ScottishPower Renewables

Harestanes West Windfarm: Borrow Pit Assessment

Technical Appendix 10.3

2760911 – P10.3 (02)

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RSK GENERAL NOTES

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1 INTRODUCTION

1.1 This report provides a Borrow Pit Assessment for Harestanes West Windfarm (hereafter referred to as the 'proposed Development') and associated development infrastructure.

1.2 This report forms a Technical Appendix to the Environmental Impact Assessment (EIA) Report for the proposed Development and should be read in conjunction with the EIA. It has been produced to address the requirement for aggregate for the proposed Development to supply the construction needs for new and upgraded access tracks and hardstanding areas, including ongoing supply for track maintenance during the operation of the proposed Development.

1.3 This report quantifies the aggregate requirement, appropriate locations within the Application Boundary from which this material can be sourced and addresses the suitability of the material for the required purpose. Potential impacts from aggregate extraction, processing and transportation are considered and assessed. Design and mitigation measures to avoid or minimise these impacts are set out, along with a number of good construction practices that would be employed during all proposed Development works.

1.4 Within this Technical Appendix, the following definitions will be used. The 'proposed Development' refers to infrastructure within the Application Boundary. 'Site' refers to the area within the Application Boundary where the proposed Development lies. 'Access track to the turbine area' refers to the route from the A701 to the 'turbine area', which is the area of the Site in which the proposed Development turbines are located.

Site Location

1.5 The proposed Development is located north-west of the village of Ae, approximately 1.3 kilometres (km) from the Application Boundary and 2.2 km from the nearest proposed turbine, and approximately 13 km north of Dumfries. The Site is located wholly within the Dumfries and Galloway Council (DGC) administrative area. The turbine area lies to the west of the Water of Ae and the Windy Hill Burn runs through the centre of the turbine area from north-west to south-east. The Site is made up of undulating hills that form part of the upland plateau or range of hills between Annandale to the east and Nithsdale to the West.

Development Proposals

- 12 wind turbines, six with a maximum height of 220 m and six with a maximum height of 200 m to blade tip;
- 12 No hardstanding areas at the base of each turbine, with an approximate total area of 3,856 m^2;
- transformer/switchgear housings located adjacent to turbines;

- site entrance from the A701, and 31.5 kilometres (km) of access track with associated watercourse crossings – of which 10.5 km are new access tracks and 21.0 km are upgrades to existing tracks;
- underground cabling linking the turbines with the substation;
- a permanent meteorological mast (PMM) and associated hardstanding area;
- an operations control building with parking and welfare facilities;
- a substation compound;
- a bellmouth and parking area adjacent to the A701;
- two temporary construction compound areas;
- extraction of material from up to three existing quarries owned and operated by Forestry and Land Scotland to provide suitable rock for access tracks, turbine bases and hardstanding;
- health & safety and other directional site signage; and
- additional development components to improve the overall ecological and environmental benefits accruing from the proposed Development in the form of peatland restoration, habitat improvement and native woodland planting.

1.6 Full details of the proposed Development design are provided in **Chapter 3: Proposed Development** of the EIA Report.

Aims

1.7 This report aims to undertake a review of available relevant site information, including all track design specifications, to produce outline borrow pit designs and development plans in order to address the aggregate need for the construction and operational maintenance associated with the proposed Development. Recommendations will be made for mitigation measures and reinstatement to minimise potential landscape, visual, hydrological and hydrogeological impacts from the excavations. Potential impacts from noise, dust and vibration are also considered.

Assessment Method

1.8 The assessment has involved the following stages:

- Desk study;
- Site reconnaissance;
- Borrow pit design; and
- Environmental review.

2 DESK STUDY

Information Sources

2.1 The desk study involved a review of available relevant information sources on the ground conditions in and around the site. Information sources included:

- Ordnance Survey (OS) mapping at 1:50,000 and 1:25,000 and Terrain 5 digital terrain model;
- High-resolution orthorectified aerial and satellite imagery;
- British Geological Survey (BGS) online and digital geological mapping, 1:50,000 scale;
- Scotland's Soils digital soil mapping, 1:250,000 scale;
- Data provided by ScottishPower Renewables (hereinafter referred to as the Applicant) including turbine foundation and track design specifications;
- Data for the proposed Development held by RSK.

Geology

2.2 Geological information is derived from the British Geological Survey (BGS) GeoIndex online geological mapping at a 1:50,000 scale and the BGS Lexicon of Named Rock Units (BGS, 2024a, b).

Bedrock Geology

2.3 The bedrock within the Site is predominantly greywacke sandstone, ranging from fine to very coarse grained and locally pebbly, with some bands of mudstone, siltstone and conglomerate in places. A minor area of breccia, a small intersection of mudstone, chert and smectite-claystone, and sandstone are present at the southern end of the Site Access **(Figure 10.3.1a)**.

2.4 All three borrow pits on Site are underlain by sandstone, mudstone, siltstone and conglomerate from the Queensberry Formation.

Superficial Geology

2.5 Superficial geology mostly consists of diamicton till (BGS, 2024a), although much of the Site is without any mapped superficial geology. In the turbine area to the west of the Site, diamicton till is the most prominent, along with a few peat deposits. The largest of these peat deposits is located roughly 1 km north-east of Auchengeith Hill, the second between the peaks of Auchengeith Hill and Big Craig, and the last is 300 m north-west of Auchengeith Hill.

2.6 To the east of the Site, along the access track to the turbine area, the area is underlain by diamicton till, peat and alluvium (comprising silt, sand, and gravel). A single peat deposit is found where the access track intersects the Deer Burn **(Figure 10.3.1b)**.

2.7 None of the borrow pits on Site are underlain by mapped superficial geology.

Soils

2.8 The Soil Survey of Scotland (1981) digital soils mapping indicates that the soil coverage within the Application Boundary is predominantly peaty gleys, peat podzol, and noncalcareous gleys (brown forest soils). Peat gleys are described as poorly drained acidic soils which support wet heathland and rough grassland communities. An area to the south of the turbine area has been identified as predominantly peaty podzols, which often has a thin iron-pan restricting the flow of water deeper into the soil. A small section of the access track to the turbine area, at Deer Burn, has been identified as Peat.

2.9 NatureScot's Carbon and Peatland map (NatureScot, 2016) has been consulted to understand the carbon-rich soils, deep peat and priority peatland habitat within the Site. Soils are predominantly Class 4 (unlikely to include carbon-rich soils). There are some areas of Class 5 (peat depth greater than 50 cm but currently lack peatland vegetation), distributed throughout the Site. Two small areas are identified as Class 3 (peaty soils that support some or mostly peat-forming vegetation) in the north western and south eastern corners of the Site. The remainder of the Site is Class 0 (mineral soils).

2.10 Additional peat deposits have been identified during the Phase 1 and 2 peat depth surveys, and are detailed in **Figure 10.3** of **Chapter 10: Hydrology, Hydrogeology, Geology and Soils** of the EIA Report.

Mineral Extraction

2.11 The proposed Development is located in an area of forestry, part of which has previously undergone rock extraction.

2.12 Fourteen quarries are identifiable from OS 1:25,0000 scale mapping, five of which lie within the Site, and nine within 2 km of the Application Boundary.

2.13 Of the five quarries within the Application Boundary, two are located within the turbine area, Drumfadkens Quarry towards the north-west and Glencorse Hill Quarry in the centre. The three remaining quarries are located along the access track to the turbine area, Killyminshaw Hill Quarry to the north west, Holehouse Hill Quarry in the south and Bog Shaw Quarry to the east. All quarries are identifiable on OS 1:25,000 scale mapping and are listed as ceased (BGS, 2024a).

2.14 One additional quarry is known to be present within the Site, but is not indicated on either the OS mapping or the BGS GeoIndex. This quarry is called Branrigg by FLS.

2.15 There are six ceased and inactive borrow pits, sand pits and gravel pits within the northern region of the Site (BGS, 2024a). However, these quarries are not identifiable on OS 1:25,000 scale mapping and, as they are ceased, are not considered to be of significance.

2.16 There are a number of ceased and inactive quarries, borrow pits, sand pits and gravel pits located in the study area to the south, east, and north west. Of these, nine are visible on OS 1:25,000 scale mapping. The remaining quarries are not identified on 1:25,000 scale mapping and, as they are ceased, are not considered to be of significance.

Rock Volumes

2.17 Calculation of aggregate requirement was undertaken by the Applicant's design team, and a total required volume was provided for the purpose of borrow pit design and assessment. A contingency of 20% was added to the estimated total, to allow for under-estimation in the requirements and for some excavated material being unsuitable for construction use.

2.18 The provided total aggregate volume required is 360,000 m^3. Including contingency, this amounts to a total of 432,000 m^3.

2.19 Three borrow pit areas have been identified to provide suitable rock for use as aggregate in turbine bases, hardstanding areas and access tracks. The volumes of material that could be supplied from each borrow pit are provided in Table 10.3.1.

Table 10.3.1: Aggregate volumes

Aggregate source	Required volume (m^3)	Design volume (m^3)
Borrow Pit 1 (Mitchelslacks	209,700	216,000
Borrow Pit 2 (Quarrybraes)	12,600	12,600
Borrow Pit 3 (Branrigg)	209,700	213,000
Total (m^3):	**432,000**	**441,600**

Design Optimisation

2.20 Design optimisation considers alternative directions and modes of working. The optimised borrow pit designs provide, in the first instance, for the rock requirement whilst also considering, in line with PAN 50: Controlling the environmental effects of surface mineral workings (Scottish Government, 1996), potential impacts on:

- Landscape;
- Ecology;
- Hydrology; and
- Hydrogeology.

2.21 Potential impacts on humans relate principally to operational factors and include:

- Noise;
- Vibration;
- Dust; and
- Visibility.

2.22 The physical constraints of rock suitability and topography, and the requirement to plan for a suitable restoration scheme, have been primary considerations in the borrow pit design. The preferred option has been to use up to three borrow pits to supply rock aggregate for the proposed Development. All three borrow pits are current or former aggregate sources used by FLS for track maintenance and are located along existing track infrastructure.

2.23 The rock within the Site has been assessed visually by an experienced geotechnical specialist as potentially suitable for track and hardstanding construction and this is borne out by experience using the material for forestry and existing windfarm tracks. However, rock exposure within the Site is relatively limited and there are likely to be local variations that restrict suitability of some of the aggregate, particularly for track running surfaces.

3 BORROW PIT METHOD OF WORKING

The Quarries Regulations 1999

3.1 The principles of the Quarries Regulations 1999, as set out in the Health & Safety Executive's document "Health and Safety at Quarries: The Quarries Regulations 1999 Approved Code of Practice" (HSE, 2013), would be followed by the appointed Contractor to provide a safe working environment during the development of the Proposed Development's borrow pits. The excavation designs must, in the first instance, provide safe and stable slopes which encompass the principle of '*design for closure*'. Haul and access roads should be of adequate width for the plant to be used on Site and allow for the provision of edge protection in all locations where applicable.

The Water Environment (Controlled Activities) (Scotland) Regulations 2011

3.2 The *Water Environment (Controlled Activities) (Scotland) Regulations 2011* as amended provide a regulatory framework to prevent pollution of the groundwater environment. Related to these, the Scottish Environment Protection Agency's (SEPA) publication *The Water Environment (Controlled Activities) (Scotland) Regulations (as amended): A Practical Guide)* (2024) sets out good practice guidelines to prevent pollution of the groundwater environment. These guidelines reflect good operational practices and would be implemented at the Proposed Development.

3.3 Where authorisations are required for process plant operation or consents to discharge (under the *Water Environment Controlled Activities (Scotland) Regulations 2011* as amended and the *Pollution Prevention and Control (Scotland) Regulations 2012*) these would be obtained in advance from SEPA.

Borrow Pit 1: Development

3.4 The proposed Borrow Pit 1 (BP1), known by FLS as 'Mitchelslacks Quarry', is located along the Application Boundary in the north of the Site and is currently in use by FLS. The proposed Borrow Pit has been previously excavated and is surrounded by commercial forestry (**Photograph 10.3.1**).

3.5 The existing topography of the proposed borrow pit area, the borrow pit development plan and the borrow pit cross-section are illustrated on **Figure 10.3.2.**

Photograph 10.3.1: View from the base of the existing borrow pit looking up the back wall, taken at 29524 59410 looking south east.

Topsoil Stripping and Storage

3.6 The Phase 1 and 2 peat depth surveys indicate that the proposed borrow pit area has no peat cover. Soil depth records within the borrow pit footprint were found to be between 0.1 to 0.2 m; surrounding this area, depths range from 0.1 to 0.3 m. It has been estimated based on survey measurements that the average depth of soil across the borrow pit footprint is 0.08 m. The borrow pit is located on a north-facing slope.

3.7 The borrow pit would be worked in strips from the existing working faces, to ensure that only enough aggregate for the proposed Development is obtained and to limit the impacts of the borrow pit to as confined an area as possible.

3.8 Topsoil would be removed in strips from the initial excavation area and would be stored in a temporary storage area. Topsoil would be stored in mounds which would not exceed 2 m in height, to minimise compaction of the soil. Additionally, the mounds would be shaped to promote shedding of water. Some limited blading would be undertaken on the soil mound surface to assist in the shedding of water and to minimise surface erosion in wet conditions. Mounds would not be compacted.

3.9 As the borrow pit excavation develops, the topsoil would be removed in advance of the active excavation and would be used elsewhere in the proposed Development as appropriate. Removed topsoil, plus rock material unsuitable for use as aggregate or fill, would be used in the final restoration of the borrow pit.

Extraction of Rock

3.10 The sandstone bedrock would be obtained by blasting. The blast techniques to be used would depend on the depth of rock to the borrow pit floor level at 272 m above Ordnance Datum (AOD). As the borrow pit has been excavated previously, face blasting is likely to

be the most practical method of extraction. Face blasting typically involves one or two rows of blast holes drilled to the target depth parallel to and behind an existing face.

3.11 The proposed location of the borrow pit is at the existing Mitchelslacks Quarry and additional workings are proposed to the south, east and west in line with previous excavation directions in this location. Access would be from the north by the existing track, just off the main access track through the Site. The previously excavated area is on flat ground, with slopes rising to the south, east and west.

3.12 The borrow pit has been designed to have four working faces and up to eight subsidiary faces, with a gently sloping floor level at 272 m AOD. The working faces would be up to 15 m in height, blasted at an angle of 75° from the horizontal. The general direction of working would be to the east, with blasted rock removed and transported to the relevant area of construction, although working towards the south-east may also be necessary.

3.13 Effects during rock extraction from noise and dust would be minimised by keeping the use of processing plant to a minimum. The blast pattern would be kept tight to maximise fragmentation, although some processing is likely to be required to produce aggregate of suitable grade for track construction. Blast design, including charge weights and delays, is the responsibility of the contractor. Processing plant would be operated only for short periods of time, as necessary to provide the aggregate requirement for construction works.

Drainage

3.14 Drainage would be directed to the northern corner, where water treatment would be provided for the borrow pit. The borrow pit floor would have a gentle slope during rock extraction, to allow for free drainage out of the borrow pit.

3.15 Natural surface runoff would be diverted around the active excavation area by construction of a low soil bund (0.5 m high) around the outer edge of the excavation, to ensure that runoff is prevented from flowing directly into the excavation. Blind ditches would be created as necessary to control water flow.

3.16 During blasting operations, joints and fractures in the sub-drill zone below the target extraction level are opened up by the expansion of gases generated by the explosives. In consequence, incident rainfall into the operational area would mostly infiltrate into the borrow pit floor. Any excess runoff would be diverted towards a constructed water collection sump, from where collected water would be allowed to discharge slowly into the trackside drainage system.

Restoration

3.17 It is likely that Mitchelslacks Quarry would need to be retained as an active excavation site for future use by Forestry and Land Scotland (FLS). As such, formal restoration plans are not appropriate at this stage.

Borrow Pit 2: Development

3.18 Borrow Pit 2 (BP2), known by FLS as 'Quarriebraes Quarry', is located in the middle of the Site at Glencorse Hill and is currently in use by FLS. The proposed Borrow Pit has been previously excavated and is surrounded by commercial forestry.

3.19 **Photograph 10.3.2** shows a view from the top of BP2 looking south-west over the excavation area. **Photograph 10.3.3** shows the view from the borrow pit floor looking south to the back wall.

Photograph 10.3.2: View from the existing borrow pit's eastern face looking across to the western face at 29588 59141.

Photograph 10.3.3: View from the base of the existing borrow pit looking up the back wall, taken at 29584 59138 looking south.

3.20 The existing topography of the proposed borrow pit area, the borrow pit development plan and the borrow pit cross-section are illustrated on **Figure 10.3.3**.

Topsoil Stripping and Storage

3.21 The Phase 1 and 2 peat depth surveys indicate that the proposed borrow pit area and immediate surroundings have no peat cover. Soil depths within the borrow pit footprint range from 0.1 to 0.2 m; immediately surrounding this area, depths range from 0.1 to 0.4 m. It has been estimated, based on survey measurements, that the average depth of soil across the borrow pit footprint is 0.02 m. The borrow pit is located at an existing north-facing quarry.

3.22 The borrow pit would be worked in strips from the existing working faces, to ensure that only enough aggregate for the proposed Development is obtained and to limit the impacts of the borrow pit to as confined an area as possible.

3.23 Topsoil would be removed in strips from the initial excavation area and would be stored in a temporary storage area. Topsoil would be stored in mounds which would not exceed 2 m in height, to minimise compaction of the soil. Additionally, the mounds would be shaped to promote shedding of water. Some limited blading would be undertaken on the soil mound surface to assist in the shedding of water and to minimise surface erosion in wet conditions. Mounds would not be compacted.

3.24 As the borrow pit excavation develops, the topsoil would be removed in advance of the active excavation and would be used elsewhere in the proposed Development, as appropriate. Removed topsoil, plus rock material unsuitable for use as aggregate or fill, would be used in the final restoration of the borrow pit.

Extraction of Rock

3.25 The sandstone bedrock would be obtained by blasting. The blast techniques to be used depends on the depth of rock to the borrow pit floor level at 278 m AOD. The blasting process is described fully under **Section 3 (Borrow Pit 1: Development, Extraction of).**

3.26 The proposed location of the borrow pit is at the existing Quarriebraes Quarry and additional workings are proposed to the south, east and west in line with previous excavation directions in this location. Access would be from the north by the existing track, just off the main track through the Site. The previously excavated area is on flat ground, with slopes rising to the south, east and west.

3.27 The borrow pit has been designed to have four working faces and up to eight subsidiary faces, with a mainly flat floor level at 278 m AOD. The working face would be up to 15 m in height, blasted at an angle of 75° from the horizontal. The general direction of working would be to the south-east with additional working to the north-east and south-west, with blasted rock removed and transported to the relevant area of construction.

3.28 Effects during rock extraction from noise and dust would be minimised by keeping the use of processing plant to a minimum. The blast pattern would be kept tight to maximise fragmentation, although some processing is likely to be required to produce aggregate of suitable grade for track construction. Blast design, including charge weights and delays, is the responsibility of the contractor. Processing plant would be operated only for short

periods of time, as necessary to provide the aggregate requirement for construction works.

Drainage

3.29 Drainage would be directed to the northern side, where water treatment would be provided for the borrow pit. The borrow pit floor would have a gentle slope during rock extraction, to allow for free drainage out of the borrow pit. This may be modified as part of the restoration process, depending on the ecological outcomes desired following restoration.

3.30 Natural surface runoff would be diverted around the active excavation area by construction of a low soil bund (0.5 m high) around the outer edge of the excavation, to ensure that runoff is prevented from flowing directly into the excavation. Blind ditches would be created as necessary to control water flow. During blasting operations, joints and fractures in the sub-drill zone below the target extraction level are opened up by the expansion of gases generated by the explosives. As a consequence, rainfall into the operational area would mostly infiltrate into the borrow pit floor. Any excess runoff would be diverted towards a constructed water collection sump, from where collected water would be allowed to discharge slowly into the trackside drainage system.

Restoration

3.31 It is likely that Quarriebraes Quarry would need to be retained as an active excavation site for future use by FLS. As such, formal restoration plans are not appropriate at this stage.

Borrow Pit 3: Development

3.32 The proposed Borrow Pit 3 (BP3), known by FLS as ‘Branrigg Quarry’, is found along the main access track to the Site, approximately 300 m east of where the Bran Burn intersects the access track. The proposed Borrow Pit has previously been excavated for aggregate material for use by FLS and is easily accessible along well-maintained tracks. BP3 is surrounded by commercial forestry, with the Bran Burn being the closest watercourse.

3.33 **Photograph 10.3.4** below is taken from the top of BP3.

3.34 The existing topography of the proposed borrow pit area, the borrow pit development plan and the borrow pit cross-section are illustrated in **Figure 10.3.4**.

Photograph 10.3.4 View across existing working area at BP3 from 29849 59552.

Topsoil Stripping and Storage

3.35 Phase 1 and 2 peat depth survey data indicates that the proposed borrow pit location has some small pockets of peat cover, notably around the northern and eastern edges and in the south-eastern corner. Peat depth ranges from 0.1 to 1.5 m within the borrow pit footprint area, and 0.3 to 1.6 m immediately surrounding this area. It has been estimated from survey measurements that the average peat depth across the borrow pit footprint area is 0.1 m. The borrow pit is on a western-facing slope and surrounded by commercial forestry.

3.36 Rock extraction would be targeted in areas without peat as far as possible.

3.37 The borrow pit would be worked in strips from the existing working faces, to ensure that only enough aggregate for the proposed Development is obtained and to limit the impacts of the borrow pit to as confined an area as possible.

3.38 Topsoil would be removed in strips from the initial excavation area and would be stored in a temporary storage area. Topsoil would be stored in mounds which would not exceed 2 m in height, to minimise compaction of the soil. Additionally, the mounds would be shaped to promote shedding of water. Some limited blading would be undertaken on the soil mound surface to assist in the shedding of water and to minimise surface erosion in wet conditions. Mounds would not be compacted.

3.39 As the borrow pit excavation develops, the topsoil would be removed in advance of the active excavation and would be used elsewhere in the proposed Development, as appropriate. Removed topsoil, plus rock material unsuitable for use as aggregate or fill, would be used in the final restoration of the borrow pit.

Extraction of Rock

3.40 The sandstone bedrock would be obtained by blasting. The blast techniques to be used would depend on the depth of rock to the borrow pit floor level at 280 m AOD. The blasting process is described fully under **Section 3 (Borrow Pit 1: Development, Extraction of rock)** and a similar process would be used for BP3.

3.41 The proposed location of the borrow pit is at the existing Branrigg Quarry and additional workings are proposed to the north, east and south in line with previous excavation directions in this location. Access would be from the south-eastern corner by the existing track, just off the main track through the Site. The previously excavated area is on flat ground, with slopes rising to the north, east and south.

3.42 The borrow pit has been designed to have one working face and two subsidiary faces, with a mainly flat floor level at 280 m AOD. The working face would be up to 10 m in height, blasted at an angle of 75° from the horizontal. The general direction of working would be to the east with additional working to the south and north, with blasted rock removed and transported to the relevant area of construction.

3.43 Effects during rock extraction from noise and dust would be minimised by keeping the use of processing plant to a minimum. The blast pattern would be kept tight to maximise fragmentation, although some processing is likely to be required to produce aggregate of suitable grade for track construction. Blast design, including charge weights and delays, is the responsibility of the contractor. Processing plant would be operated only for short periods of time, as necessary to provide the aggregate requirement for construction works.

Drainage

3.44 Drainage would be directed to the south-western corner, where water treatment would be provided for the borrow pit. The borrow pit floor would have a gentle slope during rock extraction, to allow for free drainage to the water treatment area. This may be modified as part of the restoration process, depending on the ecological outcomes desired following restoration.

3.45 Natural surface runoff would be diverted around the active excavation area by construction of a low soil bund (0.5 m high) around the outer edge of the excavation, to ensure that runoff is prevented from flowing directly into the excavation. Blind ditches would be created as necessary to control water flow.

3.46 During blasting operations, joints and fractures in the sub-drill zone below the target extraction level are opened up by the expansion of gases generated by the explosives. As a consequence, rainfall into the operational area would mostly infiltrate into the borrow pit floor. Any excess runoff would be diverted towards a constructed water collection sump, from where collected water would be allowed to discharge slowly into the trackside drainage system.

Restoration

3.47 It is likely that Branrigg Quarry would need to be retained as an active excavation site for future use by FLS. As such, formal restoration plans are not appropriate at this stage.

4 ENVIRONMENTAL REVIEW

4.1 Most potential environmental effects associated with borrow pit development have been considered within the relevant EIA Report chapters. As a result, this section provides a brief review of environmental issues not addressed elsewhere.

4.2 Borrow pit operations are relatively small-scale, owing to the limited aggregate volume requirement for the new and upgraded access tracks and hardstanding areas.

Dust

4.3 Dust emissions can arise from blasting, processing, loading-out and stockpiled material. They are sensitive to weather conditions, typically being worst in dry and windy weather. Water sprays would be available at the proposed Development for use in dust suppression in dry and windy conditions, to control and minimise dust emissions. Any processing plant brought to the proposed Development would have integral dust suppression systems to control dust emissions during processing. Effects from dust would be limited to active excavation at the borrow pits, notably during blasting, processing and loading-out of oversized and processed material. With appropriate controls in place, effects from dust emissions would be negligible.

Lighting

4.4 Any lighting associated with the borrow pits should have a clearly defined purpose and be directed to where it is required in order to provide a safe working environment. Lighting would only be used when necessary and would be switched off when not required.

Site Stability

4.5 Site stability has been assessed as part of the survey and design work for the borrow pits and has been incorporated into the design as part of a safe working environment. The proposed restoration scheme takes into consideration the requirement for long-term safety with respect to future land use.

5 CONCLUSIONS

5.1 This report sets out details with respect to the operational design for the borrow pits for the proposed Development, in order to supply the need for the proposed access track, turbine foundations and hardstanding requirements. The borrow pit design and recommended methods of operation are in line with the *Quarries Regulations, Approved Code of Practice, 1999* to provide a safe working environment and minimise risk of instability.

5.2 An Environmental Review of potential effects from the borrow pit operation has been undertaken. Use of best practice working methods and other mitigation methods as appropriate would be put in place during all borrow pit operations. It is concluded that residual effects would be minor, long-term and adverse during borrow pit operation.

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296000 300000 304000 308000

596000 592000

Branrigg Quarry
Mitchelslacks
Quarriebraes
Area A
Area B
T01
T02
T03
T04
T05
T06
T07
T08
T09
T10
T11
T12

Legend

Infrastructure
- Application Boundary
- Proposed Turbine Location
- Proposed Hardstanding
- Proposed Junction
- Existing Borrow Pit
- Proposed Meterological Mast
- Proposed Substation and Control Building Compound
- Proposed Construction Compound
- Proposed Parking Area
- Proposed New Access Track
- Proposed New Floating Access Track
- Proposed Upgraded Track
- Habitat Management Plan Area

Linear Features
- Linear Faults

Bedrock Geology
- Carghidown Formation
- Carron Basalt Formation
- Closeburn Limestone Formation
- Corncockle Sandstone Formation
- Gala Unit 4
- Gala Unit 5
- Gala Unit 6
- Gala Unit 7
- Glendearg Formation
- Hartfield Formation
- Locherben Breccia Formation
- Moffat Shale Group
- Mull Dyke-Swarm
- North Britain Dyke Suite
- Queensberry Formation
- Scottish Coal Measures Group
- Scottish Lower Coal Measures Formation
- Scottish Middle Coal Measures Formation
- Scottish Upper Coal Measures Formation
- Selcoth Formation
- Thornhill Sandstone Formation
- Townburn Sandstone

N

ScottishPower Renewables

Rev	Date	By	Comment
B	02/12/24	CP	Revised Legend and Symbology
A	16/09/24	CP	First Issue.

1:41000 Scale @A3

0 0.75 1.5 Km

Harestanes West Windfarm

Figure 10.3.1a
Geology Mapping

Drg No	HSTW-WRC-10.3.1a
Rev	B
Date	02/12/24
Figure	10.3.1.a

Datum: OSGB36 Projection: TM

292000 296000 300000 304000

596000 592000

Mitchelslacks
T01
T02
T03
T04
Quarriebraes
T05
T06
T07
T08
T09
Area A
T10
T11
T12
Branrigg Quarry
Area B

Legend

N

Infrastructure

- Application Boundary
- Proposed Turbine Location
- Proposed Hardstanding
- Proposed Junction
- Existing Borrow Pit
- Proposed Meterological Mast
- Proposed Substation and Control Building Compound
- Proposed Construction Compound
- Proposed Parking Area
- Proposed New Access Track
- Proposed New Floating Access Track
- Proposed Upgraded Track
- Habitat Management Plan Area

Superficial Geology

- Alluvial Fan Deposits
- Alluvium
- Glaciofluvial Deposits
- Gretna Till Formation
- Kilblane Sand and Gravel Formation
- Kirkbean Sand and Gravel Formation
- Langholm Till Formation
- Peat
- River Terrace Deposits
- Superficial Deposits
- Till, Devensian

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1:41000 Scale @A3

0 0.75 1.5 Km

Harestanes West Windfarm

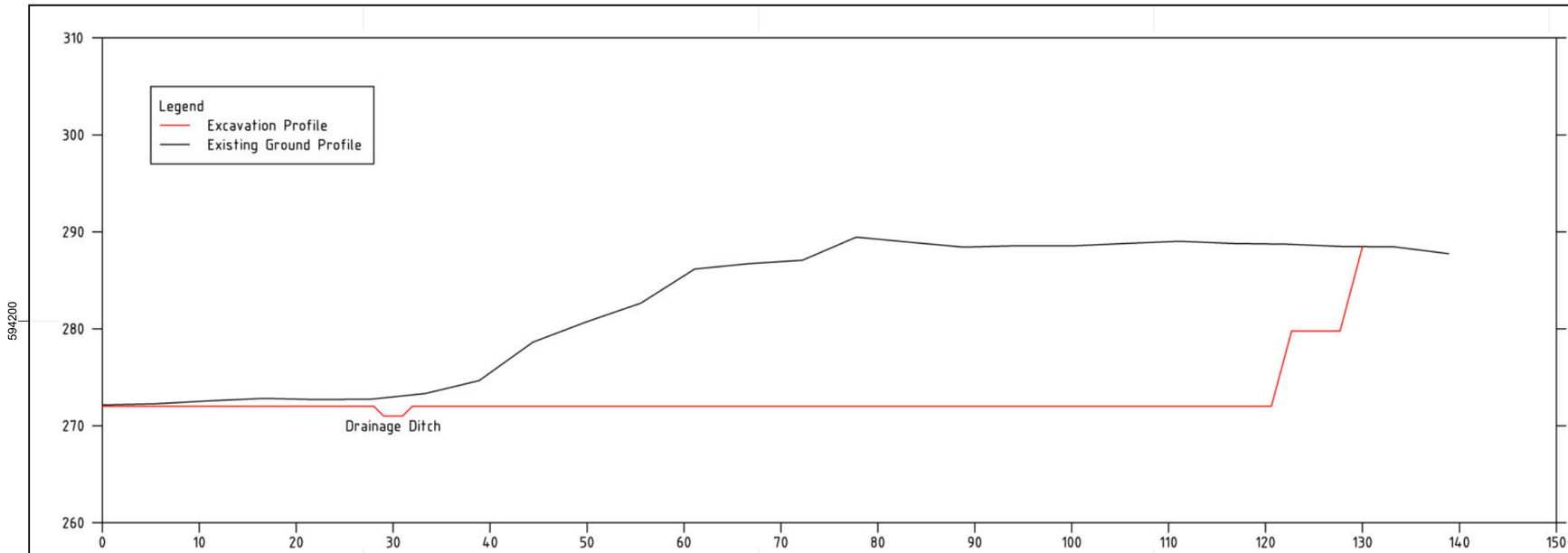
Figure 10.3.1b

Superficial Geology

Drg No	HSTW-WRC-10.3.1b
Rev	B
Date	02/12/24
Figure	10.3.1.b

Datum: OSGB36 Projection: TM

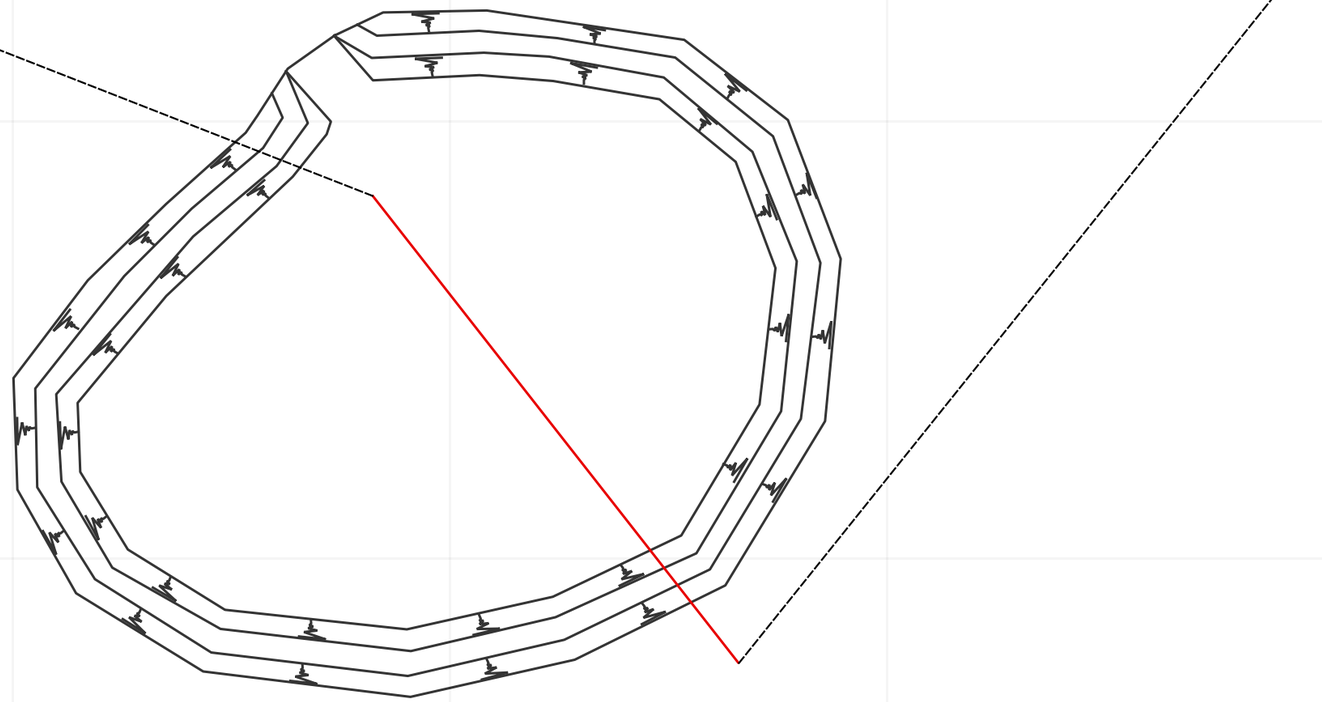
295200 295300 295400 295500 295600



Legend

N

Outline Design — Cross-sectional line



594200 594100 594000

295200 295300 295400 295500 295600

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A	28/11/24	SJ	First Issue.

1:1400
Scale @A3

0 30 60 m

Harestanes West Windfarm

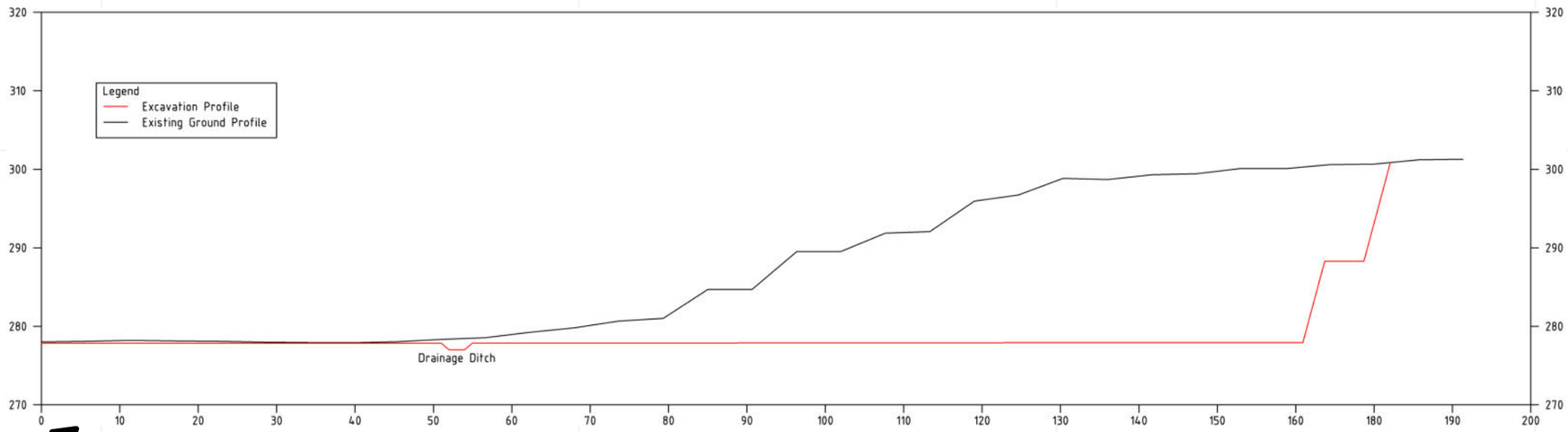
Figure 10.3.2

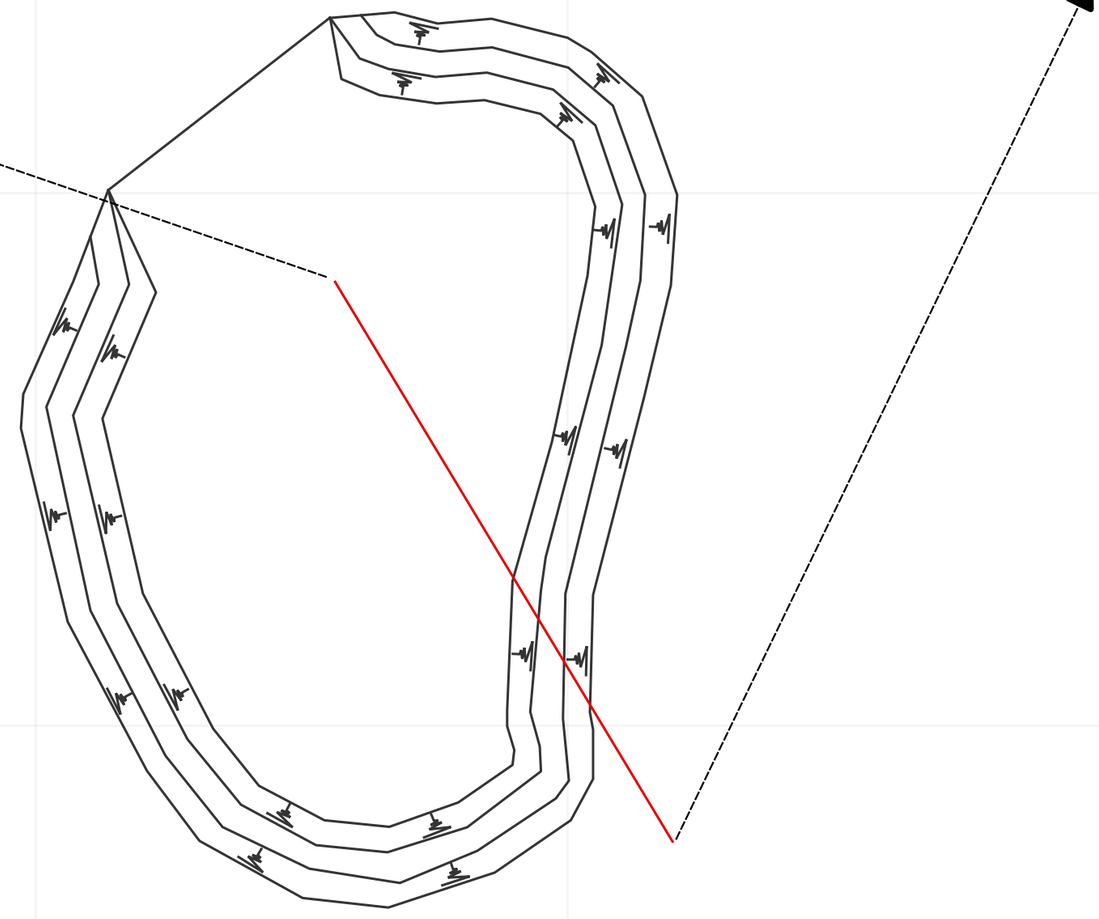
Borrow Pit 1

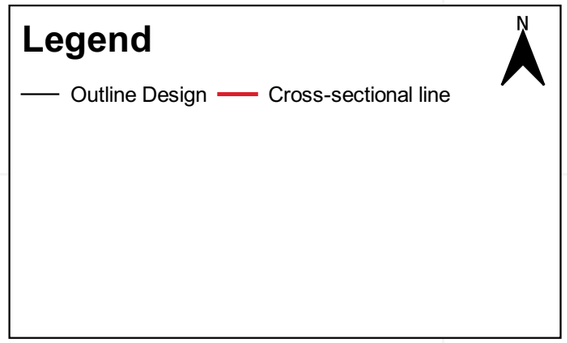
Drg No	HSTW-WRC-10.3.2	
Rev	A	Datum: OSGB36
Date	28/11/24	Projection: TM
Figure	10.3.2	

295700 295800 295900 296000 296100

591500 591400 591300







295700 295800 295900 296000 296100

ScottishPower Renewables					1:1100 Scale @A3	0 20 40 m	**Harestanes West Windfarm** Figure 10.3.3 Borrow Pit 2
	A	28/11/24	SJ	First Issue.	**No Copyright Attributions**		
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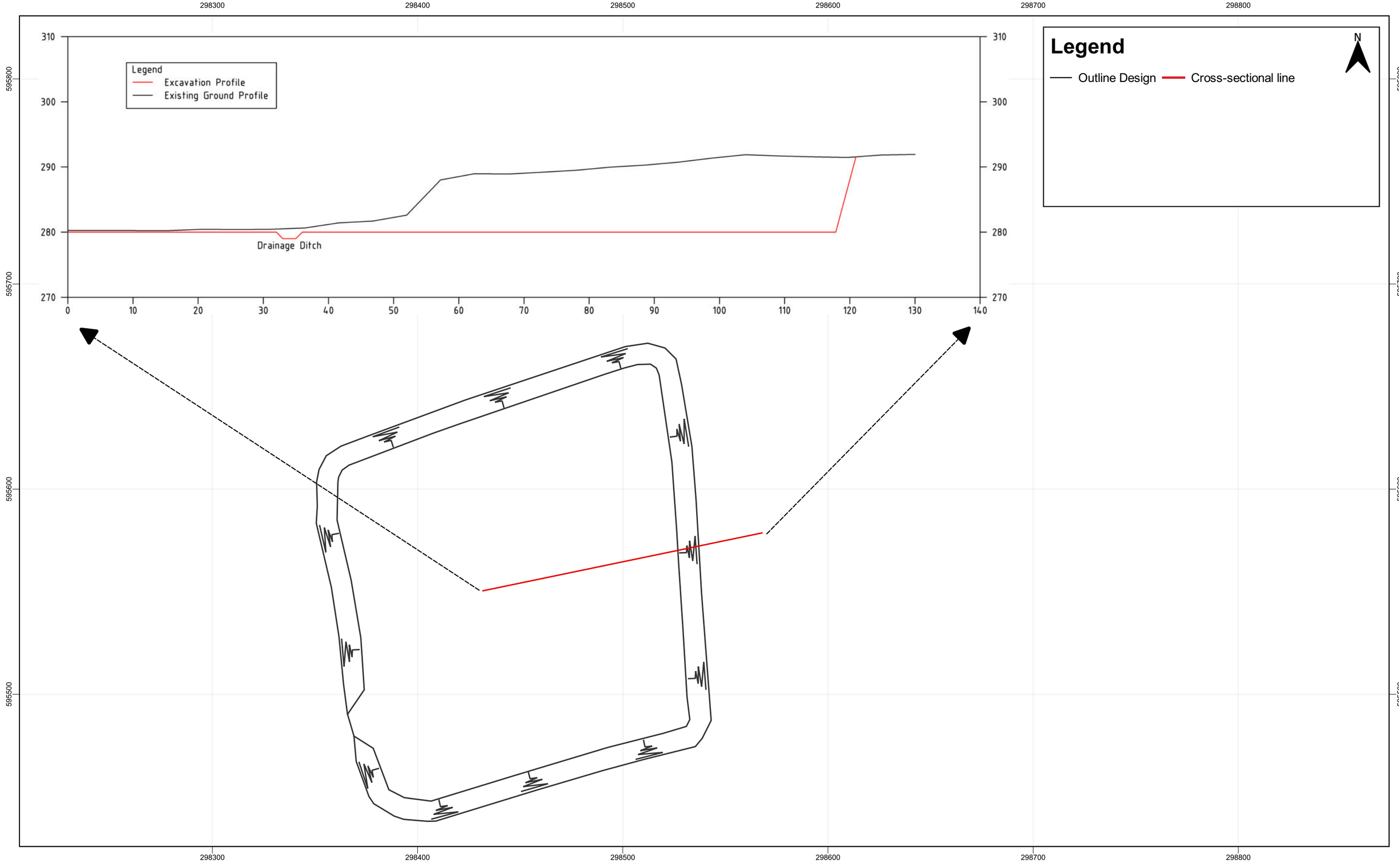
Drg No	HSTW-WRC-10.3.3	
Rev	A	Datum: OSGB36 Projection: TM
Date	28/11/24	
Figure	10.3.3	



ScottishPower Renewables					1:1700 Scale @A3	0 30 60 m	**Harestanes West Windfarm** Figure 10.3.4 Borrow Pit 3
	A	28/11/24	SJ	First Issue.	**No Copyright Attributions**		
	Rev	**Date**	**By**	**Comment**			

Drg No	HSTW-WRC-10.3.4	
Rev	A	Datum: OSGB36 Projection: TM
Date	28/11/24	
Figure	10.3.4	