure 10.5.9e**. The borrow pit would be located a short distance from the existing access track.

The underlying geology in this area is the Kirkholm Formation, comprising massive wacke and siltsone turbidite sequences.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface, which would offer a significant volume of material. Peat probing identified no significant peat.

	Characteristics
Site Dimensions	Approximately 120 x 40 m
Excavation Area*	Approximately 5,280 m ²
Height of Excavation	Approximately 3 m
Gradient and elevation	Slope increases to the north west from an elevation of approximately 205 m AOD to elevation of approximately 211 m AOD.
Details of Extraction	Combination of ripping and blasting
Overburden Type and Approximate Depth to Bedrock.	Very limited, average soils depth <0.6 m
Extent of Aggregate Extraction	Approximately 14,400 m ³

Table 4-5: Borrow Pit – BP5





	Characteristics
Aggregate Composition	Kirkcolm Formation Massive wacke and siltstone turbidite sequence

*Assumes 10% additional land take for access tracks and any Site preparation areas.

Photograph 4-8: Borrow Pit BP5 (Direction of View – north east)



4.3.6 Borrow Pit BP6

Borrow pit BP6 is located on the existing access track, within the forested area, at approximately NGR NH 220787, 580811 shown on Figure 10.5.9f. The proposed borrow pit is an extension to an existing Wee Fell borrow pit, located on the Arecleoch Windfarm but accessible to the proposed Development. Due to the anticipated high volumes of bedrock close to surface, it would be possible to extend this borrow pit in width and gain large volumes of aggregate.

The underlying geology in this area is the Kirkholm Formation, comprising massive wacke and siltsone turbidite sequences.

It is anticipated that the borrow pit would comprise a layer of weathered granular material, broken rock and rock close to surface, which would offer a significant volume of material. Peat probing identified no significant peat and found bedrock close to surface.





	Table 4-6: Borrow Pit – BP6
	Characteristics
Site Dimensions	Approximately 180 x 20 m
Excavation Area*	Approximately 3,960 m ²
Height of Excavation	Approximately 10 m
Gradient and elevation	Slope increases to the south from an elevation of approximately 238 m AOD to a maximun approximately 251 m AOD.
Details of Extraction	Combination of ripping and blasting
Overburden Type and Approximate Depth to Bedrock.	Very limited, average soils depth <0.5 m
Extent of Aggregate Extraction	Approximately 36,000 m ³
Aggregate Composition	Kirkcolm Formation Massive wacke and siltstone turbidite sequence

*Assumes 10% additional land take for access tracks and any Site preparation areas.







Photograph 4-9: Borrow Pit BP6 (Direction of View – north east)

Photograph 4-10: Borrow Pit BP6 (Direction of View – south)





5.0 Principals for Borrow Pit Design and Restoration

5.1 Excavations within Rock

Following ground investigation, the borrow pits would be designed fully with appropriate access, drainage, laydown and process areas. In advance of the works all borrow pit locations would be surveyed and pegged out and the Ecological Clerk of Works (ECOW) would be consulted on in relation to species, habitats and drainage provisions.

Excavation, handling and storage of materials would strictly conform to the standards outlined in the project Construction Environmental Management Plan (CEMP) and the Peat Management Plan (PMP), as required. Suitable areas for the storage of material would be determined in consultation with the ECoW. An outline CEMP is provided in **Technical Appendix 3.1**, Volume 1 of the EIA Report.

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 and Annex D PAN 50.

The blasted/excavated rock materials would be processed using a mobile crushing and screening plant, which would be sited within the base of the working borrow pit.

5.2 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 a maximum of 2 m in height, further details will be provided within the CEMP.

The remaining unsuitable materials (glacial material/weathered rock horizons) would be stockpiled within the base of the working borrow pit, until they are reused for reinstatement. 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 and QNJAC Guidelines.

5.3 Access Tracks and Haulage Routes

Each potential borrow pit has been located close the proposed access track, to minimise the length of additional track required to access each potential borrow pit.

Should following the detailed design phase it be deemed necessary to construct/upgrade access tracks, the tracks (haulage routes) within the borrow pit would have a gradient of no steeper than 1(V) in 10(H) and would include suitable roadside drainage ditches and soakaways where appropriate.

5.4 Water Management/Drainage

Each borrow pit would feature a perimeter drain, which would aim to prevent water in-flow into the borrow pit. The greenfield water collected within the perimeter drain would be discharged into the surrounding vegetation. Further details are included within the outline CEMP.

Further drainage within the borrow pit may be required to carry silt loaded water and where necessary settlement lagoons would be constructed within the borrow pit, to treat the drainage water. The lagoons would be contained within a bunded area at the base of the borrow pit, and subject to all necessary treatments such as silt fences for further filtration, prior to any releases.

5.5 Restoration

Upon completion of extraction at the borrow pit, it would be restored.

Site derived general fill material would be sourced from the stockpiles located within the borrow pit void. These comprise of generally unsuitable construction materials which might consist of glacial material, weathered rock and weak rock horizons, but are suitable for reuse in restoration. 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 separately) within perimeter screening mounds, would be utilised as the surface dressing layer to provide a suitable medium for seeding and planting as appropriate. No mineral soil with be used as final dressings.

The restoration of the borrow pit site would not involve importing any material onto Site.

The base of the borrow pit could re-use unsuitable material and peat materials generated from the site excavations. To create a peat habitat on the surface of the borrow pit, peat would be used to a maximum of 2 metres thick, where slopes allow, prior to being capped with vegetated turves or reseded with a suitable seed mix agreed by the Site ECoW.

ons would be surveyed and pegged out and the Management Plan (PMP), as required. Suitable engineer/blasting engineer. The engineer would

ight, further details will be provided within the t. The stockpiles would have a maximum height

be discharged into the surrounding vegetation. rainage water. The lagoons would be contained

consist of glacial material, weathered rock and he fill materials would also be used to provide a nedium for seeding and planting as appropriate.



Prior to restoration, a Borrow Pit Restoration Plan would be provided by the contractor to SPR and the ECoW for approval.

Photograph 5-1 and Diagram 5-1 show examples of borrow pit restoration.

Good Practice Guidance Documents 5.6

A number of general pollution prevention measures would be employed to minimise the risks to ground and surface waters during the development. Extraction operations would be carried out in compliance with the CEMP and all environmental legislative requirements in force during the works, along with relevant Guidance for Pollution Prevention (GPP) and other codes of industry good practice, to ensure that both ground and surface waters are not impaired as a consequence of development and restoration of the borrow pits. Peat management and re-use would be specified in a site specific Peat Management Plan.



Photograph 5-1: Borrow Pit Restoration Example





Diagram 5-1: Restoration Profile Example

6.0 Conclusions

In summary, six potential borrow pit areas have been identified and evaluated for their potential to provide aggregate for the Site access tracks for the proposed Development. It is concluded that it would be possible to source sufficient aggregate from the borrow pits onsite.

The potential borrow pit areas have been selected from a desk based assessment but have been informed by peat probing, Site inspections and an assessment of potential effects on GWDTE. Actual borrow pit locations and extents of extraction areas are indicative only and are subject to confirmation following intrusive Site investigation that would be undertaken prior to development of the borrow pits.

Calculations of volumes of aggregate are estimates only and will require more detailed design at a later stage. Once potential borrow pits have been defined, detailed ground investigation and geotechnical testing will be required to confirm the assumptions made during this assessment and to assess the suitability of potential aggregate reserves.

The intention of this assessment is to identify larger extraction volumes than is necessary for the proposed Development. This is to confirm that sufficient volumes of suitable aggregate can be sourced onsite, allowing for the fact that detailed ground investigation may identify unsuitable aggregate in some of the potential borrow pits.

There may be opportunity to win rock from infrastructure extractions, thereby reducing the volumes taken from onsite borrow pits

The borrow pit locations and dimensions have been selected at this stage to maximise aggregate potential. Post consent, and in accordance with relevant Conditions of Consent, a detailed assessment and modelling exercise would be undertaken to further assess the suitability of each borrow pit area.

All borrow pits would be restored in line with the CEMP, Peat Management Plan and industry best practice and with the advice of the Ecological Clerk of Works.

s concluded that it would be possible to source GWDTE. Actual borrow pit locations and extents gation and geotechnical testing will be required gate can be sourced onsite, allowing for the fact



FIGURES



FIGURE 10.5.1: PROPOSED SITE LAYOUT





Figure

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Technical Appendix 10. **Proposed Site Layout**

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	Figure	10.5.1	TM	

FIGURE 10.5.2: SUPERFICIAL GEOLOGY





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5	Date	13/05/19	OSGB36	
	Figure	10.5.2	Projection: TM	

FIGURE 10.5.3: SOLID GEOLOGY





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Technical Appendix 10.5 Solid Geology

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	Figure	10.5.3	TM

FIGURE 10.5.4: PEAT DEPTH PLAN





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	Figure	10.5.4	TM	

FIGURE 10.5.5: PEAT DEPTH PLAN >0.5M





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	Figure	10.5.5	

FIGURE 10.5.6: SLOPE PLAN







Extension - EIAR	Drg No	00481.00049.10.5.6.0	
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	Date	13/05/19	
	Figure	10.5.6	