TECHNICAL APPENDIX 10.3: BORROW PIT APPRAISAL

Kirkton Energy Park

Prepared for: Kirkton Wind Farm Ltd

SLR Ref: 428.11143.00001
Version No: 1
November 2022

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1.0 Introduction

SLR Consulting Ltd (SLR) was commissioned by Wind2 on behalf of Kirkton Wind Farm Ltd (the applicant) to undertake a Borrow Pit Appraisal at the proposed Kirkton Energy Park (proposed development).

The applicant is seeking section 36 consent and deemed planning permission for an onshore wind farm comprising eleven wind turbines and battery storage with associated infrastructure. It is this proposed development that has been analysed onsite and assessed within this report.

The proposed development site is located approximately 2.1km south of Melvich Village in the county of Sutherland in northern Scotland and is centred at National Grid Reference (NGR) NC 87999, 59788 (see **Figure 10.3.1**). The application boundary occupies an area of approximately 419.38ha (including the two potential abnormal load turning areas), although only a small proportion of this would be occupied by new infrastructure associated with the proposed development.

The layout of the proposed development is illustrated on **Figure 10.3.2** and would include the following key components:

- 11 wind turbines with internal transformers with bladed heights of up to 149.9m;
- associated turbine foundations and hardstanding areas;
- a total of approximately 7.52km of onsite tracks with associated water crossings, passing place and turning heads;
- search areas for up to two borrow pits;
- one onsite substation compound, which will incorporate up to 20MW of battery storage;
- one temporary site construction compound;
- a network of onsite buried electrical cables; and
- associated ancillary works.

For a full description of the proposed development, please refer to **Chapter 3: Description of Development** (EIAR Volume 2).

1.1 Scope of this Report

There has been substantial works undertaken to date at the site to inform the proposed development layout, including two phases of peat probing. The principal objective of this report is to provide an initial assessment of the aggregate requirements for the proposed 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 development.

There are up to two proposed borrow pit search areas reviewed within this report. Each borrow pit has been selected because of its morphology, accessibility from proposed tracks, orientation and the expected proximity to suitable rock close to the surface. The proposed borrow pits are in areas where peat coverage is minimal and where bedrock outcrops and potential aggregate reserves are expected to occur near the surface.

1.2.1 Sources of Information

The following sources of information have been reviewed and assessed:

- British Geological Survey (BGS) online map viewer and Geoindex[1];
- Scotland's Environment website[2]; and
- Information gathered during site visits.

[1] British Geological Survey (BGS) Online Viewer/Geoindex website http://mapapps.bgs.ac.uk/geologyofbritain/home.html; http://www.bgs.ac.uk/geoindex/ Last accessed December 2021
[2] Scotland's Environment Website www.environment.scotland.gov.uk (last accessed December 2021)

2.0 Geological Setting

The assessment has been completed through a largely desk-based review of soil and geological maps, Ordnance Survey (OS) mapping and Digital Terrain Model (DTM) mapping. No intrusive investigation has been undertaken to assess the suitability of potential sources of aggregate, however several phases of peat probing have been undertaken to assess the superficial deposits onsite. For further information refer to **Technical Appendix 10.1: Peat Landslide Hazard and Risk Assessment** (PLHRA) (EIAR Volume 4: Technical Appendices).

2.1.1 Superficial Geology

The superficial geology present on the site is a combination of Glacial Till and Peat based on the data available from BGS maps.

The BGS Sheet 115E, Solid and Drift Deposits Reay (2000), indicates that recent to Quaternary age peat is present on the lower lying, north facing slopes with Till and Morainic deposits recorded across the majority of the remainder of the site, with the exception being steeper slopes and hill tops which have no superficial deposits recorded.

The published superficial geology is illustrated in **Figure 10.3.3**.

Soils

The soils onsite generally comprise peaty gleys. Of the peat recorded onsite, the majority has been classified as Class 2 by the Carbon and Peatland 2016 map[3]. Classes 1 and 5 are also present on the site, the details of which are shown in **Table 2-1**.

Table 2-1: SNH Classifications of Peat present onsite

Class of Peat	Peat Description	Indicative Soil	Indicative Vegetation
1	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value.	Peat soil	Peatland
2	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential.	Peat soil with occasional peaty soil	Peatland or areas with high potential to be restored to peatland
5	Soil information takes precedence over vegetation data. No peatland habitat recorded. Soils are carbon-rich and deep peat.	Peat soil	No peatland vegetation

2.1.2 Bedrock Geology

The site is predominantly underlain by metamorphic lithologies from the Neoproterozoic era. Igneous granite bedrock is also present on the site which dates to the Silurian era and is shown on **Figure 10.3.4**.

The Portskerra Psammite is the dominant lithology across the site, comprising of a migmatitic psammite and semipelite subunit and a quartzite subunit.

[3] Scottish Natural Heritage (SNH), The James Hutton Institute and Scottish Government., (2016) *Carbon and Peatland 2016 map*.[viewed February 2020] Available from: map.environment.gov.scot/soil_maps/ Scottish Government, 2016, Last accessed February 2020

Table 2-2: Bedrock Geology Summary

Age	Stratigraphic Group	Unit	Subunit	Description
Silurian 443.8 – 419.2 Ma	Argyll and Northern Highland Granitic Suite	Strath Halladale Granite	-	Granite and biotite
Neoproterozoic 1000 – 541 Ma	Glenfinnan Group and Loch Eil Group	Portskerra Formation	Migmatitic psammite and semipelite	-
			Quartzite	-

2.1.3 Hydrogeology

The solid geology underlying the site is classified as a Low Productivity Aquifer, where flow is virtually all through fractures and other discontinuities.

2.1.4 Local Hydrology

The site is drained into the same water catchment. Streams flow east off the site into the Halladale River. The main streams onsite are the Allt na h-Eaglaise and the Allt nan Gall.

2.1.5 Rainfall

The nearest rainfall gauging station is the Forsinian Station located approximately 18km south of the site. The average annual rainfall at the Forsinian Station over the period 2011 to 2021 was 1,098mm (SEPA).

2.1.6 Forestry

The majority of the site is open land, however there is a forestry plantation located at the north of the site, and a smaller forestry plantation located at the south west of the site. Peat thicknesses are varied at the northern forestry plantation and limited at the forestry plantation at the south west of the site.

2.1.7 Topographic Surveys

All of the surveys were based on 5m DTM data which was used to determine slopes across the site and to determine slope coefficient (score) factors at each probe hole location. The site has been characterised into slope classes and a slope plan produced to identify slope areas where potential gradients are more or less susceptible to slope failure mechanisms. The steeper slopes on the site are generally found in the western half of the site on east facing slopes. However, the average gradient onsite is 6° and the site infrastructure has avoided steep slopes where possible.

Ground elevations at site range between approximately 20m Above Ordnance Datum (AOD) in the east of the site to approximately 160m AOD in the north west of the site. Elevations generally fall eastwards towards the Halladale River.

2.1.8 Aerial Photography

The aerial photography indicates limited changes in vegetation on the ground, it is however possible to identify stream courses, drainage ditches, and roads/tracks from the photographs. The aerial photographs were used in conjunction with the site DTM data to identify the major geomorphological features, mainly as breaks of slope. The site was further assessed during site visits when more detailed mapping was undertaken.

Interpretation of available aerial photographs was undertaken to assess and identify evidence of historic peat instability. The photographs were examined to highlight features of interest, where present, including:

- possible extension and/or compression features;
- areas of historic failure scars and debris;
- evidence of peat creep;
- areas with apparently poor drainage;
- areas with concentrations of surface drainage networks; and
- steeply incised stream cuttings within peat deposits.

The aerial photography, DTM and data gathered on site have used in conjunction to create a geomorphological interpretation of the site, presented as **Figure 10.3.5** and **Figure 10.3.6**.

Extension/Compression Features

There was no evidence visible in the aerial photographs of any extension or compression features in the peat. It was not possible to identify evidence of any significant historic peat failures or slides from the aerial photographs. Ground investigation proved that there were no significant features of this nature in the vicinity of the site and no slumping of peat was evident along track corridors.

Local Knowledge

No anecdotal background from landowners or past site users was evident to suggest that there has been a history of peat instability on the site.

2.1.9 Historic Mapping

Freely available historic OS mapping has been reviewed however no evidence of historic instability was identified.

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-metalled and would be constructed to the turbine suppliers' specifications conforming to the Specification for Highway Works.

The indicative volumes of rock required for site infrastructure are summarised in **Table 3-1** and based on a materials calculator. The aggregate requirements below have 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 (including turning heads)	27,199 m^3
Turbine Bases – formation only	2,200 m^3
Fill Above Turbine Bases	15,378 m^3
Hardstanding and Temporary Laydown	28,188 m^3
Substation	7,500 m^3
Construction Compounds	3,125 m^3
Turning areas off site	8,000 m^3
Total	**98,055 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 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

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 the site comprises Neoproterozoic aged metasedimentary rocks.

The assessment has been completed through a desk-based review of geological maps and memoirs and is supported by several site visits undertaken between 2020 and 2022.

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

The proposed borrow pit locations have been predominantly selected due to their geological setting. Other factors included environmental impacts, landscape and visual 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 the surface.

No account has been taken in the calculations for the fortuitous 'winning' of rock during the construction phase for example during infrastructure excavations. In the event that such rock was available, the amount extracted from the borrow pits would be reduced.

5.1 Borrow Pit Selection

A total of two potential search areas have been selected as possible borrow pit locations, shown in **Figure 10.3.5 and Figure 10.3.6**. Each location will be reviewed in the sections below. Potential search areas have been highlighted with indicative excavation areas identified at each borrow pit location. All borrow pits could be extended or reduced in size depending on review of aggregate requirements and/or ground investigation data.

5.1.1 Borrow Pit 1

Borrow Pit 1 (BP1) is located in the north of the site, to the north east of T1, at approximately NGR NC 88169 61096 shown in **Figure 10.3.5** with further details in **Table 5-1**.

The underlying geology in this area comprises Portskerra Psammite Formation.

Table 5-1: Borrow Pit 1

Borrow Pit 1	
Site Dimensions	Approximately 165 x 110m
Excavation Area	Approximately 13,000m^2
Height of Excavation	Approximately 8m
Gradient	Slope increasing gently towards the west
Details of Extraction	Combination of digging, drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 62,000m^3
Aggregate Composition	Portskerra Psammite Formation - Migmatitic Psammite with Migmatitic Semipelite. Metamorphic Bedrock

5.1.2 Borrow Pit 2

Borrow Pit 2 (BP2) is also located in the north of the site, although further south than BP1. BP2 is located to the east of T3, at approximately NGR NC 87980 60384 shown in **Figure 10.3.6** with further details in **Table 5-2**.

The underlying geology in this area comprises Portskerra Psammite Formation.

Table 5-2: Borrow Pit 2

Borrow Pit 2	
Site Dimensions	170 x 110m
Excavation Area	Approximately 19,000m2
Height of Excavation	Approximately 6m
Gradient	Slope increasing gently towards the west
Details of Extraction	Combination of digging, drilling and blasting
Overburden Type and Depth	Soil/weathered rock
Extent of Aggregate Extraction	Approximately 68,000 m3
Aggregate Composition	Portskerra Psammite Formation - Migmatitic Psammite With Migmatitic Semipelite. Metamorphic Bedrock

6.0 Proposed Borrow Pit Design

The indicative borrow pit volumes are presented in **Table 5-1** and **Table 5-2**. The design of the borrow pits anticipates extracting a net stone volume suitable for the requirements onsite, 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 refer to **Technical Appendix 3.1: Outline Construction Environmental Management Plan**.

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[4] and Annex D PAN 50[5].

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 1.5m 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 5m, with maximum side-slope gradients of 1(Vertical (V)) in 2.5(Horizontal (H)) and be in full compliance with the Quarries Regulations 1999[4] and Quarries National Joint Advisory Committee (QNJAC) Guidelines[6]. This material would be used as part of the restoration profiling on the cut faces.

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

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

[6] 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 3.1: Outline CEMP**.

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 onsite (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 of materials with unsuitable engineering properties for the proposed 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, which would be a maximum of 2m thick across the floor area and 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 the creation and use of the borrow pits. Extraction operations would be carried out in accordance with relevant SEPA Guidance for Pollution Prevention[7] and other codes of best practice, to ensure

[7] 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.

that both ground and surface waters are not contaminated. These would include relevant codes of best practice relevant to the site, including:

- 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)[5];
- 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).

7.0 Conclusion

In summary, the borrow pits selected have been assessed as being capable of supplying all of the aggregate required for the proposed 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 development. These calculations would be verified by detailed intrusive investigation at the proposed locations, post-consent. Calculations do not take into consideration the 'winning' of materials along the route. Each of the proposed borrow pits selected could be increased or decreased in size, depending on the aggregate requirements or following an assessment of the suitability of aggregate materials following detailed ground investigation.

FIGURES

280000 282000 284000 286000 288000 290000 292000 294000

968000 966000 964000 962000 960000 958000

N

LEGEND

Application Boundary

0 1 2 Kilometres

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APPENDIX - BORROW PIT APPRAISAL

SITE LOCATION

FIGURE 10.3.1

Scale 1:50,000 @ A3

Date NOVEMBER 2022

11143.00001.0218.0 Site Location

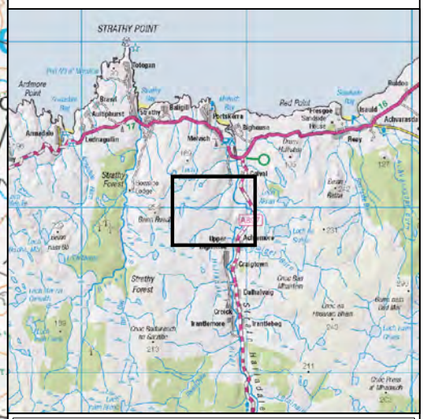
286000 287000 288000 289000 290000

961000 960000 959000

LEGEND

- Application Boundary
- Proposed Turbine
- Proposed Track / Turning Head / Passing Place
- Proposed Crane Pad
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit
- Proposed Watercourse Crossing

N



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SITE LAYOUT

FIGURE 10.3.2

Scale 1:15,000 @ A3

Date NOVEMBER 2022

0 0.5 1 Kilometres

11143.00001.0219.0 Site Layout

284000 285000 286000 287000 288000 289000 290000 291000 292000

963000 962000 961000 960000 959000

11143.00001.0220.0 Superficial Geology

N

Kilometres 0 1 2

LEGEND

- Application Boundary
- Proposed Turbine
- Proposed Track / Turning Head / Passing Place
- Proposed Crane Pad
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit

Superficial Geology

- Alluvium - Clay, Silt, Sand and Gravel
- Alluvial Fan Deposits - Sand, Gravel and Boulders
- Peat
- Hummocky (Moundy) Glacial Deposits - Sand, Gravel and Boulders
- Glaciofluvial Deposits - Gravel, Sand and Silt
- Glaciofluvial Ice Contact Deposits - Gravel, Sand, Silt and Clay
- Glaciofluvial Sheet Deposits - Gravel, Sand and Silt
- River Terrace Deposits (Undifferentiated) - Gravel, Sand and Silt
- Lacustrine Deposits - Clay, Silt and Sand
- Thormaid Till Member – Diamicton

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APPENDIX - BORROW PIT APPRAISAL

SITE SUPERFICIAL GEOLOGY

FIGURE 10.3.3

Scale 1:25,000 @ A3

Date NOVEMBER 2022

284000 285000 286000 287000 288000 289000 290000 291000 292000

963000 962000 961000 960000 959000 958000

11143.00001.0221.0 Bedrock Geology

N

LEGEND

- Application Boundary
- Proposed Turbine
- Proposed Track / Turning Head / Passing Place
- Proposed Crane Pad
- Proposed Substation Compound
- Proposed Temporary Construction Compound
- Proposed Borrow Pit

Bedrock Geology

DEVONIAN
- Tobaireach Conglomerate Member – Conglomerate
- Luachair Sandstone Member - Sandstone and Conglomerate, Interbedded
- Bighouse Formation - Sandstone, Conglomerate and [Subordinate] Argillaceous Rocks

PRECAMBRIAN
- Lower Old Red Sandstone Group - Conglomerate and [Subequal/Subordinate] Sandstone, Interbedded
- Kirtomy Gneisses - Semipelite, Gneissose
- Portskerra Psammite Formation - Migmatitic Psammite With Migmatitic Semipelite
- Portskerra Psammite Formation – Quartzite

Igenous Rocks

SILURIAN
- Strath Halladale Granite - Granite, Biotite
- Strath Halladale Granite - Granite, Foliated-Biotite
- Scottish Highland Ordovician Minor Intrusion Suite - Tonalite, Foliated

PRECAMBRIAN / SILURIAN ORDOVICIAN
- Badanloch Granite Sheets - Granite, Foliated-Biotite
- Clerkhill Appinite Suite – Amphibolite
- Unnamed Igneous Intrusion, Pre-Caledonian – Amphibolite

Linear Features
- Fault, Inferred, Displacement Unknown

0 1 2 Kilometres

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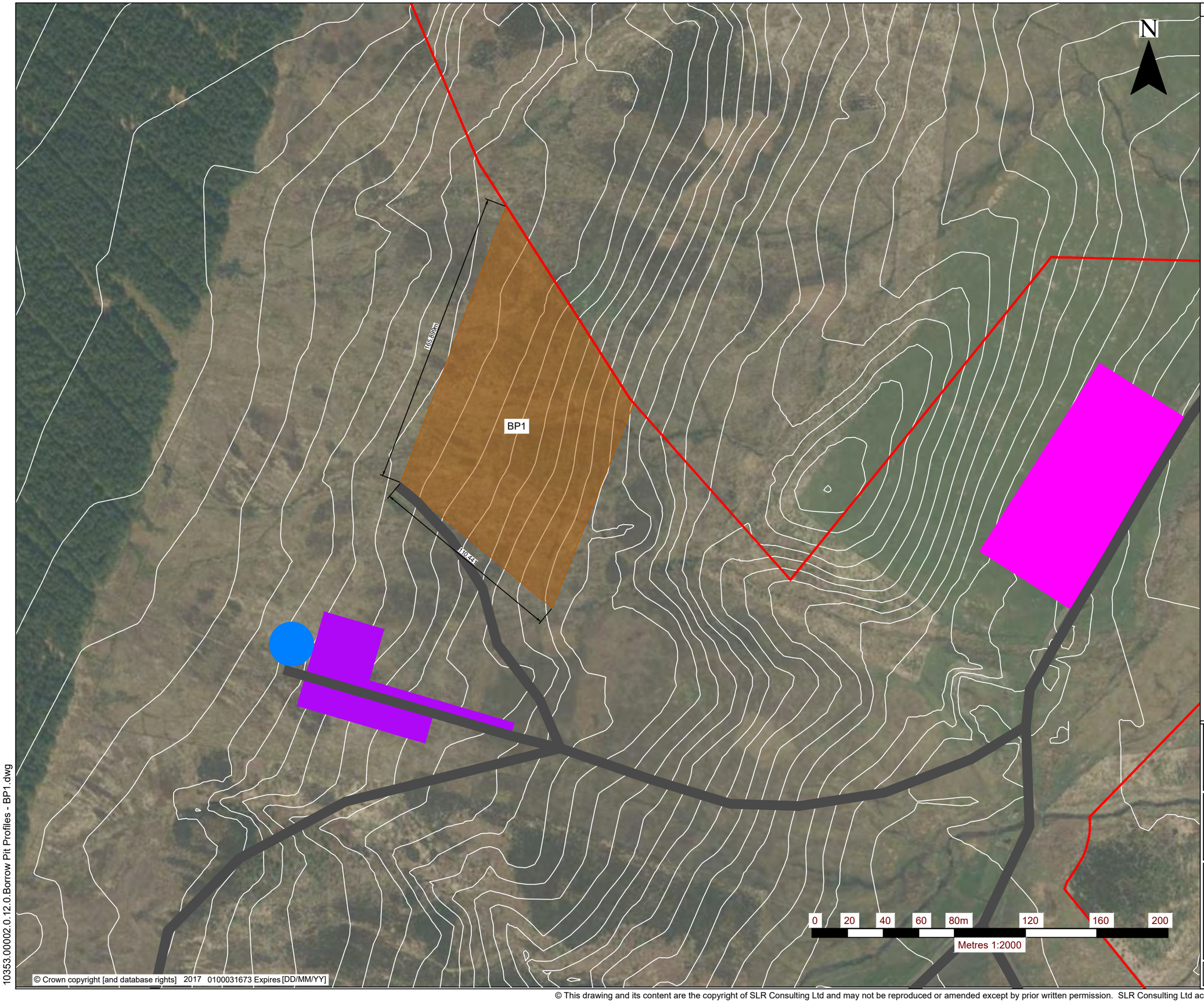
APPENDIX - BORROW PIT APPRAISAL

SITE BEDROCK GEOLOGY

FIGURE 10.3.4

Scale 1:25,000 @ A3

Date NOVEMBER 2022



LEGEND

- SITE BOUNDARY
- POTENTIAL BORROW PITS
- PROPOSED TRACK LAYOUT
- PROPOSED CRANE PADS
- PROPOSED CONSTRUCTION COMPOUND
- PROPOSED TURBINE

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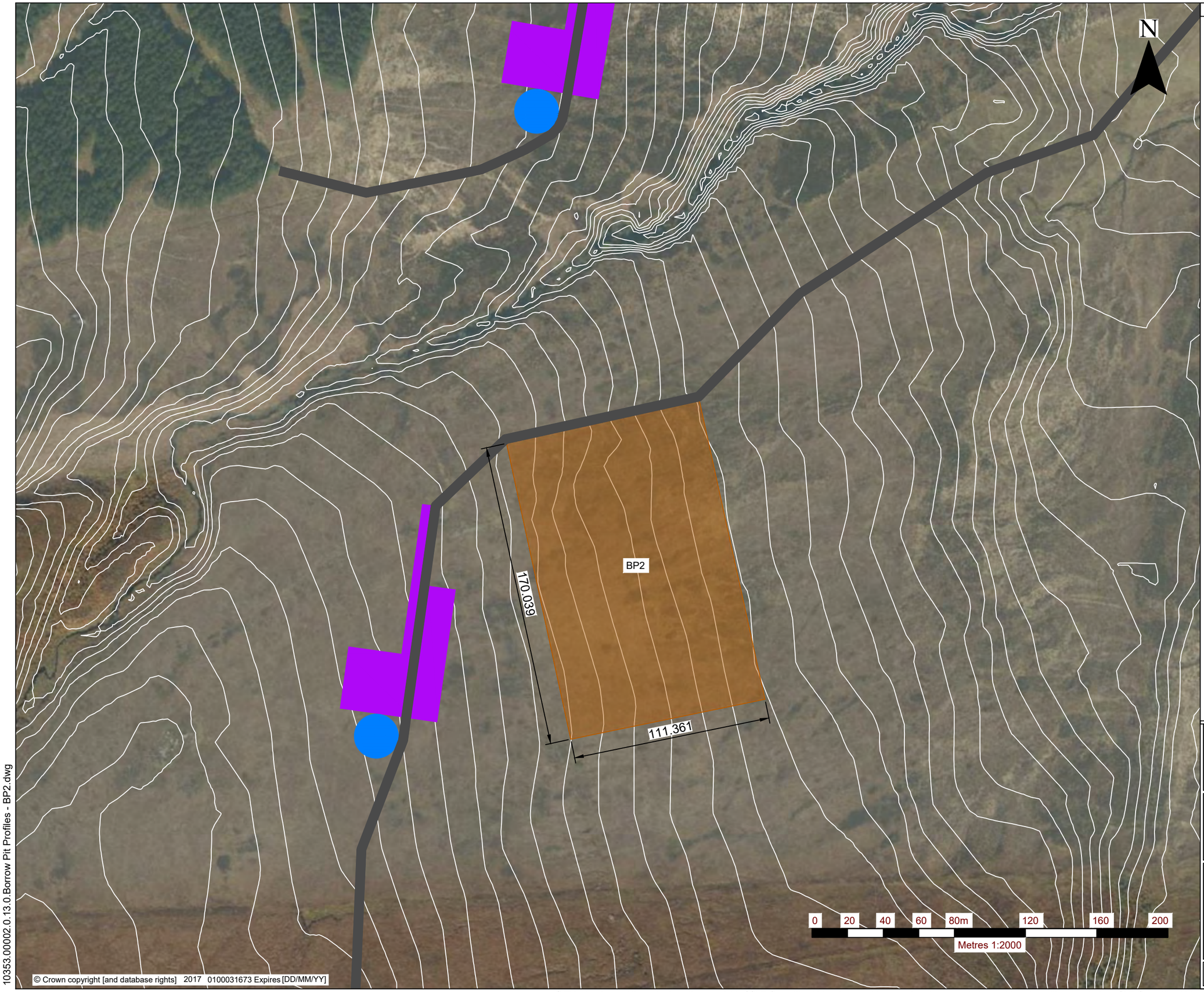
BORROW PIT PROFILES - BP1

FIGURE 10.3.5

Scale	Date
1:2000 @ A3	NOVEMBER 2022

10353.00002.0.12.0.Borrow Pit Profiles - BP1.dwg



LEGEND

- SITE BOUNDARY
- POTENTIAL BORROW PITS
- PROPOSED TRACK LAYOUT
- PROPOSED CRANE PADS
- PROPOSED TURBINE

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BORROW PIT PROFILES - BP2

FIGURE 10.3.6

Scale	Date
1:2000 @ A3	NOVEMBER 2022

10353.00002.0.13.0.Borrow Pit Profiles - BP2.dwg

APPENDIX 01

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:
Access Tracks on site (Excavated)	4857	5	7	33999	0.8	1	27199.2	27199.2	Assumes 6m width on surface with 7m average at base
Existing Upgraded (on site)	2034	5	7	10170	0.2	1	2034	2034	
Floating Track (on site)	457	5	7	2285	0.8	1	2559.2	2559.2	
Turning Heads	120	6	1	720	0.8	1	96	96	
Turning Heads	60	6	4	240	0.8	4	768	768	Assumes 4m width
Passing Places	70	5	3	210	0.8	6	1008	1008	
Turbine Bases - formation only	20	20		400	0.5	11	2200	2200	Assume all concrete imported
Fill above Turbine Bases	32	32		1024	2	11	22528	15378	Less volume of bases 11*650m3 =7150m3 Variable depende
Crane Pads	75	15		2350	1	11	25850	25850	
Blade laydown and ancillaries	85	5	-	425	0.5	11	2338	2338	
Turning Areas (Offsite)	-	-	-	16000	0.5	1	8000	8000	Calculated based on larger turning area (assumes 1 used)
Substation	100	75	-	7500	1	1	7500	7500	
Construction Compound	125	50	-	6250	0.5	1	3125	3125	
TOTAL REQUIREMENT							105205	98055	All volumes measurements in m3, based on turbine requirements provided by Wind2

Potential Volume of Rock to be sourced on site	
BP1	62,000
BP2	68,000
Total Volume from Site	130,000
Import requirements (shortfall)	-31945
Total import	-31945
plus 10% contingency	-35140

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