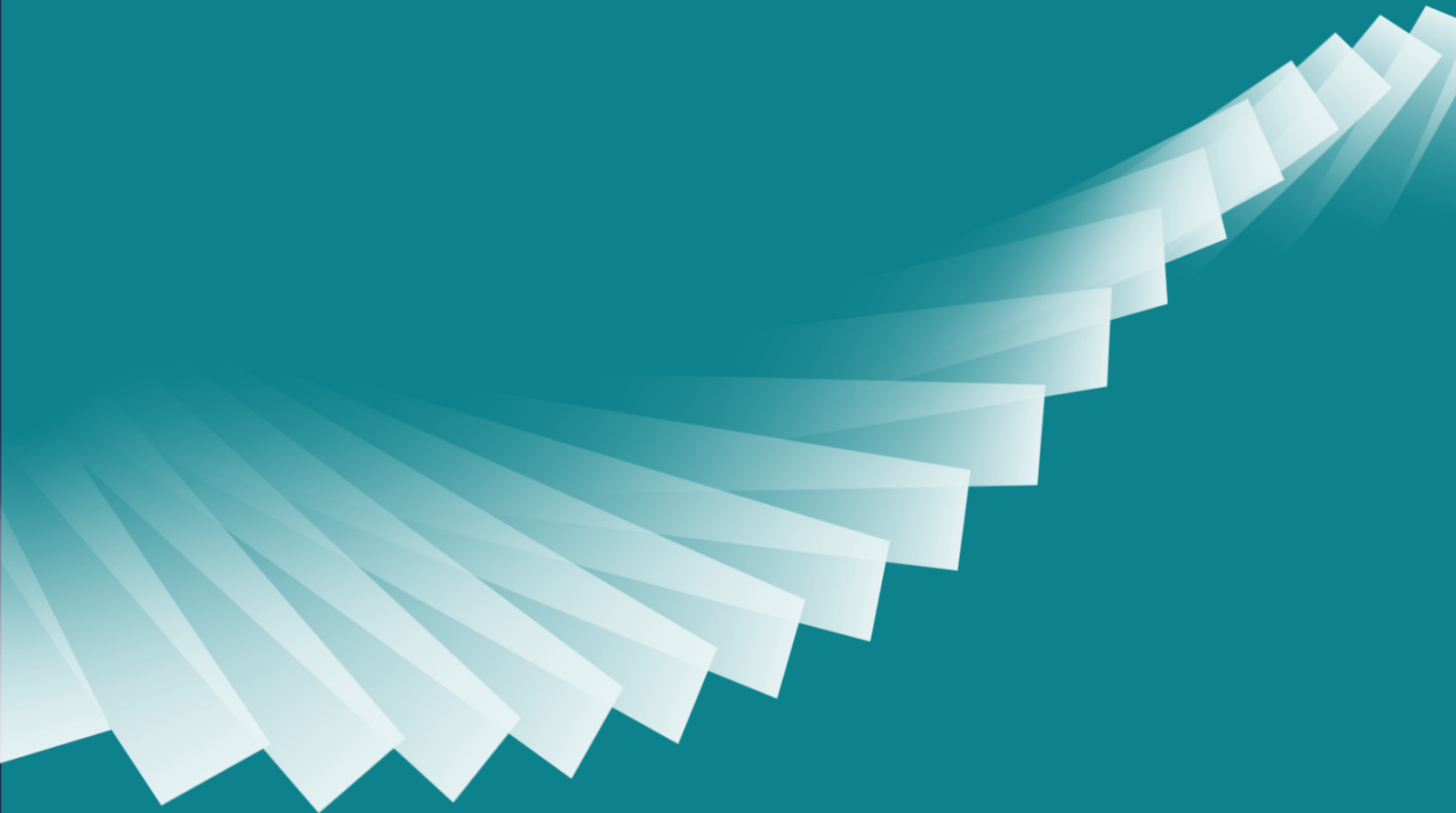




Bute Energy
Aberedw Energy Park

Appendix 4.1:

Outline Borrow Pit Restoration Plan





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1. Introduction

1.1. Instruction

Aqua Terra Consultants Ltd (Aqua Terra) was instructed by Land Use Consultants Ltd (LUC; the Client) on behalf of Aberedw Energy Park Ltd to provide an Outline Borrow Pit Restoration Plan (OBPRP) for the proposed Aberedw Energy Park near Builth Wells (the Site). Instruction to proceed in accordance with Aqua Terra Consultants Work Scope was confirmed by LUC sub-consultant agreement 12522.

1.2. Brief

Aberedw Energy Park Ltd proposes to submit an application to Planning and Environment Decisions Wales for a Development of National Significance (DNS) consent under section 62D of the Town and Country Planning Act 1990 to develop Aberedw Energy Park (hereafter referred to as 'the Proposed Development') at the Site. The Site is located approximately 3 km east of Builth Wells and 1.25 km north of Aberedw.

Eighteen turbines and associated infrastructure are proposed to be constructed on the Site.

As part of the preparations for submission of permission to undertake the development under the Developments of National Significance (DNS) process, a Scoping Direction Response has been provided by the Welsh Government Soil, Peatland & Agricultural Planning Unit, known also as the Land Quality Advice Service (LQAS) in relation to the Proposed Development in January 2024¹. It states that *"if borrow pits are proposed, then more detailed information is required on the size, extent, location and after-use of the borrow pits. PEDW recommends the Applicant liaises directly with LQAS to ensure the required detail is provided in the ES. The Applicant's attention is also drawn to comments from NRW regarding dewatering requirements should borrow pits be used, in which case consideration should be given to the effects of dewatering on controlled waters identified in the water feature survey. If borrow pits are to be included as part of the development, they must be scoped into the ES in a proportionate manner."*

Through their responses in recent scoping directions and in their responses in recent DNS cases for upland windfarms, LQAS are placing increased emphasis on the management of soils (including peat) in the decommissioning phase of development, with a focus on the holistic management of soils through the entire project lifetime. The following points are of note from the LQAS scoping response²;

"If borrow pits are included, the proposal must address Paragraph 5.14.34 of Planning Policy Wales; "Borrow pits must be restored to the high standard expected of other forms of mineral development."

"For all borrow pits, the proposals will also need to specify the afteruse in accordance with Schedule 5, paragraph 2(1) of the 1990 Act. The agreed afteruse will inform the standard of restoration, the scheme and aftercare proposals. The proposals must demonstrate that the borrow pits can be

¹ DNS: EIA Scoping Direction DNS CAS-03009-N5D9K8: Aberedw Energy Park EIA Scoping Direction. Planning & Environment Decisions Wales. 5th April 2024.

² Welsh Government Soil, Peatland & Agricultural Land Use Planning Unit 2024. Scoping Direction Consultation Response – DNS CAS-03009-N5D9K8, Aberedw Energy Park

reclaimed to an acceptable standard and after-use through a detailed scheme that is achievable and to be able to condition against. The scheme must be presented at application, and in sufficient detail for the determining authority and statutory consultees to form a judgement as to its feasibility (as per MTAN1, paragraph 106). If there is significant doubt as to whether satisfactory reclamation can be achieved at the site, and as such, planning permission should be refused (MTAN1, paragraph 97)."

This OBPRP has been written to address these requirements. It has been prepared as an appendix to **Chapter 9: Hydrology, Hydrogeology and Geology** of the ES. It sits alongside **Appendix 9.5: Outline Soil Management Plan (SMP)** and **Appendix 4.5: Outline Decommissioning Plan** as a suite of documents that concern the management of the interaction that the Proposed Development will have with ground conditions.

1.3. Regulatory context

This ODP is based upon the following guidance documents:

- Planning Policy Wales Chapter 6³
- Minerals Technical Advice Note 1 (Aggregates), Welsh Government⁴
- NatureScot (2024) Good Practice During Windfarm Construction.
- Scottish Natural Heritage (2016) Decommissioning and restoration plans for wind farms – guidance. Version 2, February 2016⁵
- Welstead J, Hirst R, Keogh D, Robb G and Bainsfair R (2016) Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591.⁶
- WindEurope (2020) Decommissioning of onshore Wind Turbines – Industry guidance Document.⁷
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, Department for Environment, Food and Rural Affairs (Defra)⁸
- Good Practice Guide for Handling Soils in Mineral Workings, The Institute of Quarrying⁹.
- Environmental good practice on site guide (fifth edition)). CIRIA Report No. 811, 2023.

The publication of the updated Chapter 6 of PPW in October 2023 represents the most recent update to planning policy with regards to ground conditions and soils. It references the seven goals of the Well-being of Future Generations Act, listing protection of soils as one of the aspects underlying the

³ Welsh Government 2023. Letter to Addressing the Nature Emergency through the Planning System: Updated National Planning Policy for Chapter 6 of Planning Policy Wales. Published as Dear Chief Planning Officer (CPO) letter 18th October 2023.

⁴ Welsh Government 2004, Minerals Technical Advice Note 1 (Aggregates) [MTAN1]. Available at: <http://gov.wales/topics/planning/policy/mineralstans/?lang=en>

⁵ Scottish Natural Heritage (2016) Decommissioning and restoration plans for wind farms – guidance. Version 2, February 2016

⁶ Welstead J, Hirst R, Keogh D, Robb G and Bainsfair R (2016) Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591..

⁷ WindEurope (2020) Decommissioning of onshore Wind Turbines – Industry guidance Document.

⁸ Defra, 2009; 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites'. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/707134/pb13298-code-of-practice-090910.pdf

⁹ IoQ 2021. Good Practice Guide for Handling Soils in Mineral Workings. Institute of Quarrying. 2021. <https://www.quarrying.org/soils-guidance>

Resilient Wales goal. It provides the goal of Distinctive and Natural outcomes, and lists soil compaction and sealing, and soil carbon management as underpinning such outcomes.

Chapter 6 of PPW has some significant policy wording with reference to soils, the most salient of which have been drawn out and listed below (noting that there is some erroneous repetition in the numbering of paragraphs within the document):

- Paragraph 6.4.3 (page 9) requires that development proposals must consider the need to safeguard soil, including peat.
- Paragraph 6.4.21 (page 13) describes the step-wise approach to maintaining and enhancing diversity. Step 1 requires avoidance of habitats which are irreplaceable, the list of which includes peatland and “*long undisturbed soils*”. It states that proposals within these habitats are, “*as a matter of principle unacceptable*” and “*it will be wholly exceptional for development to be justifiable in such instances*”.
- Paragraph 6.4.20 (page 19) describes that where peat is identified within proposed developments considerable weighting shall be given to its protection, and “*unless other significant material considerations indicate otherwise it will be necessary to refuse permission.*”

1.4. Scope

The scope of this document has been defined in order to address the matters raised in the LQAS Scoping Direction response. It has also been drafted cognisant of the policy set out in Chapter 6 of PPW.

Section 2 provides some background context and explains the step-wise approach taken to the design of the development with respect to borrow pit location and extent, balancing the many environmental constraints and considerations that have needed to be taken into account in designing the Proposed Development.

Section 3 describes the borrow pit proposals for the Proposed Development, referring to the ES and other supporting documents where appropriate. It includes a description of the current land use at each proposed borrow pit location and soils present.

Section 4 describes the intended method of working and proposed beneficial after-use of the two proposed borrow pit locations and provides details, appropriate to the pre-consent stage of a wind farm development, to achieve this after-use.

2. Design context

2.1. Background

2.1.1. Borrow pits and detailed infrastructure design

Borrow pits are required to provide a source of aggregate for wind farm infrastructure. At pre-consent stage, Borrow Pit Search Areas are typically defined to enable an assessment of potential environmental impacts on an area of sufficient size to deliver, as far as can be predicted at pre-consent stage, the required volume of aggregate for the development. It is important to note that the currently proposed Borrow Pit Search Areas do not represent the anticipated scale of the borrow pits: Each search area is larger than is likely to be required, but represents the entirety of the area within which a borrow pit may be situated. The precise size and location of the borrow pit(s) within these search areas will be determined by:

- Detailed ground investigation, whereby boreholes and trial pits will be used to ascertain the rock quality and variability, and hence the suitability for each part of the two search areas to deliver the required aggregate volumes;
- Detailed civil engineering design, whereby the elevations, construction techniques and engineering options will be optimised in order to deliver a materials balance that is as near neutral as possible, thus minimising the amount of fill required; and,
- Detailed civils and structures design, whereby the actual required volume of aggregate of differing types can be defined.

It is only once these lengthy and resource-intensive processes of detailed design are sufficiently complete that the actual required extent of the borrow pits can be determined. Therefore, at this juncture, it is not possible to provide a detailed design for the proposed borrow pits. Hence this document is focussed on demonstrating certainty that the combination of development layout, borrow pit design and standard after-care techniques can deliver suitable restoration of the borrow pit features.

2.1.2. Resource and demand

The geology beneath the Proposed Development comprises Silurian mudstones and siltstones. In the north of the Site, they form the Builth Mudstones Formation. This is overlain successively by the Irfon Formation and the Cwm Graig Ddu Formation. In the west of the Site, the published geological mapping¹⁰ distinguishes between these three lithologies. They are described as follows:

Builth Mudstones Formation: Mudstone, blue-grey, laminated and calcareous, including slumped & disturbed beds, burrow-mottled mudstone and shelly limestone.

Irfon Formation: Mudstone, grey, thin-bedded with abundant siltstone laminae, including thick units of slumped or disturbed strata.

Cwm Graig Ddu Formation: Mudstone and siltstone, grey, thin-bedded, variably bioturbated, with abundant laminae and thin beds of sandstone.

¹⁰ BGS 2005. 1:50,000 Geology Series. England and Wales Sheet 196: Builth Wells.

In the east of the Site, the published mapping¹¹ does not distinguish between these Formations, describing them all as Wenlock and Ludlow Strata (undifferentiated) – mudstone, siltstone and sandstone, grey-brown.

In terms of the resource potential for use as an aggregate, the three Formations will likely vary little, with all three comprising a weak to moderately weak, well laminated mudstone or siltstone. The two proposed Borrow Pit Search Areas lie in the east of the Site, in the area mapped as undifferentiated.

The rocks beneath the Site are shown on published mapping to have bedding that dips moderately steeply (between 10 degrees and 25 degrees), with the orientation of this dip typically being towards the south-east.

The precise nature of the rock mass and its discontinuities beneath each proposed search area will need to be determined during the detailed ground investigation phase of works in due course. Notwithstanding this, it is anticipated that a well-designed borrow pit slope will remain stable at relatively steep angles (1 in 3 or steeper).

Chapter 4 of the ES provides a description of the proposed approach to sourcing aggregates for the development. The most sustainable approach is to source as much aggregate on the Site itself, thus minimising the environmental impacts associated with bulk aggregate haulage. It is anticipated that up to 50% of the required aggregate is sourced on Site, with imported aggregates typically being those meeting specialist requirements of the design.

2.2. Choosing borrow pit locations (step-wise approach)

The layout of the Proposed Development was designed as an iterative process, with each iteration being defined by the need to manage a range of environmental constraints. The proposed location for the borrow pits was defined using a step-wise approach, with each step discussed in turn below:

2.2.1. Avoidance

Due to their high environmental value and/ or sensitive nature, Borrow Pit Search Areas were placed such that they were outside the following;

- areas of peat (defined as having peat deeper than 30cm in thickness).
- areas assessed likely to have “long undisturbed soils” (see **Appendix 9.5: OSMP**).
- groundwater dependent terrestrial ecosystems (GWDTEs) (see **Appendix 9.2: Water Resources Assessment (WRA)**).
- Annex 1 and Section 7 habitats (see **ES Chapter 7: Ecology (non-avian)**).

ES Chapter 3 references Borrow Pit locations that were discounted.

2.2.2. Minimising impact

In order to minimise the impact that the borrow pits may have on sensitive receptors, they were also situated as follows;

- Outside of areas that are, or might be, hydrologically connected to peat bodies.
- At least 250m away from GWDTEs.

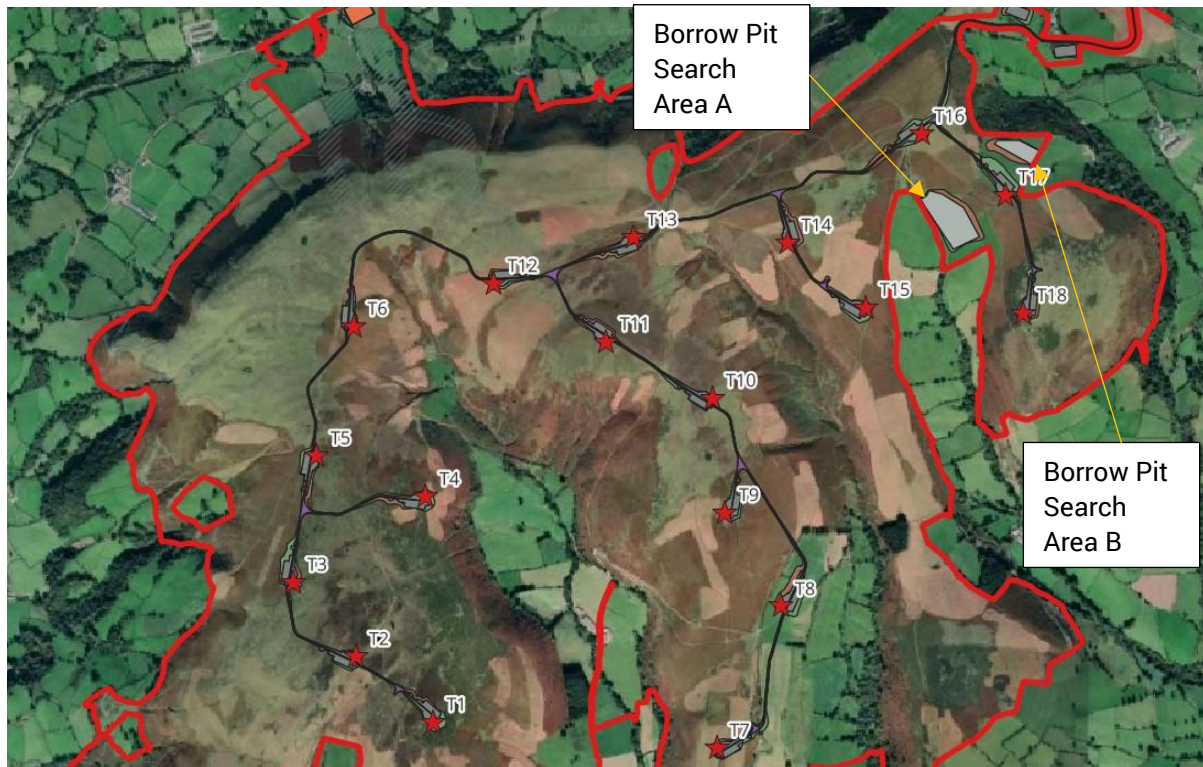
¹¹ BGS 2004. 1:50,000 Geology Series. England and Wales Sheet 197: Hay-on-Wye

- At least 50m from watercourses where possible, unless site specific mitigation measures are sufficient to mitigate any potential impacts.

The potential landscape and visual effects of the Borrow Pit Search Areas were also taken into account in **ES Chapter 5: Landscape and Visual Amenity**.

As a result of the above considerations, two Borrow Pit Search Areas were identified. These are illustrated in Figure 2-1 below:

Figure 2-1 Borrow Pit Search Areas



3. Borrow pit locations

3.1. Borrow Pit Search Area A

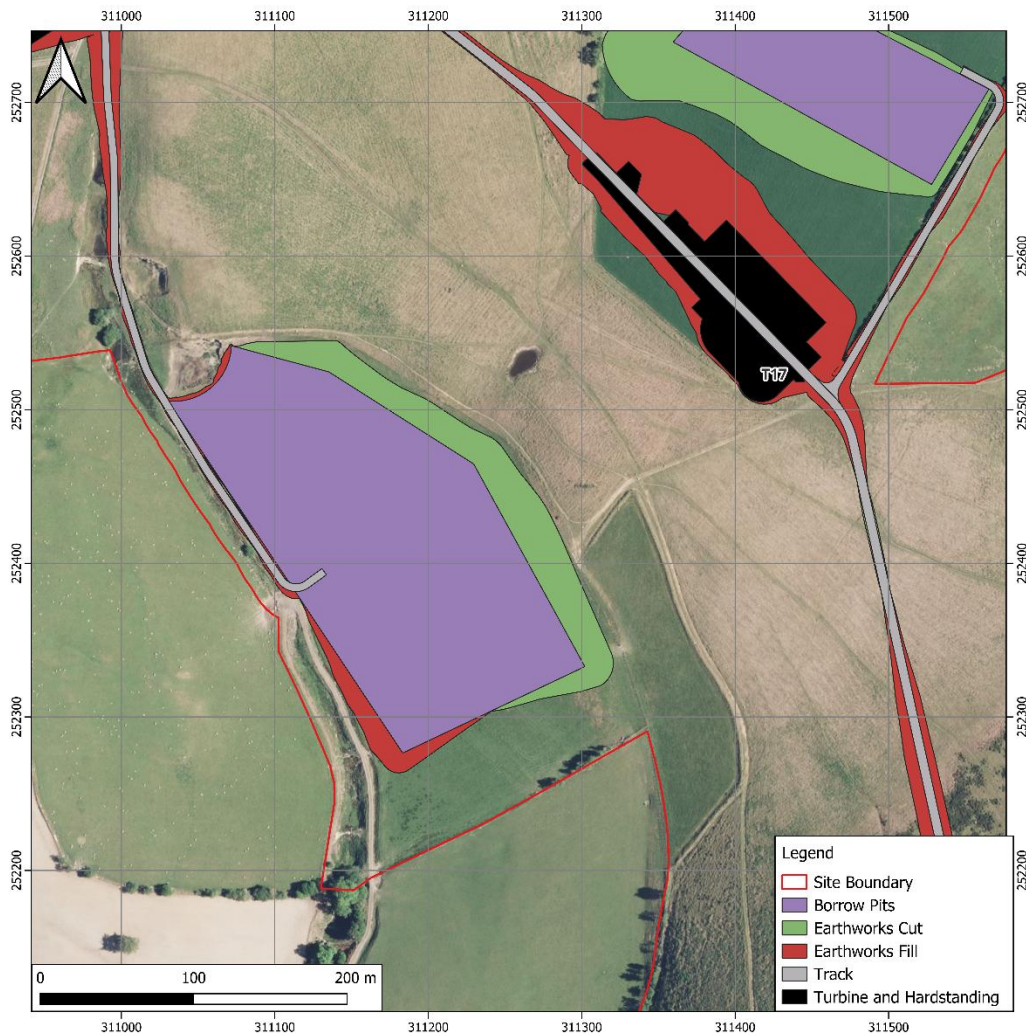
Borrow Pit Search Area A is centred on NGR 311173,252408. The area is shown to be underlain directly by mudstone and siltstone bedrock for the majority of its footprint, with the south-western corner shown as having some glacial till superficial deposits present. This corner of the footprint is topographically the lowest area and at the very edge of till coverage within the valley below. Hence the thickness of till is considered likely limited.

3.1.1. Current land use

The entirety of the Borrow Pit Search Area A is occupied by semi-improved grassland, as can be seen on

Figure 3-1. This area has been mapped during the NVC survey work undertaken in support of **Chapter 7: Ecology (non-avian)**. This describes the vegetation in the field in which the search area lies as being covered by improved grassland.

Figure 3-1 Borrow Pit Search Area A



3.1.2. Soils

The soil types and thicknesses on Site were mapped as part of the fieldwork undertaken in preparing Chapter 9 of the ES. This process is documented in the OSMP in **Appendix 9.5**.

Twenty-three soil probes were undertaken across the footprint of Borrow Pit A. The soil was recorded as a silt loam or sandy silt loam in the majority of these positions. Probes undertaken along the western edge of the Search Area were recorded to have a silty clay loam. This transition to a slightly heavier soil broadly aligns with the mapped presence of glacial till substrate in the lower, south-western part of the Search Area.

The silt loam and sandy silt loam was described as between 1cm and 15cm in thickness over a stony substrate. A distinct topsoil/ subsoil transition was not evident, and hence a distinct topsoil horizon was not differentiated. This sandy silt loam and silt loam is considered to represent a gradation from A horizon to B horizon. The stoney substrate upon which the soil gouge refused is likely a weathered bedrock C horizon.

The silty clay loam was recorded as between 7cm and 58cm thick over a cohesive substrate. Again, a gradation from topsoil to subsoil was seen, with a reduction in organic content with depth (albeit organic content was limited even in the uppermost part of the profile).

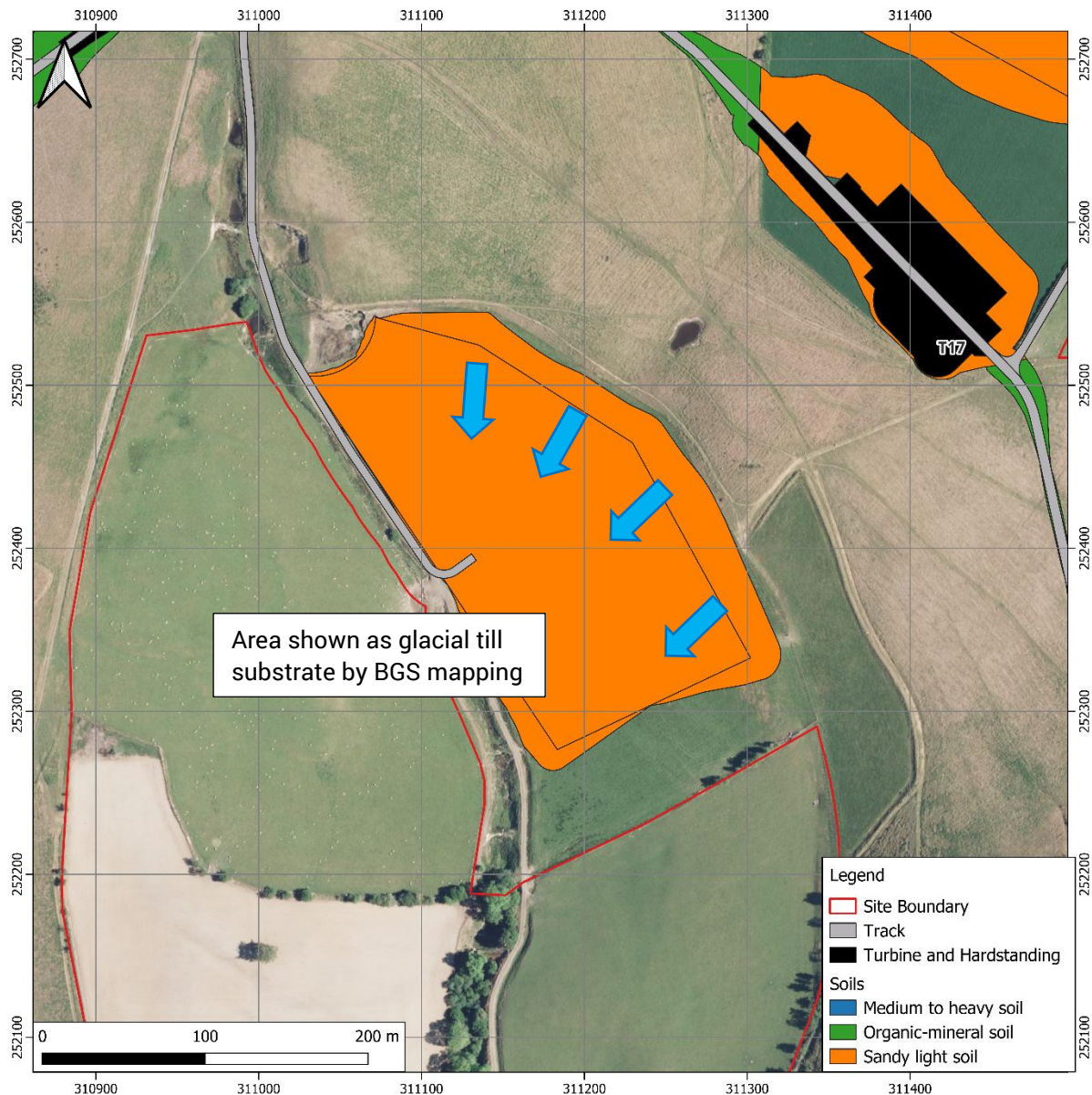
3.1.3. Topography and drainage

This Borrow Pit Search Area lies on a south-westerly facing slope. The land immediately to the north-east is a saddle in the upland plateau, between the isolated peak of Wylfre to the east and the wider Aberedw Hill plateau to the west.

The Search Area itself drains south-westwards to the stream that is situated in the base of the valley, a tributary of the River Edw.

The elevation of the land falls from approximately 370mAOD in the northern end of the area, to 340m at the southern end. The slope angle is approximately 1 in 5, or 11 degrees.

Figure 3-2 Borrow Pit Search Area A, soil type and drainage



3.2. Borrow Pit Search Area B

Borrow Pit Search Area A is centred on NGR 311493,252717. The area is shown to be underlain directly by mudstone and siltstone bedrock for all of its footprint.

3.2.1. Current land use

The entirety of the Borrow Pit Search Area A is occupied by semi-improved grassland, as can be seen on Figure 3-3. This area has been mapped during the NVC survey work undertaken in support of **Chapter 7: Ecology (non-avian)**. This describes the vegetation in the field in which the search area lies as being covered by **improved grassland**.

Figure 3-3 Borrow Pit Search Area B



3.2.2. Soil

Ten soil probes were undertaken across the footprint of Borrow Pit B. These consistently described a silt loam, between 11 cm and 14 cm in thickness over a stony substrate. A distinct topsoil/ subsoil transition was not evident, and hence a distinct topsoil horizon was not differentiated. This silt loam is considered to represent a gradation from A horizon to B horizon. The stony substrate upon which the soil gouge refused is likely a weathered bedrock C horizon (Figure 3-4).

Figure 3-4 Borrow Pit Search Area B, soil type and drainage



3.2.3. Topography and drainage

This Borrow Pit Search Area lies on a north-easterly. The land immediately to the south-west is a saddle in the upland plateau, between the isolated peak of Wylfre to the east and the wider Aberedw Hill plateau to the west (Borrow Pit Search Areas A and B sit on the slopes on opposite side of this same saddle in the topography).

The Search Area itself drains north-eastwards to the valley of the River Edw to the north-east.

The elevation of the land falls from approximately 350mAOD in the south-west, to 330m in the north-east. The slope angle is approximately 1 in 4, or 14 degrees.

4. Borrow pit working

4.1. Method of working

The proposed method of working is described within **Chapter 4** of the ES. The proposed method of handling soils in the construction and decommissioning phases of the Proposed Development are discussed in **Appendix 9.5: OSMP**.

The OSMP provides an assessment of the soil volumes that will be generated should the entirety of each search area require to be stripped of soil to facilitate aggregate extraction. This is summarised in Table 4-1 below.

Table 4-1 Soil volumes arising from Borrow Pit Search Areas

Soil type	Borrow Pit Search Area	Volume (m3)
Silt loam with localised sandy silt loam	A	3,263
Silt loam	B	1,362
Silty clay loam (approximately 10% of area of Borrow Pit Search Area A only)	A	323
Total		4,988

The reader is directed to the OSMP for the overall protocols and principles to be followed in the handling and management of soils during the construction phase of the Proposed Development, including during the working of the borrow pits. Some additional principles that will be adhered to during borrow pit working are also provided below:

- Prior to the stripping of soil and overburden, stockpile locations will be clearly defined (within the search area footprint) in consultation with the Ecological Clerk of Works (ECOW).
- Vegetation and topsoil will be stripped and set aside on non-woven, permeable geotextile. The area to be stripped of vegetation and topsoil will include that area in which stockpiles are to be placed.
- Underlying sub-soil will then be stripped and stored on non-woven geotextile in areas of lowest gradient, and in areas that do not collect run-off from adjoining land. The area to be stripped of soil will include that area in which stockpiles are to be stored.
- Additional geotextile may be used to protect soil stockpiles.
- Silt fencing shall be constructed on the down-gradient side of stockpiles.
- Glacial till, where present, will be stripped and stored separately to the turves and soil. Where suitable, till overburden will be used as general fill elsewhere in the development. Where not suitable, or excess to requirements, till will be stored on permeable geotextiles.
- The borrow pit shall be worked until exhaustion, after which reinstatement shall occur (see Section 5.2).
- The stripping of topsoil and sub-soil, and its placement for storage, shall be undertaken outside of periods of heavy rain or frost, to minimise the potential for damage or erosion of the materials.

4.1.1. Drainage management

Drainage management will be constructed to prevent surface water run-off and shallow throughflow from entering the borrow pit from the adjoining land. It will also be constructed to prevent runoff from rainfall on the footprint of the borrow pit.

Outline drainage management for the construction phase of the Proposed Development is provided within the CEMP. In addition to these overarching principles and practices, the following points will be adhered to:

- Run-off and shallow throughflow from adjoining land shall be captured (in a perimeter gravel-filled drainage ditch, shallow v-ditch or similar) upslope of the borrow pit footprint. These waters shall then be directed (again via gravel-filled drainage ditch or shallow v-ditch) to a soakaway trench constructed on the down-slope side of the borrow pit..
- Rainfall landing within the pit, and any groundwater collected within it, shall be directed towards the main headwall / face of the borrow pit and collected in a sump. This water will then be directed, either via pump or by gravity drainage, to a series of settlement management ponds and/ or structures. These in turn will then discharge to soakaway trenches on the downslope side of the borrow pit.

As well as the outline drainage examples listed above, specific drainage solutions designed according to local conditions will be employed where required.

5. Proposed beneficial after-use

5.1. Proposed beneficial after-use

Both Borrow Pit Search Area A and Borrow Pit Search Area B will be repurposed as receptor sites for heathland creation upon completion of their working.

Re-instatement of both borrow pits shall be undertaken at the end of the construction period of the development as soon as it is feasible to do so. Table 5.1 below details the donor heath communities and associated species:

Table 5-1 Donor NVC communities for heathland creation

NVC code	Community	Associated species
H8	<i>Calluna vulgaris</i> – <i>Ulex galli</i>	– Heather <i>Calluna vulgaris</i> – Western gorse <i>Ulex galli</i> – Bell heather <i>Erica cinerea</i> – European gorse <i>Ulex europaeus</i> – Bracken <i>Pteridium aquilinum</i>
H9	<i>Calluna vulgaris</i> – <i>Deschampsia flexuosa</i>	– Heather <i>Calluna vulgaris</i> – Wavy hair-grass <i>Deschampsia flexuosa</i> – Bilberry <i>Vaccinium myrtillus</i> – Western gorse <i>Ulex galli</i> – Bell heather <i>Erica cinerea</i>
H12	<i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i>	– Heather <i>Calluna vulgaris</i> – Bilberry <i>Vaccinium myrtillus</i> – Crowberry <i>Empetrum nigrum</i> – Cowberry <i>Vaccinium vitis-idaea</i>
H18	<i>Vaccinium myrtillus</i> – <i>Deschampsia flexuosa</i>	– Bilberry <i>Vaccinium myrtillus</i> – Wavy hair-grass <i>Deschampsia flexuosa</i> – Crowberry <i>Empetrum nigrum</i>

5.1.1. Considerations for successful after-use

MTAN1 highlights a number of issues that can inhibit successful restoration and aftercare. These are discussed in turn in the following table:

Table 5-2 Considerations for successful after-use

Consideration	Management
Inadequate or poor quality soil	Soil volumes that would be generated if the entire search areas were to be stripped have been calculated. The entirety of those soils stripped from the borrow pit area shall be stored and replaced on the Borrow Pit Search Area(s). The stripped footprint will be very similar to the restored footprint.

Consideration	Management
	If the topography of the restored footprint leads to a slightly larger surface area, approximately 6,000m³ soils are to be generated by stripping of permanent infrastructure (i.e. tracks and turbine bases), thus providing plenty of additional soils of the same type to facilitate aftercare. A detailed soil balance will be calculated as part of the Main Contractor's responsibility to compile a Detailed Soil Management Plan. This will be undertaken once the final detailed design for both borrow pits and infrastructure is complete.
Insufficient material to restore land to reasonable contours in relation to the surrounding ground	A detailed borrow pit design will be created as part of the Main Contractor's responsibility to compile a Detailed Soil Management Plan. This will be undertaken once the ground investigation and detailed infrastructure design have been completed. The cutting of rock in the borrow pits will be undertaken to meet this design i.e. achieving appropriate underlying contours to allow soil restoration will be a key design principle for the detailed design.
Insufficient land around the excavation to achieve sufficient contours	A detailed borrow pit design will be created once the ground investigation and detailed infrastructure design have been completed. The search area footprints have been drawn to be larger than the actual borrow pit dimensions required. Hence there will be ample space within them to achieve the required restoration design.
Exposure of restored land to extremes of climate, hindering success of new planting	The after-care of the restored borrow pits will form part of the overarching commitment to reinstatement and aftercare of the construction-phase footprint. As such, there will be a mechanism in place by which the ongoing nurturing of the restored pits can be secured through the operational phase of the development.
Unsuitable choices of species	Using brash and seeds from dry heath donor sites, species should reflect upland heath communities as set out in Table 5.1. Organic mineral soils from earthworks will provide suitable topsoil to support establishment.
Inadequate drainage	Drainage design shall form an important element of the detailed borrow pit design. The final form of the pit base shall be designed such that gravity drainage can be reinstated in the direction of the surrounding topography.
Instability of slopes	The rock mass and soil slope stability of the search areas will be assessed as part of the ground investigation works and this will feed into the detailed design for the borrow pits. The current slope angles within the search areas are between 1 in 4 and 1 in 5. It is anticipated that bedrock slopes steeper than 1 in 3 will be stable in the long term; cutting the rock in accordance with this principle will provide ample extraction opportunity whilst enabling a restored soil profile overlying the bedrock that matches similar existing slopes across the wider Site.
Lack of care and expertise	An experienced land restoration contractor will be employed to undertake the works.

5.2. Reinstatement process

MTAN1 states that after-uses involving plant growth must include a restoration plan for a series of key stages. Each stage is considered below:

5.2.1. Stripping of soils and soil-making materials and their storage or direct replacement.

This is discussed in the OSMP. The principles set out within the OSMP shall apply to the borrow pit footprints as part of the overall development footprint.

5.2.2. Storage and placement of overburden

Again, this is discussed within the OSMP. The principles set out within the OSMP shall apply to the borrow pit footprints as part of the overall development footprint.

5.2.3. Achieving the landscape and landform objectives for the Site

Borrow pits shall be restored to a profile that mirrors the natural landform, therefore blending the restored pits into the landscape. Schematic cross sections are presented as **Error! Reference source not found.** to **Error! Reference source not found.** below.

A detailed borrow pit landscape design has also been produced for each of the three borrow pit search areas. This is detailed in Figure 4.8a to Figure 4.8c within the ES. This design is anticipated to change following ground investigation and detailed civil engineering design, as this will dictate the volume of site-won aggregates required.

Notwithstanding this, the landscape design plans and cross sections provided in Figure 4.8a to 4.8c within the ES provide a robust restoration design with achieves the landscape and landform objectives for the Site.

Figure 5-1 Cross sections providing indicative profile for construction-phase and restored pit in Search Area A

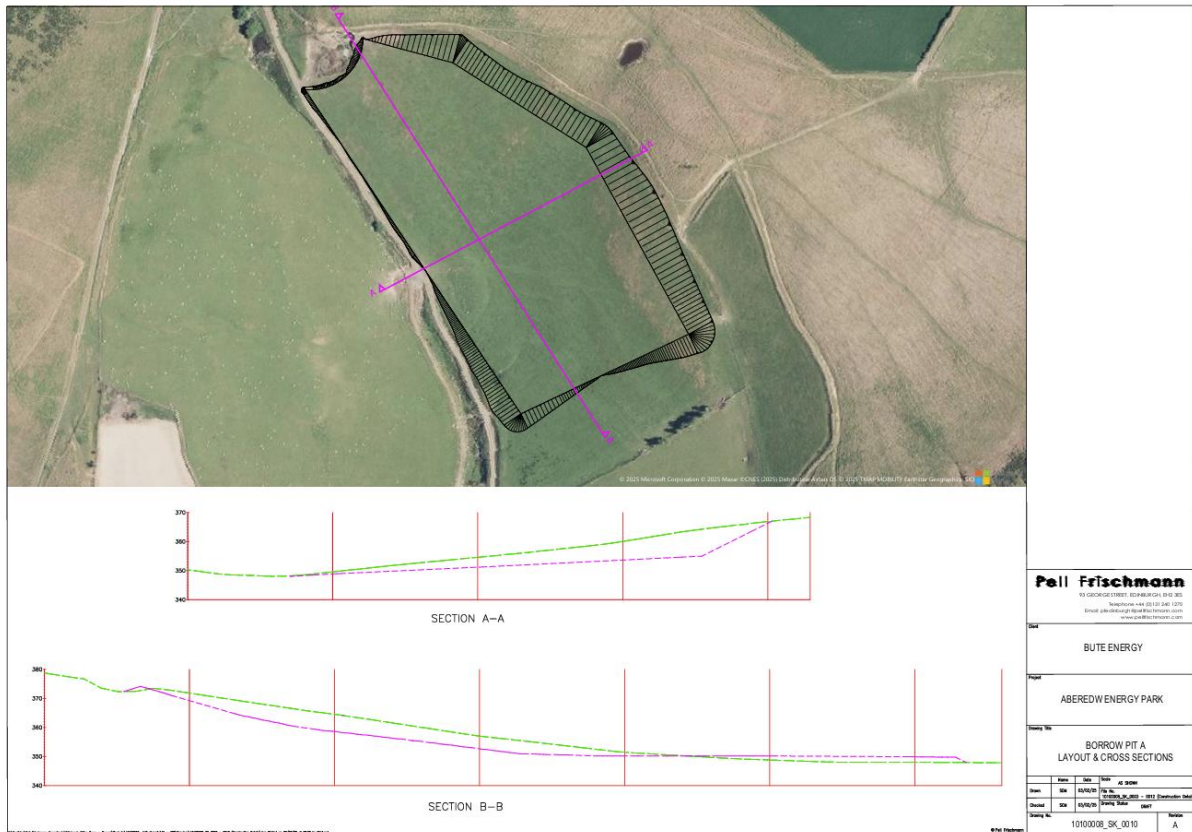
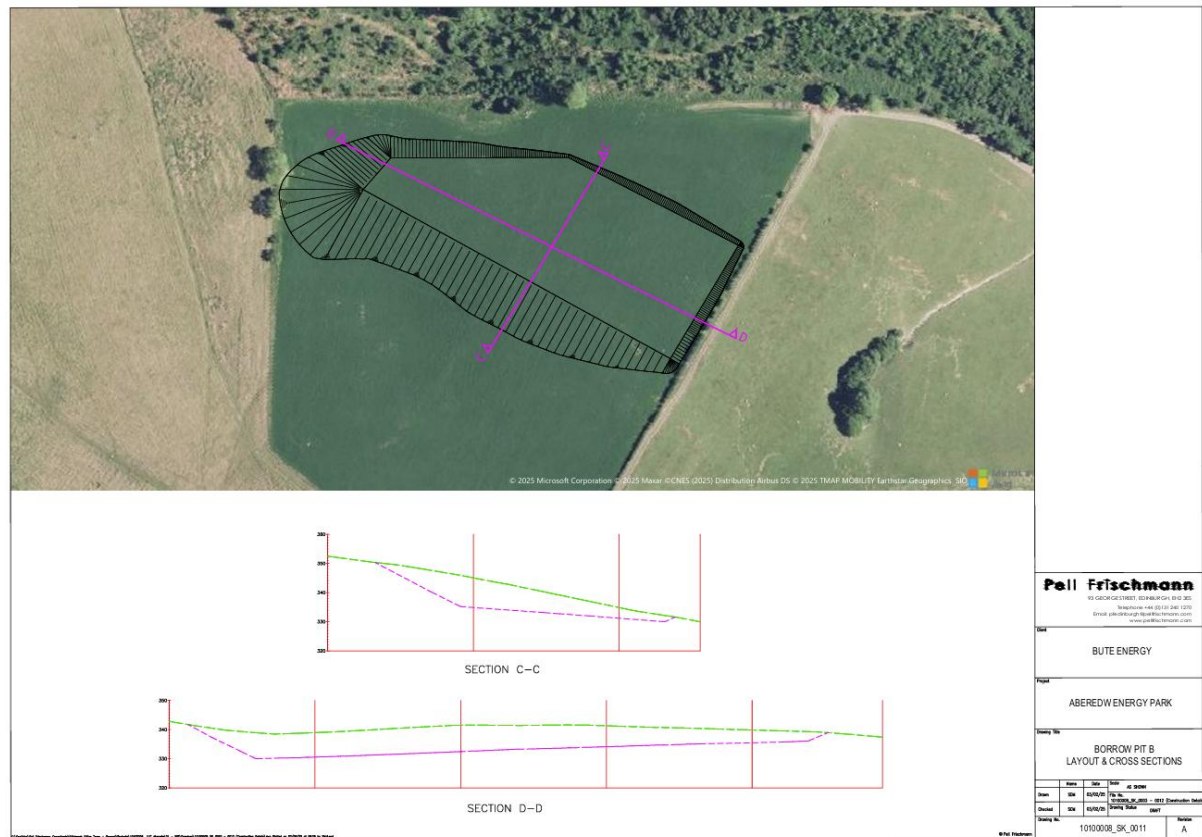


Figure 5-2 Cross sections providing indicative profile for construction-phase and restored pit in Search Area B



5.2.4. Restoration, including soil placement, relief of compaction and provision of surface features

5.2.4.1. Soil placement and relief of compaction

General principles of soil restoration are discussed within the OSMP (**Appendix 9.6**), and will also apply to the borrow pit search areas.

The following additional steps will be undertaken on each borrow pit search area:

- Where the base of the pit comprises sub-soil or compacted aggregate, the entire base of the pit will be ripped to reduce compaction and increase vertical drainage.
- Landform creation: Where soil is required to fill the void prior to placing the final sub-soil and topsoil layers, sub-soil shall be placed in accordance with an Earthworks Specification. The content of the earthworks specification will be defined by the ground investigation and by the geotechnical and civil engineering design. Soil placement will be strictly controlled to ensure that soils are placed at acceptable moisture content and compacted to acceptable density. Soil will be placed and validated in layers, and the process repeated until the landform has been created to a level that is the required level below finished landform (the Formation Level: (150mm below finished landscape levels). If insufficient overburden is present within the search area as a result of stripping pre-excavation, sub-soil won from

nearby trackways or other infrastructure may be required to achieve the stated formation level.

- Once the Formation Level has been formed and compacted, the formation Level will be ripped to aid vertical drainage, and the final sub-soil then topsoil layers placed in accordance with the protocols set out in the OSMP.
- The reformed landform will blend in with the natural landscape however the exact dimensions and design will be developed at a later stage. Slopes will be smoothed with vertical or steep cutting avoided to reduce erosion and allow vegetation to grow. The contours of the landform will be in line with the adjacent terrain. Natural drainage patterns will be recreated by the addition of swales or shallow channels to guide runoff.

5.2.4.2. Seeding

The following sets out the sequence and timing of steps that will be undertaken to successfully establish vegetation growth on each borrow pit search area:

Figure 5-3 Seeding and planting protocol

Borrow Pit Search Area	Preparation (timing)	Sowing/ Planting	Follow-up actions
A & B	Place sub-soil and topsoil in accordance with OSMP. Topsoil to be favoured from organic mineral soils gathered from construction works.	Seed with seed collected from heather brash: Sow at a rate of 20 kg/ha Sow in Spring	Place bio-degradable netting over sown areas.

5.2.5. Aftercare

The after-care of the restored borrow pits will form part of the overarching commitment to reinstatement and aftercare of the construction-phase footprint. As such, there will be a mechanism in place by which the ongoing nurturing of the restored pits can be secured through the operational phase of the development.

There are existing areas of the site on which grazing land and commercial forestry is present at slopes of 1:3 or steeper. There is therefore on-site precedence that this after-use is achievable.

Achieving vegetated slopes up to 1:3 (26°) is commonplace within earthworks delivery on large infrastructure projects. The soils in the proposed Search Areas on Site are either weathered glacial till (clay-dominated soils with a high sand and gravel content) or (predominantly) derived from weathered mudstone and siltstone (silt dominated, but with a notable sand content in places). Literature values provided for the effective angle of shearing resistance of such soils range from 27° to 35° (Carter & Bentley 2016)¹² for unvegetated slopes (up to 1:1.5). The lower end of this range

¹² Carter & Bentley 2016. Soil properties and their correlations, 2nd Edition. Wiley.

assumes cohesionless, organic-free soils, which will not be the case on Site (where clay content and organic content will be <0).

This indicates that such soils are stable at steeper angles than are proposed in the borrow pit restoration. Vegetation can increase soil strength over and above this by between 50 and 70% (Norris et al 2008)¹³.

A gradient of 1:3 will be the steepest slope formed as part of the restoration of borrow pits. Where the constraints of space, environmental considerations and requirements of drainage design allow, a more relaxed slope will be formed where possible. The precise landform to be created during restoration will be designed during the detailed design process.

Notwithstanding it being a maximum proposed slope gradient, achieving stable vegetated grazing land within the borrow pits up to a gradient on 1:3 is considered appropriate and feasible.

5.2.5.1. Maintenance

The following table sets out the proposed maintenance programme for the aftercare of the borrow pits. It is envisaged that this aftercare maintenance will be continued for five years following restoration. Failure to achieve the success criteria set out in Table 5-4 may necessitate extension of this maintenance period beyond 5 years. Grazing should be kept to a minimum or ideally absent within this 5-year period.

Table 5-3 Proposed annual maintenance programme

	J	F	M	A	M	J	J	A	S	O	N	D
Remove litter, rubbish & debris												
Spot treat undesirable species with selective translocated herbicide												
Control emerging scrub and bracken												
Monitoring												

5.2.5.2. Monitoring

The following table sets out the proposed monitoring requirements for the aftercare of the borrow pits. It is envisaged that this monitoring will be continued for five years following restoration. Failure to achieve the success criteria necessitate extension of this monitoring period beyond 5 years.

¹³ Norris, Stokes, Mickovski, Cammeraat, van Beek, Nicholl and Achim (eds). 2008. Slopes stability and erosion control: ecotechnological solutions. Springer.

Table 5-4 Proposed monitoring requirements

Feature	Management/ Monitoring requirement	Criteria for success	Monitoring approach	Remedial actions
Dry Heath	Little to no grazing with scrub and bracken removed where dominance becomes obvious. No fertilizer to be applied.	50% of vegetation cover should be made up of the following species: <i>Arctostaphylos</i> sp., <i>Betula nana</i>, <i>Calluna vulgaris</i>, <i>Erica</i> sp., <i>Empetrum nigrum</i>, <i>Racomitrium lanuginosum</i>, <i>Vaccinium</i> sp. Less than 10% of vegetation cover should be made up of bracken Less than 1% vegetation cover should comprise weedy, invasive species	Annual monitoring programme for 5 years (or as agreed) to record: Ground cover, sward height, species diversity; and, Fixed point photography.	Remove bracken and dominant scrub species. Treat undesirable species such as <i>Cirsium arvense</i>, <i>Cirsium vulgare</i>, large docks (excluding <i>Rumex acetosella</i>), <i>Ranunculus repens</i> or <i>Urtica dioica</i>.

6. Conclusions

As has been set out above, the degree to which borrow pit restoration can be defined and prescribed at this stage in the project is limited pending the forthcoming process of detailed design.

Notwithstanding this, the content of this report addresses the matters raised by LQAS in their Scoping response sufficiently to demonstrate that borrow pit restoration is feasible and that its delivery is assured as part of the Proposed Development.

Appendix A Report conditions



AQUA TERRA

CONSULTING

Report Conditions

This report has been prepared by Aqua Terra Consultants Ltd. (Aqua Terra) in its professional capacity as soil and groundwater specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client and is provided by Aqua Terra solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report, taking account of the terms of reference agreed with the client. The findings are based on the information made available to Aqua Terra at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology, and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

Where necessary and appropriate, the report represents and relies on published information from third party, publicly and commercially available sources which is used in good faith of its accuracy and efficacy. Aqua Terra cannot accept responsibility for the work of others.

Site investigation results necessarily rely on tests and observations within exploratory holes only. The inherent variation in ground conditions mean that the results may not be representative of ground conditions between exploratory holes. Aqua Terra take no responsibility for variation in ground conditions between exploratory positions.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, Aqua Terra may, by prior written agreement, agree to such release, if it is acknowledged that Aqua Terra accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. Aqua Terra accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual, or otherwise, against Aqua Terra except as expressly agreed with Aqua Terra in writing. Aqua Terra reserves the right to withhold and/ or negotiate the transference of reliance on this report, subject to legal and commercial review.