



ENERGYBUILD LIMITED

ABERPERGWM COLLIERY – MINE WASTE REPOSITORY

PLANNING PERMISSION REF. P2014/0729

RESTORATION SCHEME TO DISCHARGE CONDITION 69

OCTOBER 2023

DATE ISSUED:	6 th October 2023
JOB NUMBER:	CA12936
REPORT NUMBER:	01
VERSION:	V1.0
STATUS:	Final

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WASTE RESOURCE MANAGEMENT

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DRAWINGS	TITLE	SCALE
CA12936/001	Planning permission boundary for Mine Waste Repository – Current and previous land use	NTS @ A3
CA12936/002	Extent of reinstated soil profiles on restored ground and location of soil storage mounds within areas previously subjected to opencast coal extraction within the Mine Waste Repository	1:2500 @ A3
CA12936/003	Distribution of soil groups on previously undisturbed ground within the curtilage of the Mine Waste Repository	1:2500 @ A3
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CA12936/006	Proposed final landform, slope gradients, surface water drainage system and access arrangements	1:2500 @ A1
CA12936/007	Proposed landscaping scheme	1:2500 @ A1
CA12936/008	Proposed restored soil profiles	1:2500 @ A1
CA12936/009	Proposals for ecological conservation in the course of operating the Mine Waste Repository	1:5000 @ A3

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1 INTRODUCTION

- 1.1 Wardell Armstrong LLP have been instructed by Energybuild Limited to prepare a written scheme of Restoration for the Mine Waste Repository (MWR) in accordance with Condition 69 of planning permission ref. P2014/0729, granted on 27th September 2018 by Neath Port Talbot County Borough Council, as the mineral planning authority.
- 1.2 To ensure the long-term production and supply of coal from Aberpergwm Mine, a long term location needed to be secured for the deposit of colliery mine waste, including discard from coal preparation and waste rock from underground mining development. The MWR is the long term solution capable of accommodating approximately 10.4 million m³ of material.
- 1.3 The MWR is situated on high ground on the Hirfynydd mountain to the south of the Sarn Helen Roman Road, 2km west of the village of Glynneath and 3km to the east of Seven Sisters. Approximately 70% of the mine waste repository site has been surface mined whilst the remainder of the proposed repository area is comprised of rough part harvested commercial forestry. Peat deposits exist at the eastern area of the site which will be translocated to the mitigation area as deposition proceeds.
- 1.4 The deposition of discard at the MWR will be carried on in conjunction with the continued use and improvement of the existing haul road, including water pollution control measures, and the provision of an associated inspection and maintenance regime which will ensure that discard haulage operations are carried out in an environmentally acceptable manner.
- 1.5 The MWR is designed to accommodate the mining waste and coal processing discard during the full anticipated operational life of Aberpergwm Mine. The facility is an intrinsic and critically important aspect of the overall mine development and operational programme and will enable the exploitation of in excess of 70 million tonnes of valuable anthracite coal resource. Only inert mining and processing mineral waste product will be deposited at the mine waste repository during its operational life.
- 1.6 Discard mineral will be deposited on site in a phased and controlled manner over the anticipated life of the repository. The methodology of deposition will conform to best practice, geotechnical design and monitoring, within the requirements of the Mines and Quarries (Tips) Act. The deposition will produce a domed section land form with a maximum elevation of 486 AOD. The northern extremity of the structure will blend

into the existing elevated topography which is comprised of a restored surface mining area and overburden mound associated with previous open cast mining operations.

- 1.7 Development of the MWR will commence in the Phase 1 area involving the infilling of the final void of the Forest Quarry 2 Opencast site and then progress to the southern half of the eastern boundary. Deposition of colliery spoil will then progress in a southerly direction creating an outer (completed) flank to the MWR structure. Operations will then progress in a northerly direction into the Phase 3 area as shown in Drawing No. CA126936/001.
- 1.8 Undisturbed peat and soil resources which exist on site, mainly at the southern and eastern areas, will be excavated prior to the deposition of discard. Soils and inferior peat will be utilised to provide early restoration of the southern flank and progressive restoration of the repository as deposition proceeds. Existing excavated soils currently maintained in storage mounds on the eastern side of the site will be utilised in a similar fashion.
- 1.9 Ultimate full restoration of the MWR site will include areas of mixed coniferous plantation/acid grassland heathland mosaic and commercial forestry plantation which will promote suitable habitats for Skylark and Meadow Pipit. The coniferous plantation will be beneficial for Nightjar during the post planting and post felling periods. The creation of ephemeral ponds will promote colonisation by frogs and newts which in turn will be beneficial for Honey Buzzards.

2 RESTORED LANDFORM

2.1 Final Landform

2.1.1 The final landform proposed for the MWR is shown on Drawing number CA12936/006 'Proposed final landform, slope gradients, surface water drainage system and access arrangements'.

2.1.2 The MWR has the outline of a 'keyhole' being relatively narrow at its southern extremity, having a maximum width at its centre and tapering on the north. The southern section has a pronounced ridge like cross section but the landform opens out northwards and flattens to give a gentler rolling profile. The construction of a flat plateau top has been purposely avoided and the tip is crowned by a flattened hillock. The proposed net change in ground level is greater at the southern point of the repository where the ground level would increase as a result of the development from approximately 425 m AOD to 460 mm AOD and least at the northern edge where the change is from 460 m AOD to 480 m AOD. The maximum height of the proposed landform is 486.2 m AOD. The elevated landform offers vistas into, and across, the Neath Valley below and to take full advantage of these a viewing platform will be constructed using sandstone flagstones to create a paved area surrounded by a circular dry stone wall to replicate a sheep fold.

2.1.3 The landscape design complements the landform and in particular capitalises on the elevation and orientation of the ridgeline to create a promontory. The southern part of the repository and the lower flanks of the northern part of the repository will be planted with Sitka spruce as commercial plantation. A transitional broken band of Scots pine, with a component of downy birch and rowan, will be planted above this as open amenity woodland. Grassland will be established on the extensive open ground on the rolling upper surface.

2.2 Gradients

2.2.1 Slope gradients have been set by the design at a maximum of 33% and a minimum of 5% in order to ensure the stability of soils reinstated on slopes and to conversely prevent any risks of ponding water. The colouring on the aforementioned plan shows that gradients of 11-20% have been achieved over the greater part of the area and in fact rarely exceed 25%. The change in levels are progressive rather than abrupt with the resulting smooth and flowing transitions producing a generally sympathetic

landform that strives not to be imposed on the surrounding relief. The landform gives rises to two near equal watersheds with the eastern half of the site (42 ha) within the Craig Llwyd catchment and the western half (31 ha) within the Rheola Brook catchment.

3 RESTORATION DRAINAGE MEASURES

(Timing, Maintenance Works, Temporary Drainage Methods)

3.1 Catchments

- 3.1.1 The final landform of the MWR has been designed to replicate the original split of the on-site catchment areas to the east and west to re-establish the original watershed between the Rheola Brook and Nant Clwyd which existed prior to the opencast operations affecting the system so that there will be no long-term changes to the catchment areas and no residual impacts arising from the distribution of the areas that drain to the receiving watercourses.
- 3.1.2 As the outer flanks of the MWR are constructed there will be the development of a system of permanent peripheral drains which are designed to intercept surface drainage arising from the finished surfaces of the structure. The ditches will be designed to link in with the existing and proposed water treatment facilities as indicated in Drawing No. CA12936/007 'Proposed Landscaping Scheme'.

3.2 MWR construction

- 3.2.1 The potential impacts that have been identified during the MWR site filling operations are principally the generation of increased sediment loads in the surface water run-off and an increased rate of surface water run-off from the excavated surfaces. Without mitigation, both of these potential impacts could be of some significance in the short and medium term with temporary moderate adverse effects.
- 3.2.2 The peripheral intercept channel around the MWR site will temporarily reduce the catchment areas drained to the receiving watercourses and this will have some impact on the flows through the Nant Clwyd waterfall. The catchment area will reduce from an estimated 10.686 Ha to 9.129 Ha, with a corresponding flow reduction of around 15% for any given rainfall event, so 85% of the pre-development flows will continue through the waterfall and this will have only minor impact at this location.
- 3.2.3 The MWR and haul road operational surface water management and surface water treatment systems will remain in place for the duration of the restoration works and will be maintained as long as they are needed to continue to offer protection to the receiving downstream watercourses. The possible impacts associated with sediment

on the downstream watercourses during this phase are considered to be at worst minor adverse and would be short-term resulting in temporary effects to surface water quality.

3.3 MWR Drainage

- 3.3.1 The potential risks from flooding within the site will be minimal and similar to that for the earlier phases. Once the restored ground surfaces have mature vegetation the surface water run-off will return closely to the original baseline conditions to allow the attenuation ponds to be partially reshaped and/or filled with on-site material. The restoration works to the surface water management systems will be undertaken as the final operations before each part of the site enters into aftercare arrangements.
- 3.3.2 Drainage of the MWR will be achieved by a combination of berms and armoured channels. The approach will be the same as that adopted for the restoration of the former Sarn Helen and Nant y Mynydd OCCSs. The forest roads to the north and east of the MWR will be retained on completion of the scheme. The drainage design allows for the part construction of berms and armoured channels in the course of construction of the MWR and the progressive restoration of separate tiers of batter.
- 3.3.3 Drawing number CA12936/010 'Standard details for permanent infrastructure' confirms the construction and dimensions of berms, armoured channels, drainage ditches, forest roads and culverts'.

3.4 Water Treatment Areas and Settlement Lagoons

- 3.4.1 A maximum attenuation volume of up to around 14,000cum will be required for 100-yr rainfall events including climate change, and the provision of the total volume will be split with attenuation volumes of 7,330cum at the southern low point, around 3,570cum at WTA 2A and 3,330cum at WTA 2B. The general arrangement of the operational surface water management system for the site is shown on *Figure 9.15 'Mine Waste Repository SW Management Plan'*.
- 3.4.2 The maximum discharge from existing Outlet 1 at WTA 2A will be set at 470 l/sec and from existing Outlet 2 at WTA 2B it will be set at 406 l/sec; both are the same discharge rates that are specified by the current environmental permit. The existing attenuation pond at WTA 2A will be reconfigured and extended to provide additional storage volume, the existing attenuation pond at WTA 2B will be enlarged and a third

attenuation pond at the southern low point will be added to enable the peak flows to be regulated. The layout details are shown on

- Figure 9.16, 'Mine Waste Repository WTA 2A Layout'
- Figure 9.17, 'Mine Waste Repository WTA 2B Layout' and
- Figure 9.18, 'Mine Waste Repository Attenuation Pond'.

3.4.3 The attenuated flows will pass through the parallel settlement lagoons at WTA 2A and WTA 2B to remove sediment and other suspended solids collected by the surface water in transition prior to discharge back into the receiving watercourses. After passing through the proposed drainage systems the adverse impacts on downstream water quality are considered to be minor to negligible.

3.4.4 The three attenuation areas will be subject to detailed design and although the respective discharges will not be varied from the permitted rates, the added facilities may require a variation of the existing environmental permit from National Resources Wales. If this is required, an application will be submitted at the appropriate time to ensure that the surface water treatment area may be upgraded with additional attenuation volume in good time and as required for the site operations.

Berms

3.5 The drainage berms will be arranged at approximately 10 metres vertical intervals down the MWR and have a width of approximately 4.5 metres which is graded back towards a drainage ditch at a gradient of approximately 1 in 10. The drainage ditches will have gradients of between approximately 1.5% and 2.5% and will be linked into the peripheral drainage system.

Environmental protection from spillages

3.6 The potential impacts associated with oil, fuel and hydraulic fluid leakages on the surface water environment will continue to be managed through established good site practice and the potential impacts will be similar to the earlier phases. The on-site arrangements will continue to mitigate against the potential effects from such leakages and these will be maintained during the progressive removal of the other site facilities as they become redundant.

4 SOIL RESOURCES

4.1 Soil Resources – Stored Soils

- 4.1.1 The deferment of progressive restoration during the operation of the Forest Quarry 2 Extension OCCS led to the accumulation of a substantial soil volume estimated to be 163,560 m³. These soils were surcharged upon Overburden Mound 2 in the expectation that they could, in the event of the MWR development proceeding, remain in place for an extended period. The location and extent of the storage area is indicated on Drawing number CA12936/002 'Extent of reinstated soil profiles on restored ground and location of soil storage mounds within areas previously subjected to opencast coal extraction within the Mine Waste Repository'. The area allocated to soil storage extends to an area of 10.4 ha giving an average height to the storage mound of 1.6 m, and is consistent with the method of construction, which involved block tipping generally without 'haymaking'.
- 4.1.2 The soils were originally stored as a series of linear mound separated by aisles for access but infilled in the latter stages of operation of the Forest Quarry 2 Extension OCCS when excavation proceeded through an historical 'peat store' to the east of the office compound. This yielded a large volume of additional soil. It is understood the crude peat / subsoil composite stored at this location, some 47,500 m³ originated from the Forest Quarry OCCS and was reserved to complete the restoration of the site, which included ground beneath Overburden mound 1. Infilling was carried in preference to expanding the storage area in order to provide an extensive contiguous surface so as to assist in the long term management and to remove water that showed an increasing propensity to accumulate along aisles.
- 4.1.3 The soils stored on Overburden Mound 2 are peat / subsoil composites recovered from the Angelzarke, Gelligaer, Rhondda and Crowdy Series. These contain peat to subsoil (exceptionally clay in the Crowdy series) at ratios of between 0.3:1 and 1.8:1 but with an average for all series of 1:1. The storage of the composite, including that originating from the Crowdy Series, which possesses the highest proportion of peat, has not proved to be problematic. This is due largely to the attention given during the recovery operation to mix the mineral fraction, regardless of whether this is subsoil or clay, through the peat and to tear and fracture the peat and to generally avoid extracting whole blocks. The resulting composites have proven to be stable with infrequent slumping attributable to the incorrect placement of deep peat within the

storage area, which should in accordance with the soil strategy have been deposited within the Nant y Mynydd Conservation Area.

- 4.1.4 The opportunity was taken in the later stages of operation of the Forest Quarry 2 Extension OCCS to recover unclassified subsoil and soil-forming material from the aforementioned historical contained storage area. These were placed in temporary storage on graded backfill with survey indicating a total quantity of 9,814 m³. Assessment has shown the subsoil and soil-forming materials, which had been used to construct the containment structure itself, to be generally too stony to be suitable for use other than as a drainage layer in the lower part of reconstructed soil profiles. The materials are considered perhaps better suited to use as reasonably well graded engineering fill for the construction of berms.

4.2 Reinstated Soils – Forest Quarry 2 and Forest Quarry 2 Extension OCCS

- 4.2.1 The location and extent of soils reinstated on previously disturbed ground is indicated on Drawing number CA12936/002. Two areas are identified with 11.6 ha located on the former Forest Quarry OCCS together with a further 3.70 ha on the Forest Quarry 2 OCCS.
- 4.2.2 The former Forest Quarry OCCS was not subject to soil survey prior to operation of the site and while it is highly likely that the natural soils present on this area belonged to the Gelligaer Association the proportion of different series, including most notably the Winter Hill and Crowdy Series, which comprise in large part of 'deep peat' is unknown. No records are available to confirm the measures employed to recover soils but it is clear that these were reasonably effective as the restored area possesses a continuous soil cover which has permitted the successful re-establishment of Sitka spruce which was planted in Spring 2010.
- 4.2.3 Observations on soil type and thickness were made by Dr Nigel Bending (Progressive Restoration) in Winter 2009 in the course of overseeing the construction of a berm and armoured channel to provide an effective surface water drainage system on the restored area and also of ripping the site prior to planting. The berm constructed at that time is approximately 400 m in length and runs generally east west but bows inwards towards the centre of the restored area at its midpoint before heading north.
- 4.2.4 Approximately 40% of the restored area is to the north of the berm and 60% to the south. The soil cover was removed entirely along the line of the berm to reveal the

overburden surface and the excavation filled with sandstone fill removed from Overburden mound 1. The soil thickness was found to vary considerably along the length of the berm from approximately 250 mm at its western most point to 2,000 mm at its midpoint with a 'nominal' average of 750 mm. The soils comprised of well humified peat with variable, but generally low proportions, of subsoil and soil forming material, although the soils comprised locally only of soil-forming material with little or no peat. The records show that a total of 33,485 m³ of peat / subsoil composite were reinstated on the 3.70 ha area so achieving a soil thickness of 905 mm

4.3 Future Soil Resources - Soil-forming materials from excavation of additional peat

4.3.1 The opportunity exists in the course of constructing the MWR to further develop the Nant y Mynydd Conservation Area in order provide additional opportunities for the creation of new peat bogs. Drawing number CA12936/005 'Further development of Nant y Mynydd Conservation Area' identifies possible locations for three new containment cells within the area. Each is located on ground that has been affected to some degree of previous disturbance that has generally removed the peaty topsoil or peat from the ground surface to reveal the underlying subsoil.

4.3.2 The total potential quantity of subsoil and soil-forming material that could be produced in the course of excavation of the three cells is estimated to be 20,999 m³. However, this should be regarded as the maximum quantity available as any clay encountered would be retained for reuse in lining of the structures. While the quality of the materials generated is uncertain they are likely to contain a high proportion of stone and they are therefore most likely only to be suitable for use as drainage layer in the lower part of reconstructed soil profiles.

4.4 Future Soil Resources – Natural soil profiles on undisturbed ground

4.4.1 A soil survey was carried out by Dr Nigel Bending (Progressive Restoration) in November 2013 in order to map the distribution of soils within the 11.5 ha area of previously undisturbed land to the east and 8.2 ha area to the south of the former Forest Quarry 2 Extension OCCS. Drawing number CA12936/001 identifies the additional areas that required soil survey.

4.4.2 The distribution of soil types is shown on Drawing number CA12936/003 'Distribution of soil groups on previously undisturbed ground within the curtilage of the mine waste

repository'. It should be noted that boundaries between some soil types have by necessity been extrapolated. Because direct observations of soil profiles were not made during the survey the soils have been classified into four generic units as follows:

- a) Deep peat (Winter Hill and Crowdy Series)
- b) Organic soils (Crowdy and Rhondda Series)
- c) Mineral soils (Rhondda and Gelligaer Series)
- d) Skeletal soils and exposed rock (Anglezarke Series)

- 4.4.3 The split between mineral soils (mineral soils and skeletal soils) and organic soils (deep peat and organic soils) on undisturbed ground is approximately 60/40 although the greater proportion of organic soils, including all deep peat occurs on the Additional land to the east of the FQ2E. Mineral soils are most abundant (10.7 ha), followed by the organic soils (5.7 ha), deep peat (2.4 ha) and skeletal soils (0.9 ha).
- 4.4.4 The soils identified during the survey belong to the Gelligaer Association and this is the predominant soil association within the Pennant Sandstone uplands on the South Wales Coalfield where the plateaus and ridges are wholly devoid of glacial deposits. The sandstones are exceptionally hard and resistant to weathering so that majority of mineral soil profiles are relatively thin. However, deep raw peats are common within the association. These are usually located within basins carved out by glaciers into the sandstone pavement.
- 4.4.5 The distribution of soil types across the site is generally well ordered and reflects substantive differences in the shape of the underlying highly eroded subcropping sandstone pavement, the degree of fracturing within the sandstone, the topography of the existing ground surface, surface water drainage and the incidence of a clay layer above the sandstone.
- 4.4.6 The Mineral soils, which belong in large part to the Rhondda and Gelligaer Series, were recorded as having an organic upper layer between 100-450 with a mean of 259 mm and a subsoil layer between 207-350 with a mean of 321 giving a recoverable soil thickness of 580 mm.
- 4.4.7 The Organic soils, which belong in large part to the Crowdy and Rhondda Series, were recorded as having an organic upper layer between 500-1,750 mm with a mean of 944 mm and a subsoil layer between 207-347 with a mean of 328 giving a recoverable soil thickness of 1,272 mm.

- 4.4.8 The Deep peats, which belong in large part to the Winter Hill and Crowdy Series, were recorded as having an organic upper layer between 1,800-2,800 mm with a mean of 2,165 mm and a clay layer between 259-347 with a mean of 290 mm giving a recoverable soil thickness of 2,460 mm.
- 4.4.9 The Skeletal soils and exposed rock, which belong in large part to the Angelzarke Series, were recorded as having an organic upper layer between 0-250 mm with a mean of 115 mm and a subsoil layer between 0-200 with a mean of 145 giving a recoverable soil thickness of 260 mm.
- 4.4.10 It should be noted that subsoil and clay thicknesses have been extrapolated from previous surveys for the soil series concerned.
- 4.4.11 Further analysis of the distribution of peat within the site is presented on Drawing number CA12936/004 'Isopachytes to show thickness of peat on undisturbed ground within curtilage of the Mine Waste Repository'. This shows peat thickness across the site and this clearly delineates the significant area of 'deep peat' (defined as peat greater than 1,800 mm in thickness) within the northern part of the Additional land to the east of FQ2E.
- 4.4.12 Exposures of deep peat were available for detailed examination in the course of the survey at the limit of excavation to the Forest Quarry 2 Extension OCCS. The Winter Hill Series peats are fibrous, light brown (H4) and contain occasional preserved wood fragments of birch and hazel, while the Crowdy Series peats are amorphous and contain black (H8) humified organic matter. The maximum thickness of peat recorded for the Crowdy series was 1,800 mm, which exceeds the maximum recorded in previous surveys of 1,280 mm. Corresponding figures for the Winter Hill series, were 2,800 mm for the current survey and 2,200 mm for previous surveys

4.5 **Estimated quantity of soil resources**

- 4.5.1 The soil resources available for use in restoration of the proposed Mine Waste Repository can be sub-divided according to those which are from areas which have been subject to previous disturbance (restored and unrestored ground) and those which will be generated by the recovery of soils from previously undisturbed areas. The latter require removal in order to prevent their sterilisation by over tipping in the course of extending the Mine Waste Repository. Soil type and volume from each source and described and quantified below.

Potential soils resources from areas subject to previous disturbance

- 4.5.2 The soil resources from areas subject to previous disturbance include the following: (1) soils in long-term storage on the former Forest Quarry 2 Extension OCCS, (2) soils available for recovery from previously restored ground, and (3) potential soil-forming materials from on going underground operations at Aberpergwm Mine and from the further development of the Nant y Mynydd Conservation Area. Table 2 'Soil resources from areas subject to previous disturbance (restored and unrestored) within the Mine Waste Repository' identifies the soil types and volume of soils for the three categories above under Parts 1-3 while a summary is provided in Part 4.
- 4.5.3 The total volume of soils from areas subject to previous disturbance, which can be confidently predicted to be available for use in restoration of the site is 317,513 m³. Approximately 90% of the total is comprised of peat / subsoil composite with 163,560 m³ of this soil type in long-term storage and 120,485 m³ available for recovery from previously restored areas. The balance of 30,813m³ is comprised of generally inferior subsoil and soil-forming material. Colliery discard is excluded from the totals but would clearly be available in sufficient quantity to meet the requirements for restoration should a need be identified.

Potential soil resources from areas of previously undisturbed ground

- 4.5.4 A prediction of the quantities of soil types likely to be generated by excavation within previously undisturbed areas is given in Table 3 'Potential soil resources from areas of forestry plantation on previously undisturbed ground within the Mine Waste Repository' and is based on the extent of disturbance of the soil groups identified above. The approach adopted is identical to that applied to the interpretation of information from previous soil surveys. It is based on the recovery of peat / subsoil (exceptionally clay) composites from below mineral soils, organic soils and skeletal soils and of peat and clay separately from beneath deep peat.
- 4.5.5 The total volume of peat / subsoil available for recovery is estimated to be 209,643 m³. The volume of deep peat available is estimated to be 52,283 m³ and the clay volume 7,113 m³. The quantities of deep peat and clay potentially available exceeds the capacity for the further development of the Nant y Mynydd Conservation area and in particular for the construction of Peat bog 1, an Extension to Peat bog 2 and a Satellite to Peat bog 1. In order to overcome this difficulty and conserve the full volume of pristine deep peat available, opportunities for the construction of peat bogs

in the course of the restoration of the Mine Waste Repository itself have been explored.

- 4.5.6 Drawing number CA12936/003 identifies the proposed phasing of operations in the course of constructing the MWR. Table 3 'Potential soil resources from areas of forestry plantation on previously disturbed ground within the Mine Waste Repository' provides a breakdown of the quantity of soils, which will be recovered during each phase of the development based on the extent of disturbance of each soil group.
- 4.5.7 The presumption in developing the phasing has been to avoid disturbance into previously undisturbed areas for as long as possible, on the basis that firstly the projections for the capacity of the MWR are based on maximum levels of coal production and, secondly because allowance has been made for a high ratio of discard to vend. This approach ensures that deep peat will only be subject to disturbance if absolutely necessary in the latter stages of the development.

5 PROCEDURES FOR RESREADING OF PEAT, SUBSOIL AND TOPSOIL

5.1 MWR Construction Phases

- 5.1.1 The Mine Waste Repository will be progressively restored as individual phases of tipping are completed; however, it should be noted that Phases 1 and 3 will not be restored until near completion of the development in order to provide areas for temporary soil storage. It will not be possible to soil the entire area of phases, for example on the eastern side of Phase 2, in order to prevent soil loss, in the course of later tipping. The opportunity may exist, especially in the course of Phases 6 and 7 to carry out progressive restoration concurrently with the deposition of colliery discard.
- 5.1.2 Colliery discard will be deposited, spread and levelled in accordance with the rules established for tipping in order to construct the landform illustrated on Drawing number CA12936/006. Thereafter the drainage system, or that part of the system associated with the phase of the development being restored will be constructed in order to ensure that soils once placed will be adequately protected from scour and erosion and not at risk of slumping. Particular attention will be paid to the construction of berms to ensure their surface are fully compacted so as to permit their use by articulated dump trucks for distributing soils in the course of restoration.
- 5.1.3 The colliery discard has the potential to be used as a soil-forming material to augment the available natural soil resources. Its use as lower layer in the construction of soil profiles for forestry and woodland is likely to be most advantageous by providing opportunities for structural root development below the depth that could otherwise ordinarily be achieved by the recovery and reinstatement of natural soils and by bolstering water storage.

5.2 Soil strategy

- 5.2.1 The soil resources potentially available for use in the restoration (which totals 525,301m³) to the vegetation types contained within the proposed landscape scheme is summarised in Appendix 1 'Soil use and management for the restoration of the Mine Waste Repository'.
- 5.2.2 The table is divided into two parts, Part 1 confirms the available soil resources, while Part 2 shows the proposed construction of restored soil profiles for each vegetation type together with the soil volume that would be required to provide the thickness of layers indicated based on the area of each vegetation type.

- 5.2.3 The analysis indicates that the soil resource is sufficient to provide 950 mm deep soil profiles for both Commercial plantation (Sitka spruce) and Amenity woodland (Scots pine with downy birch and rowan) and 400 mm deep for Conservation grassland (mosaic of wet and dry acidic grassland).
- 5.2.4 The soil resource is sufficient to allow all soil profiles to be constructed using peat / subsoil composite exclusively as an upper layer with the small balance of surplus deep peat used only exceptionally for this purpose. The deep peat requirements for the construction of Peat bog 1, the Satellite to Peat bog 1 and the Extension to Peat bog 2 within the Conservation Area on Nant y Mynydd and the construction of Bog 5 within MWR are also identified in Part 2 of the table. The thickness of peat in each additional bog and the volume of peat to be deposited are indicated together with corresponding figures for clay to be used for lining the containment structures.

5.3 Respreading of soils

- 5.3.1 Soil profiles will be constructed by loose tipping. The distribution of soil profiles and details of their construction are shown on Drawing number CA12936/008 'Proposed restored soil profiles'. The method of construction for soil profiles will depend on slope gradients and the access available for articulated dump trucks.

Colliery Discard

- 5.3.2 The colliery discard that is deposited within the MWR will provide the sub grade upon which the recovered natural soils will be reinstated. However, the discard itself has the potential to be used as a soil-forming material and comprise at a least a part of the reconstructed soil profiles.
- 5.3.3 The colliery discard has the potential to be used as a soil-forming material to augment the available natural soil resources. Its use as lower layer in the construction of soil profiles for forestry and woodland is likely to be most advantageous by providing opportunities for structural root development below the depth that could otherwise ordinarily be achieved by the recovery and reinstatement of natural soils and by bolstering water storage.

Soil Profile 1

- 5.3.4 The construction of Soil profile 1, which is generally located on slopes of less than 10%, will follow the now conventional narrow strip system that allows soils to be deposited,

spread and levelled using a tracked excavator without traversing the soil surface. Soil-forming material (rock regolith) will be spread using a bulldozer to produce a 75 mm thick 'blinding' layer over the graded landform immediately prior to soil profile construction. The contoured and profiled fill surface will be ripped downslope using winged tines pulled by a D6 bulldozer, in strips 6.0 m wide to a depth of 400 mm in order to relieve compaction within the soil-forming material and colliery discard. Large stone (>150 mm in any dimension) visible on the ripped surface and liable to intrude significantly into the final cover will be removed. Trucks will reverse downslope up to the edge of the strip (which will be orientated parallel to the dip of the slope) and tip peat / subsoil composite in conical mounds. The spacing between the mounds will allow for a final 325 mm soil thickness to be achieved. An excavator, fitted with a toothed digging bucket, standing on the fill surface immediately behind the edge will spread the material to the required thickness and in the process remove obstructions greater than 150 mm in any dimension from the surface. Care will be taken to ensure that any soils deposited by trucks on the unprepared fill surface in pulling away after tipping is recovered. The final surface shall be left generally free of significant (>50 mm) depressions and high spots but not graded flat in order to slow the shedding of surface water and to encourage infiltration.

Soil Profile 2

- 5.3.5 The construction of Soil profile 2, which is generally on slopes of greater than 10% and up to 33% will be accomplished by a modified form of loose tipping. The fill surface will once again be ripped downslope, and obstructions removed but dump trucks will deposit the peat / subsoil upon berms, which are positioned at regular intervals to divide the batters. A tracked excavator working from upon the fill surface alongside the ripped strip will haymake the soils onto the ripped colliery discard and into position to achieve a final soil profile 900 mm in thickness. The removal of obstructions and the surface finish shall be as per Soil profile 1.
- 5.3.6 Areas upon which soils are reinstated will be protected from loss, damage and contamination with colliery discard by the excavation of drainage ditches and /or bunds to provide a physical barrier to encroachment by equipment.

Replacement of Peat crude

- 5.3.7 The peat resource identified within the Additional land to the east of FQ2E presents the opportunity to build upon the success of the mitigation scheme which was implemented in order to permit development of the Forest Quarry 2 Extension OCCS.

While the principal voids which remained after sandstone quarrying within 'Area 1' were utilised in the course of constructing Bogs 2, 3 and 4 within the Nant y Mynydd Conservation area a number of additional opportunities have been identified for bog construction within this area and these are identified on Drawing number CA12936/005.

6 ACCESS AND RIGHTS OF WAY

- 6.1 The restored area provides numerous opportunities for informal recreation and includes a footpath along the ridge and towards the site's highpoint, with the numerous berms providing additional access at easy gradients (<2%) to walkers and mountain bikers. Providing a dedicated access through the grassland is intended to guide access in order to leave the remainder of the area undisturbed as this has potential as habitat for ground nesting birds.

7 SITE CLEARANCE AND REINSTATEMENT

- 7.1 The Environmental Statement submitted in support of the planning application ref. P2014/0729 stated in Section 2.3.8 that on site structures would comprise a standard portacabin welfare and site office cabin, portaloo, and bunded diesel tank.
- 7.2 These structures would not be permanent features and would most likely be frequently relocated to suit the deposition of the waste.
- 7.3 Currently, there are no such buildings located at the MWR site. However, should in future the need arise for such temporary structures be used, these will be removed once no longer needed and their locations reinstated in accordance with the Landscaping Scheme as illustrated on Drg. CA12936/007.

APPENDICES

APPENDIX 1

SOIL USE AND MANAGEMENT FOR THE RESTORATION OF THE MINE WASTE REPOSITORY

Proposed Mine Waste Repository, Nant Y Mynydd, Neath, Port Talbot - Potential soil resources and their allocation for site restoration

Table 4. Soil use and management for the restoration of the Mine Waste Repository (Revised 13th May 2014)

Part 1. Soil resources available for use in restoration

Source	Estimated volume of soil resources available (m³)					Total (m³)
	Peat / subsoil composite	Deep peat	Clay	Soil-forming material (rock regolith and subsoil)	Soil-forming material (colliery discard)	
Soil resources from previous opencast developments and ongoing drift mining	284,045	0	800	30,813	0	315,658
Soil resources from Additional previously undisturbed areas that will be restored	149,247	53,283	7,113			209,643
Total	433,292	53,283	7,913	30,813	0	525,301

Part 2. Restored soil profiles and allocation of soils by vegetation type

Vegetation type	Area (ha)	Instruction of restored soil profiles, thickness of soil layers (mm) and position					Soil volume required (m³)					Total (m³)
		Peat / subsoil composite	Deep peat	Clay	Soil-forming material (rock regolith and subsoil)	Soil-forming material (colliery discard)	Peat / subsoil composite	Deep peat	Clay	Soil-forming material (rock regolith and subsoil)	Soil-forming material (colliery discard)	
		Upper layer	Upper layer	Lower layer	Lower layer	Lower layer						
Mine Waste Repository												
Peat bog 5	1.2	0	1,800	500	0	0	0	21,600	6,000	0	0	27,600
Commercial forestry plantation - Sitka spruce	28.4	900	0	0	0	0	255,600	0	0	0	0	255,600
Commercial forestry plantation - Sitka spruce	2.0	0	450	0	450	0	0	9,000	0	9,000	0	18,000
Amenity woodland - Open Scots pine with minor downy birch and rowan	8.9	900	0	0	0	0	80,100	0	0	0	0	80,100
Conservation grassland - mosaic of wet and dry acidic grassland with	26.9	325	0	0	75	0	87,295	0	0	20,145	0	107,440
Grassland along berms, within fire breaks and road verges	6.6	150	0	0	0	0	9,900	0	0	0	0	9,900
Sub total	74.0						432,895	30,600	6,000	29,145	0	498,640
Nant y Mynydd - Conservation area												
Peat bog 1	0.55	0	2,235	0	0	0	0	12,293	0	0	0	12,293
Satellite Peat bog 1	0.16	0	1,155	250	0	0	0	1,802	390	0	0	2,192
Extension Peat bog 2	0.45	0	1,745	250	0	0	0	7,887	1,130	0	0	9,017
Total allocated							432,895	52,582	7,520	29,145	0	522,142
Total available							433,292	53,283	7,913	30,813	0	525,301
Balance							397	701	393	1,668	0	3,159

APPENDIX 2

SOIL VOLUME GENERATION BY INDIVIDUAL PHASES

Proposed Mine Waste Repository, Nant Y Mynydd, Neath, Port Talbot - Potential soil resources and their allocation for site restoration

Table 5. Soil volume generation by individual phases (Revised 13th May 2014)

Phase	Location	Area (ha)	Extent of soil cover to be removed to allow deposition of colliery discard (ha)			Estimate of soil volume to be recovered prior to deposition of colliery discard (m ³)			Total soils to be excavated (m ³)	Volume of peat and clay to be deposited within Nant Y Mynydd Conservation	Soils retained within Mine Waste Repository for use in restoration (m ³)
			Natural soils on undisturbed area	Reinstated soils on previously restored area	Long-term soil storage	Natural soils on undisturbed area	Reinstated soils on previously restored area	Long-term soil storage			
1	Open final void from FQ2E and temporary spoil holding area / delivery pad	10.90	1.78	0.00	0.00	29,077	0	0	29,077	13,323	15,754
2	Opencast backfill (graded)	11.20	0.40	0.00	0.60	4,744	0	9,814	14,558	1914	12,644
3	Overburden mound 1 (ungraded)	3.80	0.00	0.00	0.00	0	0	0	0	0	0
4	Undisturbed ground (Additional land to the south of FQ2E)	8.40	8.22	0.00	0.00	58,646	0	0	58,646	0	58,646
5	Overburden mound 2 with soil storage over, including restored area	19.00	0.00	3.70	10.40	0	33,485	163,560	197,045	0	197,045
6	Restored ground within the former Forest Quarry OCCS	12.00	0.00	11.60	0.00	0	87,000	0	87,000	0	87,000
7	Undisturbed ground (Additional land to the east of FQ2E)	11.40	10.78	0.00	0.00	117,175	0	0	117,175	8,175	109,000
Total		76.70	21.18	15.30	11.00	209,643	120,485	173,374	503,502	23,412	480,090

Note:

Excavation arising from Nant Y Mynydd (circa 20,999 m³) generated in the course of excavating Bog 2 Extension and Satellite Peat bog 1 are excluded from the above calculations

Soils used to establish grassland along berms, within fire breaks and along verges which account for less than 2% of the soils utilised in the restoration scheme are ignored for the purpose of the above

APPENDIX 3

SOIL VOLUME UTILISED IN PROGRESSIVE RESTORATION

Proposed Mine Waste Repository, Nant Y Mynydd, Neath, Port Talbot - Restoration and aftercare scheme

Table 6. Soil volume utilised in progressive restoration (Revised 13th May 2014)

Phase	Location	Area (ha)	Soils retained within Mine Waste Repository for use in	Vegetation type (ha)				Soil used in soil profile construction (m ³)			Soil volume used in soil profile construction (m ³)	Running total of soil utilised in restoration (m ³)	Notes
				Commercial forestry plantation - Sitka spruce	Amenity woodland - Open Scots pine with minor downy birch and rowan	Conservation grassland - mosaic of wet and dry acidic grassland with scattered hawthorn	Peat bog	Soil profile 2	Soil profile 1	Soil profile 3			
Soil profile thickness (mm)								900	400	2,300			
2	Opencast backfill (graded)	11.20	12,644	6.30	2.50	0.80	0.00	79,200	3,200	0	82,400	12,644	Excess into temporary storage
4	Undisturbed ground (Additional land to the south of FQ2E)	8.40	58,646	7.00	0.00	0.00	0.00	63,000	0	0	63,000	-23,754	Shortfall from temporary storage
5	Overburden mound 2 with soil storage over, including restored area	19.00	197,045	10.80	3.20	1.90	0.00	126,000	7,600	0	133,600	134,045	Rehandling of stored soils required
6	Restored ground within the former Forest Quarry OCCS	12.00	87,000	0.00	1.60	7.80	1.20	14,400	31,200	27,600	73,200	-46,600	Shortfall from temporary storage
7	Undisturbed ground (Additional land to the east of FQ2E)	11.40	109,000	6.00	1.50	3.00	0.00	67,500	12,000	0	79,500	35,800	Excess into temporary storage
1	Open final void from FQ2E and temporary spoil holding area / delivery pad	10.90	15,754	0.00	0.00	10.40	0.00	0	41,600	0	41,600	-63,746	Shortfall from temporary storage
3	Overburden mound 1 (ungraded)	3.80	0	0.50	0.10	3.00	0.00	5,400	12,000	0	17,400	-41,600	Shortfall from temporary storage
Total		76.70	480,090	30.60	8.90	26.90	1.20	355,500	107,600	27,600	490,700		

Note :

The differences between the area of each vegetation unit contained within the restoration scheme and those shown on the table are because the surface areas shown on the drawing have been calculated on LSS which takes into account the topography whereas the areas calculated on the table are flat surface areas. Soil quantities have been adjusted to take account of the error

Soils used to establish grassland along berms, within fire breaks and along verges which account for less than 2% of the soils utilised in the restoration scheme are ignored for the purpose of the above

Soils used in progressive restoration are ignored for the purpose of the above calculation and it is assumed that all areas within a phase will be available for restoration which is unlikely to be the case for earlier phases in particular

Clay and peat (circa 23,502 m³) utilised in the course of constructing, Peat bog 1, Bog 2 Extension and Satellite Peat bog 1 are excluded from the above calculations

APPENDIX 4

SEED MIX FOR CONSERVATION GRASSLAND – MOSAIC OF WET AND DRY ACIDIC GRASSLAND WITH SCATTERED HAWTHORN

Proposed Mine Waste Repository, Nant Y Mynydd, Neath, Port Talbot - restoration and aftercare scheme

Table 7. Seed mix for conservation grassland - mosaic of wet and dry acidic grassland with scattered hawthorn (Revised 13th May 201

Name		Numbers		Open ground reference number and area (m ²)		Total (kgs.)
Common	Scientific	Composition (% by weight)	Kilograms of seed (per ha)	G-01	G-02	
			60	18.46	8.41	26.87
Slender Creeping Red Fescue	<i>Festuca rubra spp. litoralis</i>	35	21	388	177	582
Creeping Bent	<i>Agrostis stolonifera</i>	30	18	332	151	499
Crested Dogs tail	<i>Cynosurus cristatus</i>	8	4.8	89	40	133
Meadow Fescue	<i>Festuca pratensis</i>	5	3	55	25	83
Cocksfoot	<i>Dactylis glomerata</i>	5	3	55	25	83
Velvet Bent	<i>Agrostis canina spp. canina</i>	5	3	55	25	83
Annual Meadow Grass	<i>Poa annua</i>	5	3	55	25	83
Rough Stalked Meadow Grass	<i>Poa compressa</i>	5	3	55	25	83
Wild white clover	<i>Trifolium repens</i>	2	1.2	22	10	33
Total		100	60	1,108	505	1,664

Note:

Hawthorn to be broadcast spread using stratified seed from old established mature bushes within the locality. Underlying colliery fill to be completely cultivated to 750 mm below ground level prior to soil placement over at strategic locations

APPENDIX 5

FORESTRY AND WOODLAND PLANTING MIXES

Proposed Mine Waste Repository, Nant Y Mynydd, Neath, Port Talbot - restoration and aftercare scheme

Table 8. Forestry and woodland planting mixes (Revised 13th May 2014)

Part 1a. Commercial forestry plantation - Sitka spruce

Name		Numbers				Sub-compartment reference and area (ha)										Total (no.)
Common	Scientific	%	Spacing (between rows) (m)	Spacing (within rows) (m)	Plants (per ha)	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09	SS-10	
Gross area (ha)						0.35	1.99	1.79	0.11	4.14	3.53	4.29	2.68	2.28	1.64	22.81
Allowance for open space						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net plantable area (ha)					3,086	0.35	1.99	1.79	0.11	4.14	3.53	4.29	2.68	2.28	1.64	22.81
Sitka spruce	<i>Picea sitchensis</i>	99	1.8	1.8	3,055	1,071	6,094	5,482	337	12,640	10,793	13,099	8,198	6,973	5,003	69,690
Hawthorn	<i>Crataegus monogyna</i>	0.5	1.8	1.8	15	5	31	28	2	64	55	66	41	35	25	352
Rowan	<i>Sorbus aucuparia</i>	0.5	1.8	1.8	15	5	31	28	2	64	55	66	41	35	25	352
Total		100			3,086	1,082	6,155	5,537	340	12,768	10,902	13,231	8,281	7,043	5,054	70,394

Part 1b. Commercial forestry plantation - Sitka spruce

Name		Numbers				Sub-compartment reference and area (ha)										Total (no.)
Common	Scientific	%	Spacing (between rows) (m)	Spacing (within rows) (m)	Plants (per ha)	SS-11	SS-12	SS-13	SS-14							
Gross area (ha)						1.51	1.30	1.95	1.35							6.10
Allowance for open space						0.00	0.00	0.00	0.00							0.00
Net plantable area (ha)					3,086	1.51	1.30	1.95	1.35							6.10
Sitka spruce	<i>Picea sitchensis</i>	98	1.8	1.8	3,024	4,565	3,925	5,886	4,070							18,445
Hawthorn	<i>Crataegus monogyna</i>	1	1.8	1.8	31	47	40	60	42							188
Rowan	<i>Sorbus aucuparia</i>	1	1.8	1.8	31	47	40	60	42							188
Total		100			3,086	4,658	4,005	6,006	4,153							18,822

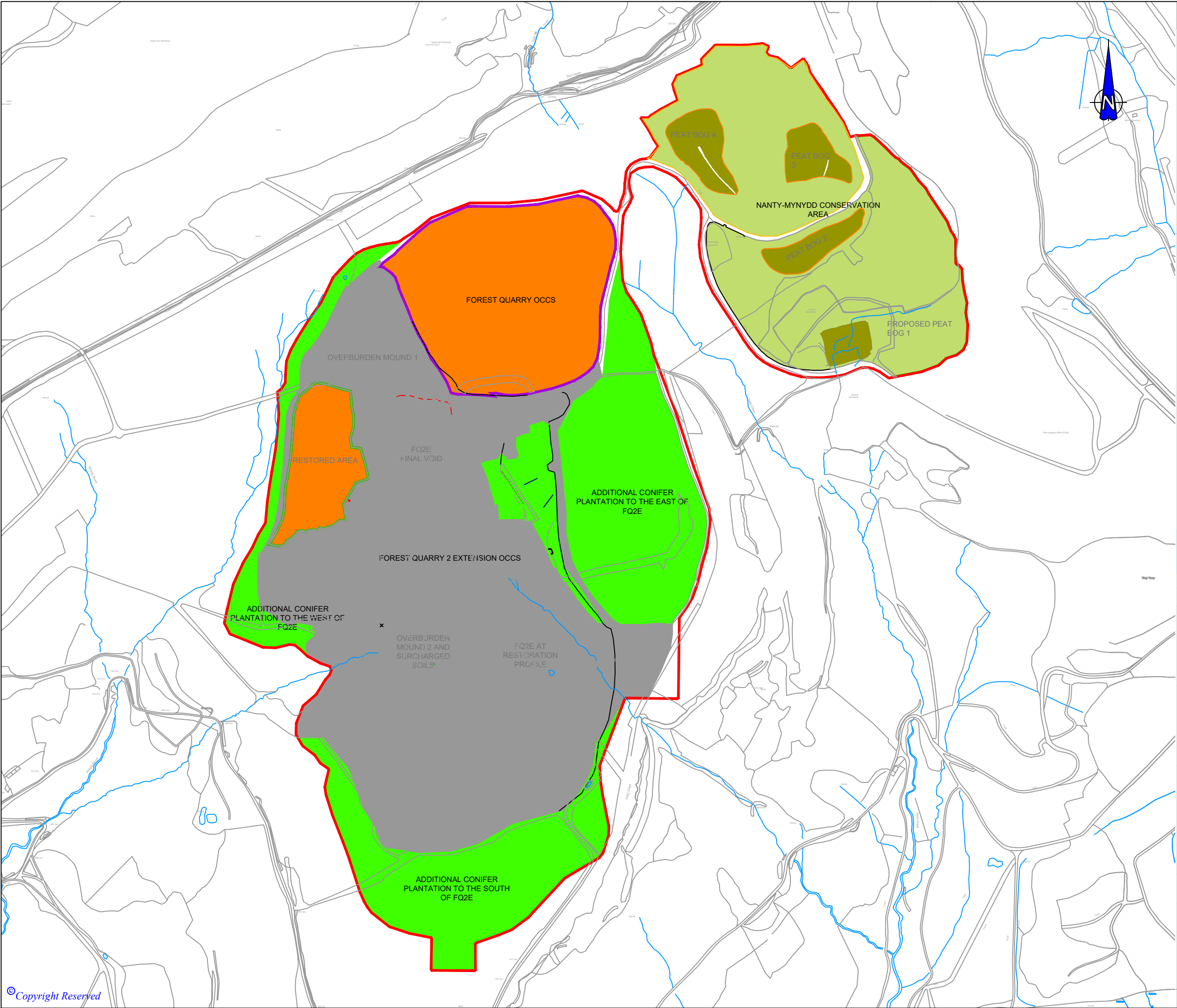
Part 2. Amenity woodland - Open Scots pine with minor downy birch and rowan

Name		Numbers				Sub-compartment reference and area (ha)										Total (no.)
Common	Scientific	%	Spacing (between rows) (m)	Spacing (within rows) (m)	Plants (per ha)	SP-01	SP-02	SP-03	SP-04	SP-05						
Gross area (ha)						0.98	2.13	2.42	2.61	0.75						8.89
Allowance for open space						0.20	0.43	0.48	0.52	0.15						1.78
Net plantable area (ha)					3,086	0.78	1.70	1.93	2.09	0.60						7.11
Scots pine	<i>Pinus sylvestris</i>	90	1.8	1.8	2,777	2,171	4,725	5,366	5,807	1,674						19,744
Downy birch	<i>Betula pubescens</i>	4	1.8	1.8	123	96	210	239	258	74						878
Rowan	<i>Sorbus aucuparia</i>	4	1.8	1.8	123	96	210	239	258	74						878
Hawthorn	<i>Crataegus monogyna</i>	2	1.8	1.8	62	48	105	119	129	37						439
Total		100			3,086	2,412	5,250	5,963	6,453	1,860						21,938

DRAWINGS

DRAWING CA12936/001

Planning permission boundary for Mine Waste Repository – Current and previous land use



DO NOT SCALE FROM THIS DRAWING

Legend

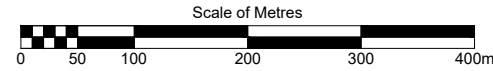
Mine Waste Repository and Nant y Mynydd Conservation Area Boundary

Undisturbed Ground (24.5 Ha)

Disturbed and Restored Ground (14.9 Ha)

Disturbed and Unrestored Ground (43.1 Ha)

Unaffected by Proposed Development (18.4 Ha)



REVISION	DETAILS	DATE	DRN	CHKD	APP'D

CLIENT

PROJECT

MINE WASTE REPOSITORY

P2014/0729 - CONDITIONS 69 & 72

RESTORATION & AFTERCARE SCHEMES

DRAWING TITLE

PLANNING PERMISSION BOUNDARY FOR

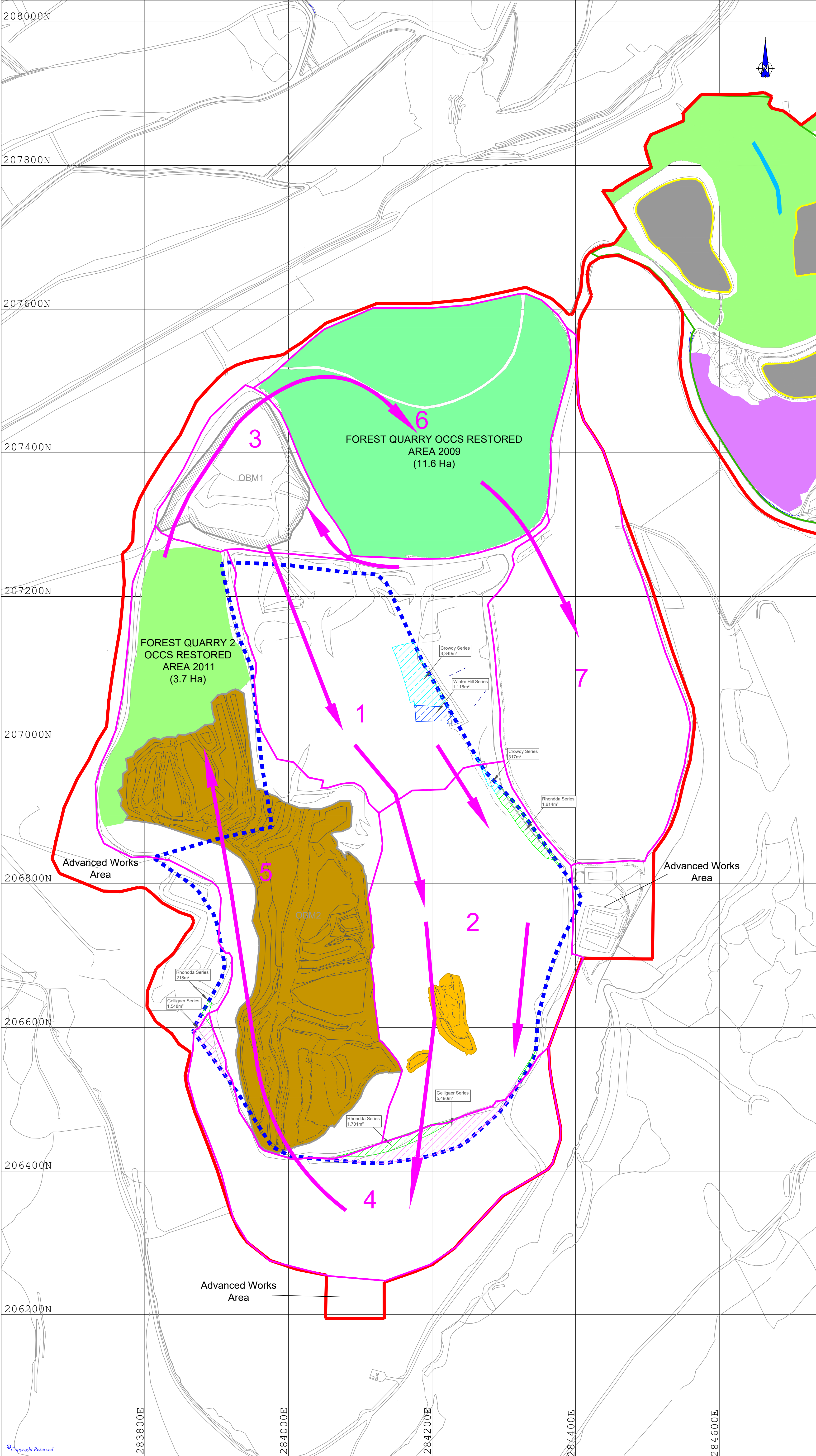
MINE WASTE REPOSITORY - CURRENT

AND PREVIOUS LAND USE

DRG No.	CA12936-001	REV	SUIT.
DRG SIZE	A3	SCALE	DATE
		NTS	OCTOBER 2023
DRAWN BY	CHECKED BY	APPROVED BY	
DNH			

DRAWING CA12936/002

**Reinstated soil profiles on restored ground and location of soil storage mounds within
previous opencast coal extraction areas within the Mine Waste Repository**



DO NOT SCALE FROM THIS DRAWING

Legend

Planning Permission boundary for Forest Quarry 2 Extension

Forest Quarry 2 Extension Limit of Excavation

FQ2E Peat Conservation Area

Stored Soils

Overburden Mound 2 and Soil Storage Mounds (Peat/Subsoil Composite) (10.4 Ha)

Subsoil and Soil Forming Material on Graded Backfill at Final Level (0.6 Ha)

Soils Reinstated on Restored Areas

Forest Quarry OCCS (Peat/Subsoil Composite)(87,000m³)

Forest Quarry 2 OCCS (Peat/Subsoil Composite) (33,485m³)

Remaining Soils

Rhondda Series (Stagnohumic Surface Water Clay)

Crowdy Series (Raw Oligo-Amorphous Peat)

Winter Hill Series (Raw Oligo-Fibrous Peat)

Gelligaer Series (Ferric Stanopodzols)

Phasing Areas 1 - 7

Direction of Development within each Phase

Note:
For further details of soils in long-term storage and soils available for recovery from previously restored ground see Table 2 Part 1 and 2 contained within the Soil Use and Management Strategy.

Scale of Metres

050100150200m

REVISION

DETAILS

DATE

DRAWN

CHKS

APPRO

CLIENT

Energybuild

PROJECT

MINE WASTE REPOSITORY
P2014/0729 - CONDITIONS 69 & 72
RESTORATION & AFTERCARE SCHEMES

DRAWING TITLE

REINSTATED SOIL PROFILES ON RESTORED GROUND AND
LOCATION OF SOIL STORAGE MOUNDS WITHIN PREVIOUS OPENCAST
COAL EXTRACTION AREAS WITHIN THE MINE WASTE REPOSITORY

DRG No.

CA12936-002

REV

SUIT. CODE

DRG SIZE

A1

SCALE

1:2500 @A1

DATE

OCTOBER 2023

DRAWN BY

DNH

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APPROVED BY

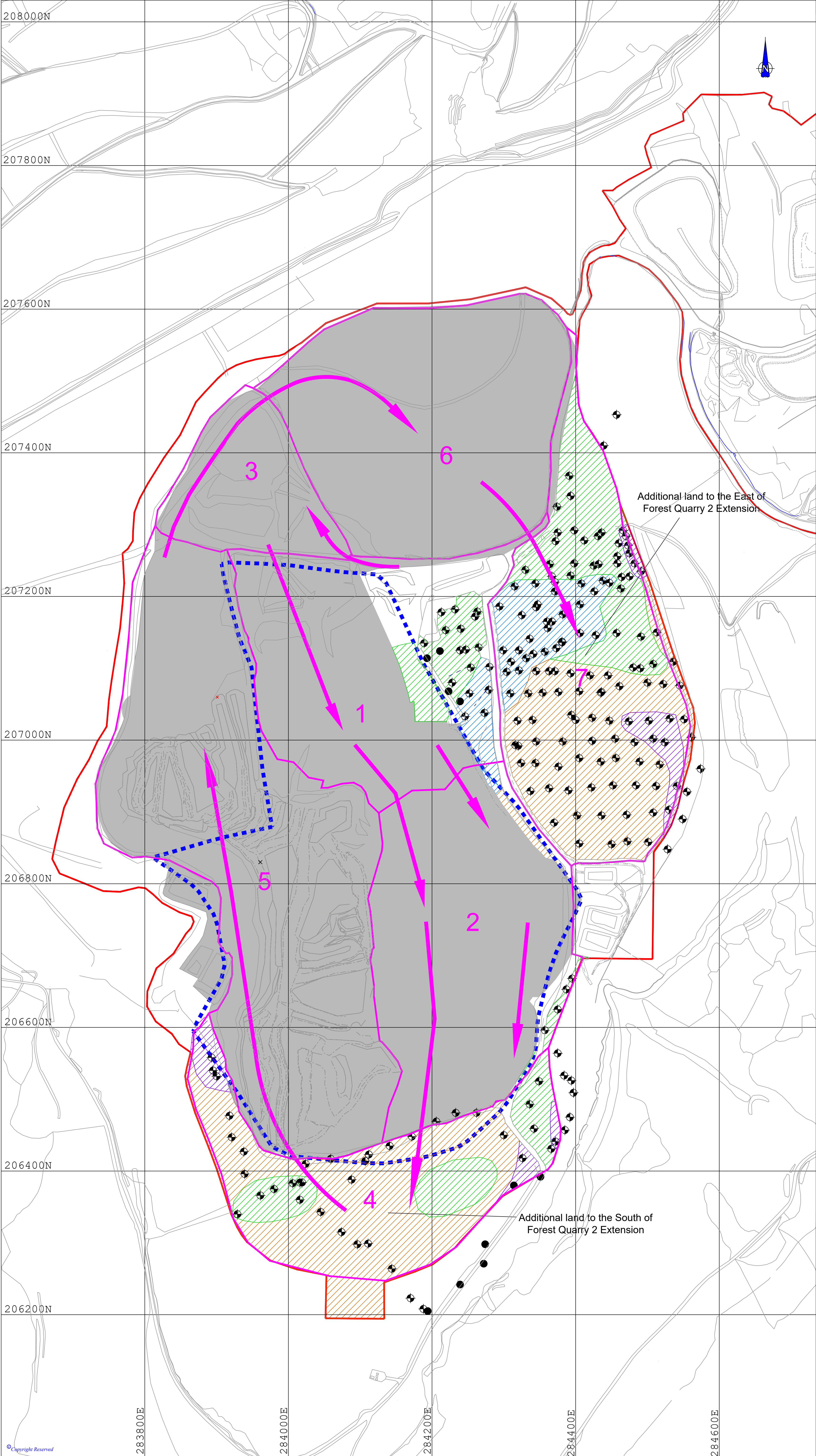
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DRAWING CA12936/003

**Distribution of soil groups on previously undisturbed ground within
the curtilage of the Mine Waste Repository**



DO NOT SCALE FROM THIS DRAWING

Legend

Mine Waste Repository and Nant y Mynydd Conservation Area Boundary

Forest Quarry 2 Extension Limit of Excavation

Previously Disturbed Ground

Phasing Areas 1-7

Direction of Development within each Phase

Natural soil profiles on undisturbed ground

Deep Peat (Winter Hill and Crowdy Series)

Organic Soils (Crowdy and Rhondda Series)

Mineral Soils (Rhondda and Gelligaer Series)

Skeletal Soils and Exposed Rock (Anglezarke Series)

Visible Exposure

Probe

Scale of Metres

0 50 100 150 200m

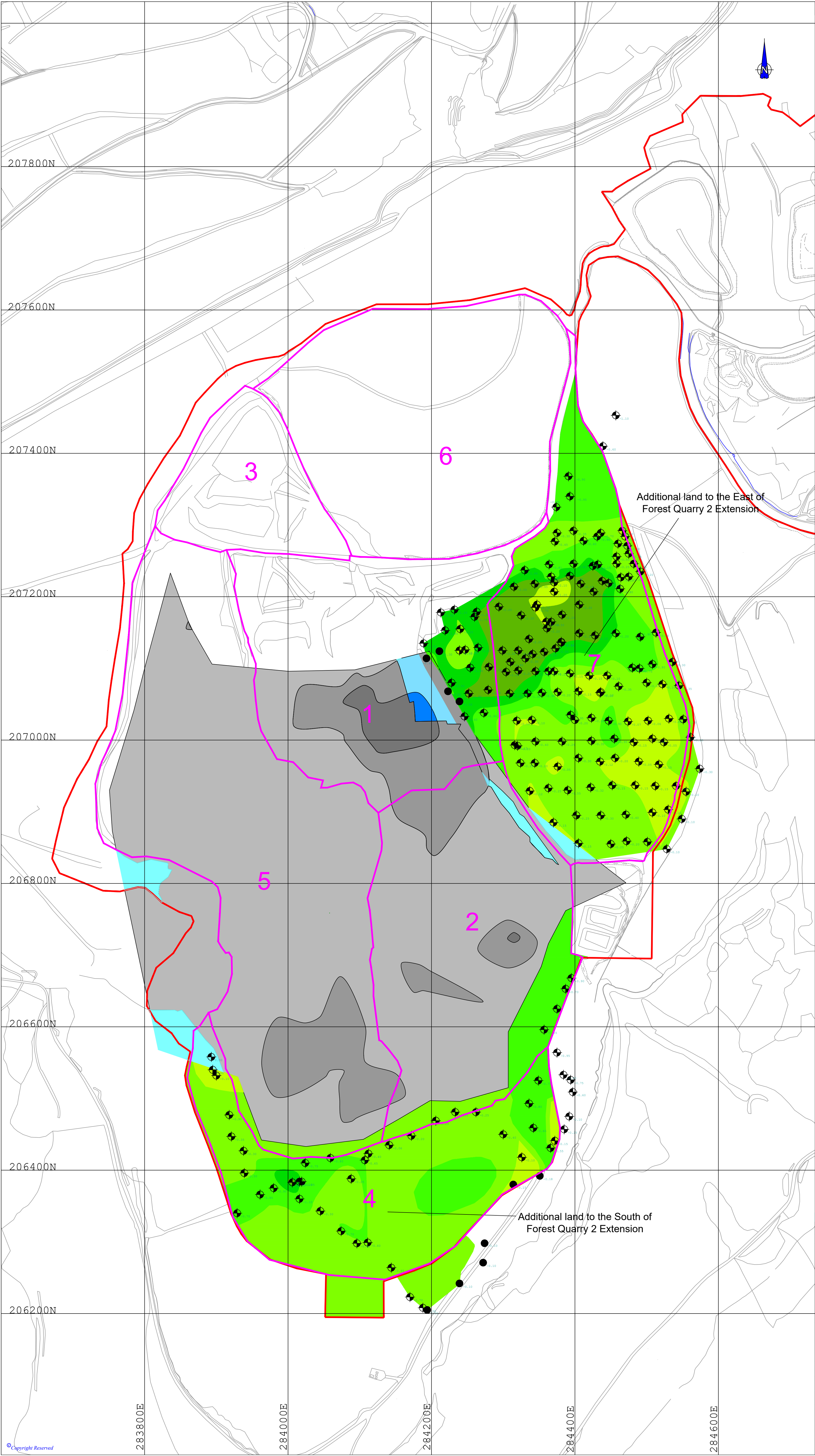
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CLIENT	Energybuild				
PROJECT	MINE WASTE REPOSITORY P2014/0729 - CONDITIONS 69 & 72 RESTORATION & AFTERCARE SCHEMES				
DRAWING TITLE	DISTRIBUTION OF SOIL GROUP ON PREVIOUSLY UNDISTURBED GROUND WITHIN THE CURTILAGE OF THE MINE WASTE REPOSITORY				
DRG No.	CA12936-003	REV	SUIT. CODE		
DRG SIZE	A1	SCALE	1:2500 @A1	DATE	OCTOBER 2023
DRAWN BY	DNH	CHECKED BY	APPROVED BY		





DRAWING CA12936/004

**Isopachytes to show thicknesses of peat on previously undisturbed ground
within the curtilage of the Mine Waste Repository**



DO NOT SCALE FROM THIS DRAWING

Legend

Mine Waste Repository and Nant y Mynydd Conservation Area Boundary

Peat Thickness on Undisturbed Areas November 2010 Survey

0 - 0.75m

0.75 - 1.50m

1.50 - 2.25m

2.25 - 3.00m

>3m

Peat Thickness on Undisturbed Areas November 2013 Survey

0 to 0.15m

0.15m to 0.6m

0.6m to 1.2m

1.2m to 1.8m

Greater than 1.8m

Peat Thickness on Previously Worked Areas

0 - 0.75m

0.75 - 1.50m

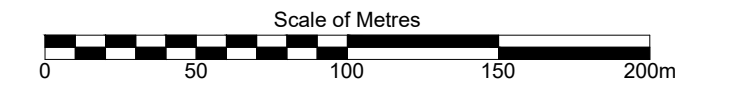
1.50 - 2.25m

2.25 - 3.00m

Visible Exposure

Probe

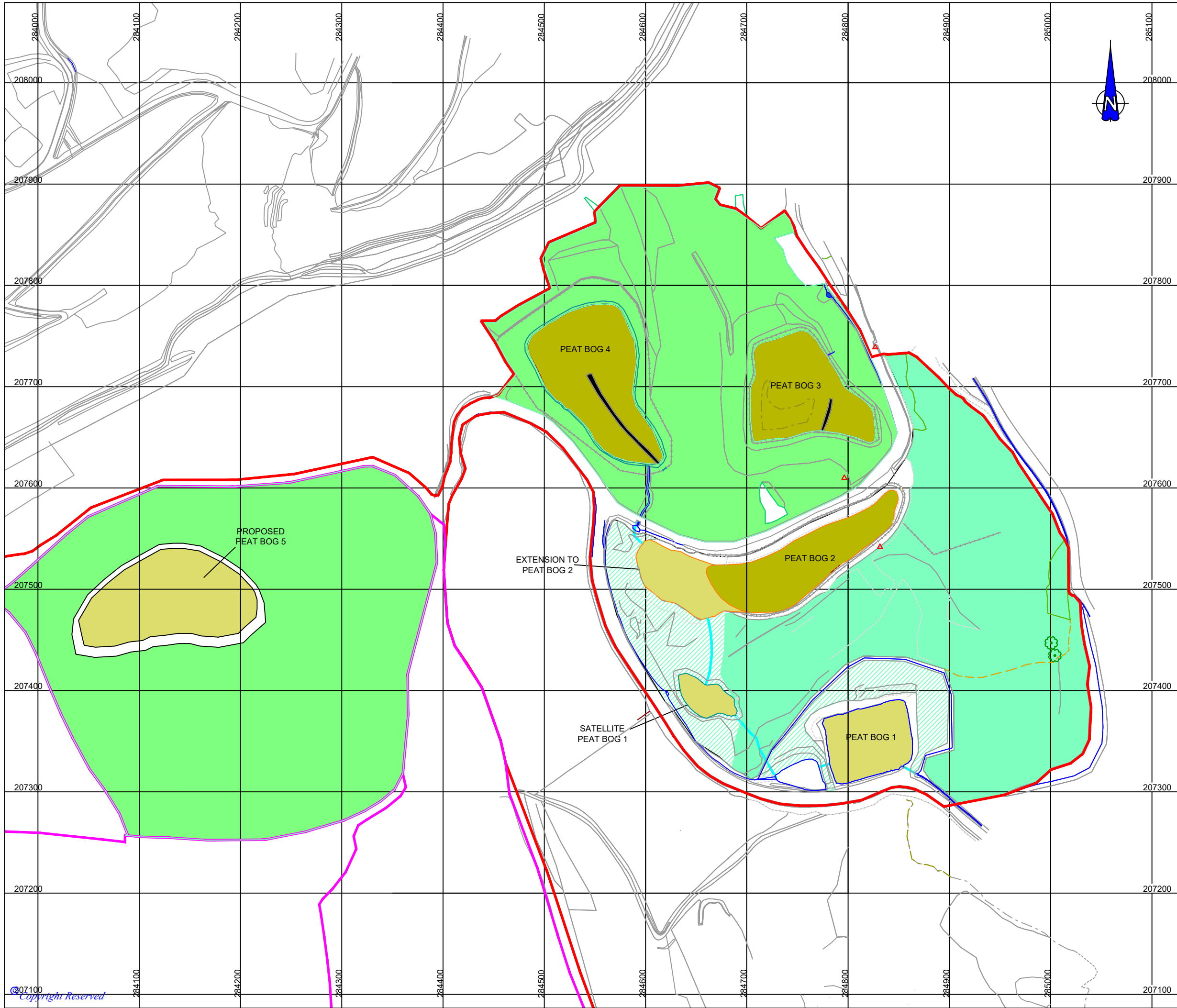
Note:
Approximately 50,000m³ of Peat was excavated in the course of operating the Forest Quarry 2 Extension OCCS and deposited within 3 purposely constructed cells within the conservation areas on Nant-Y-Mynydd for the creation of new peat bogs as part of a comprehensive mitigation scheme.



REVISION	DETAILS	DATE	DRAWN	CHECKED	APPROVED
CLIENT					
PROJECT					
MINE WASTE REPOSITORY P2014/0729 - CONDITIONS 69 & 72 RESTORATION & AFTERCARE SCHEMES					
DRAWING TITLE					
ISOPACHYTES TO SHOW THICKNESS OF PEAT ON UNDISTURBED GROUND WITHIN CURTILAGE OF THE MINE WASTE REPOSITORY					
DRG No.		CA12936-004		REV	SUIT. CODE
DRG SIZE		A1		SCALE	1:2500 @A1
DRAWN BY		DNH		CHECKED BY	APPROVED BY
DATE		OCTOBER 2023			

DRAWING CA12936/005

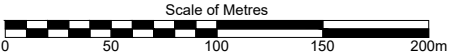
Further development of Nant y Mynydd Conservation Area



DO NOT SCALE FROM THIS DRAWING

- Legend
- Mine Waste Repository and Nant y Mynydd Conservation Area Planning Application Boundary
- Existing Peat Bogs (Constructed as part of the mitigation scheme for the Forest Quarry 2 Extension OCCS.)
- Proposed Peat Bogs (To be constructed as part of the mitigation scheme for the Mine Waste Repository)
- Conservation Grassland - mosaic of wet and dry acidic grassland with scattered hawthorn
- Recovering Heathland on ground only marginally affected by previous development
- Area effected by previous development with subsoil/soil forming material exposed on ground surface
- Drainage channel

DESCRIPTION	PEAT SURFACE AREA (m²)	PEAT VOLUME (m³)	CLAY LINING VOLUME (m³)	MUCKSHIFT VOLUME (m³)
BOG 1	5,500	12,285	NIL	2,885
BOG 2 EXTENSION	4,520	7,870	1,130	15,520
PEAT BOG 5	12,000	21,600	6,000	0
SATELLITE PEAT BOG 1	1,560	1,805	390	2,594
TOTALS	23,580	43,560	7,520	20,999



REVISION	DETAILS	DATE	DRN	CHKD	APP'D
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CLIENT

PROJECT

MINE WASTE REPOSITORY
P2014/0729 - CONDITIONS 69 & 72
RESTORATION & AFTERCARE SCHEMES

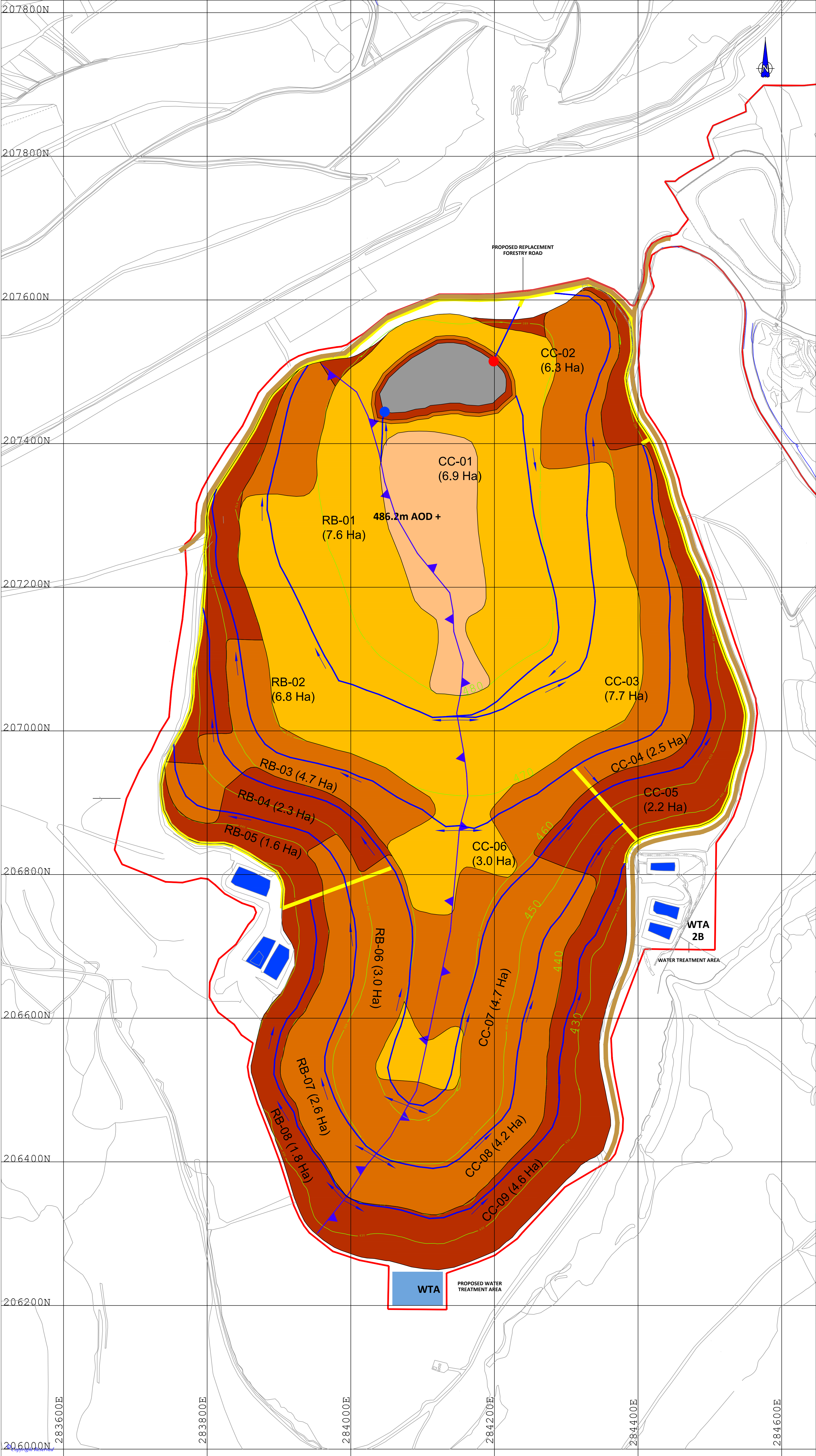
DRAWING TITLE

FURTHER DEVELOPMENT OF
NANT-Y-MYNYDD CONSERVATION AREA

DRG No.	CA12936-XXX	REV	SUIT.
DRG SIZE	A3	SCALE	1:2500 @ A3
DRAWN BY	DNH	CHECKED BY	APPROVED BY

DRAWING CA12936/006

**Proposed final landform, slope gradients, surface water drainage system
and access arrangements**



DO NOT SCALE FROM THIS DRAWING

REFERENCE

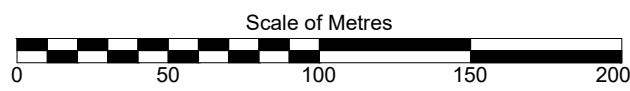
- Mine Waste Repository and Nant y Mynydd Conservation Area boundary
- Proposed alignment of Forestry Roads
- Proposed Peat Bog 5 (12,000 m²)
- Proposed Peat Bog 5 Inlet
- Proposed Peat Bog 5 Outlet
- Water Treatment Area
- Proposed Drainage Berm
- Stone Armoured Channel
- Proposed Drainage Ditch
- Watershed

Slope Gradients

- <5%
- 6-10%
- 11-20%
- 21-33%

Catchments

- Rheola Brook (31.3 Ha) RB-01
- Craig Clwd (41.9 Ha) CC-01



REVISION	DETAILS	DATE	DRAWN	CHECKED	APPROVED



PROJECT
MINE WASTE REPOSITORY
P2014/0729 - CONDITIONS 69 & 72
RESTORATION & AFTERCARE SCHEMES

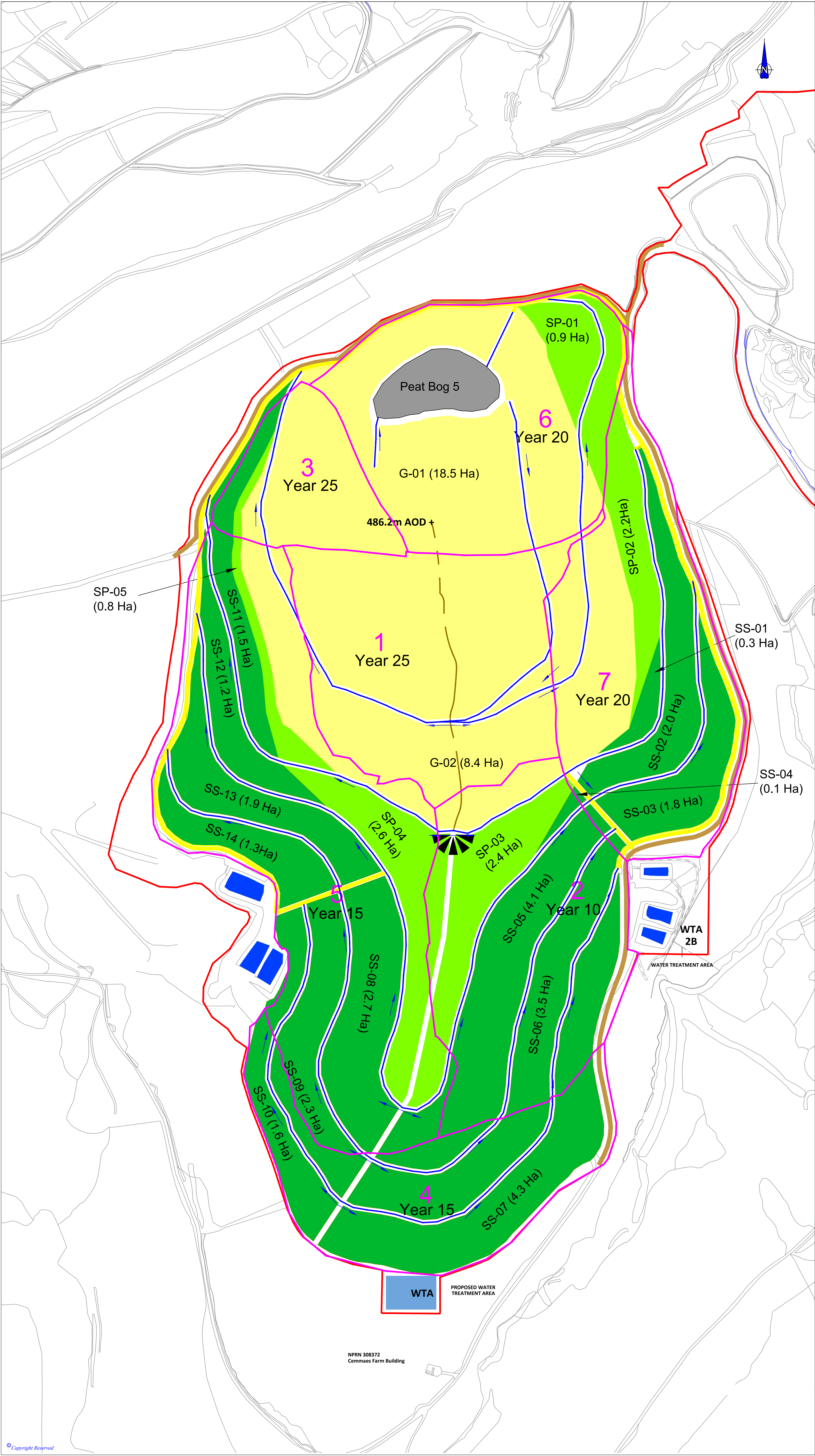
DRAWING TITLE
PROPOSED FINAL LANDFORM, SLOPE
GRADIENTS, SURFACE WATER DRAINAGE
SYSTEM AND ACCESS ARRANGEMENTS

DRG No.	CA12936-006	REV	SUIT. CODE
DRG SIZE	A1	SCALE	1:2500 @A1
DRAWN BY	DNH	CHECKED BY	APPROVED BY
DATE	OCTOBER 2023		



DRAWING CA12936/007

Proposed landscaping scheme



DO NOT SCALE FROM THIS DRAWING

REFERENCE

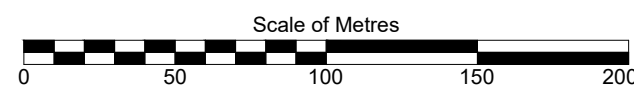
- Mine Waste Repository and Nant y Mynydd Conservation Area Boundary
- Phasing Areas 1-7
- Proposed alignment of Forestry Roads
- Water Treatment Area
- Proposed Drainage Berm
- Stone Armoured Channel
- Proposed Drainage Ditch
- Footpath to Viewing Platform

- Vegetation Type
- Amenity Woodland - Open Scots Pine with minor downy birch and rowan (8.9 Ha)
 - Commercial Forestry Plantation - Sitka Spruce (30.4 Ha)
 - Conservation Grassland - mosaic of wet and dry acidic grassland with scattered hawthorn (26.9 Ha)
 - Peat bog - bog community by translocation of turfs augments by natural recolonisation (1.2 Ha)
 - Circular viewing platform to represent a sheep fold

Approximate completion of progressive restoration of each Phase

Phase 2	Year 10
Phase 4 & 5	Year 15
Phase 6	Year 20
Phase 7, 1 & 3	Year 25

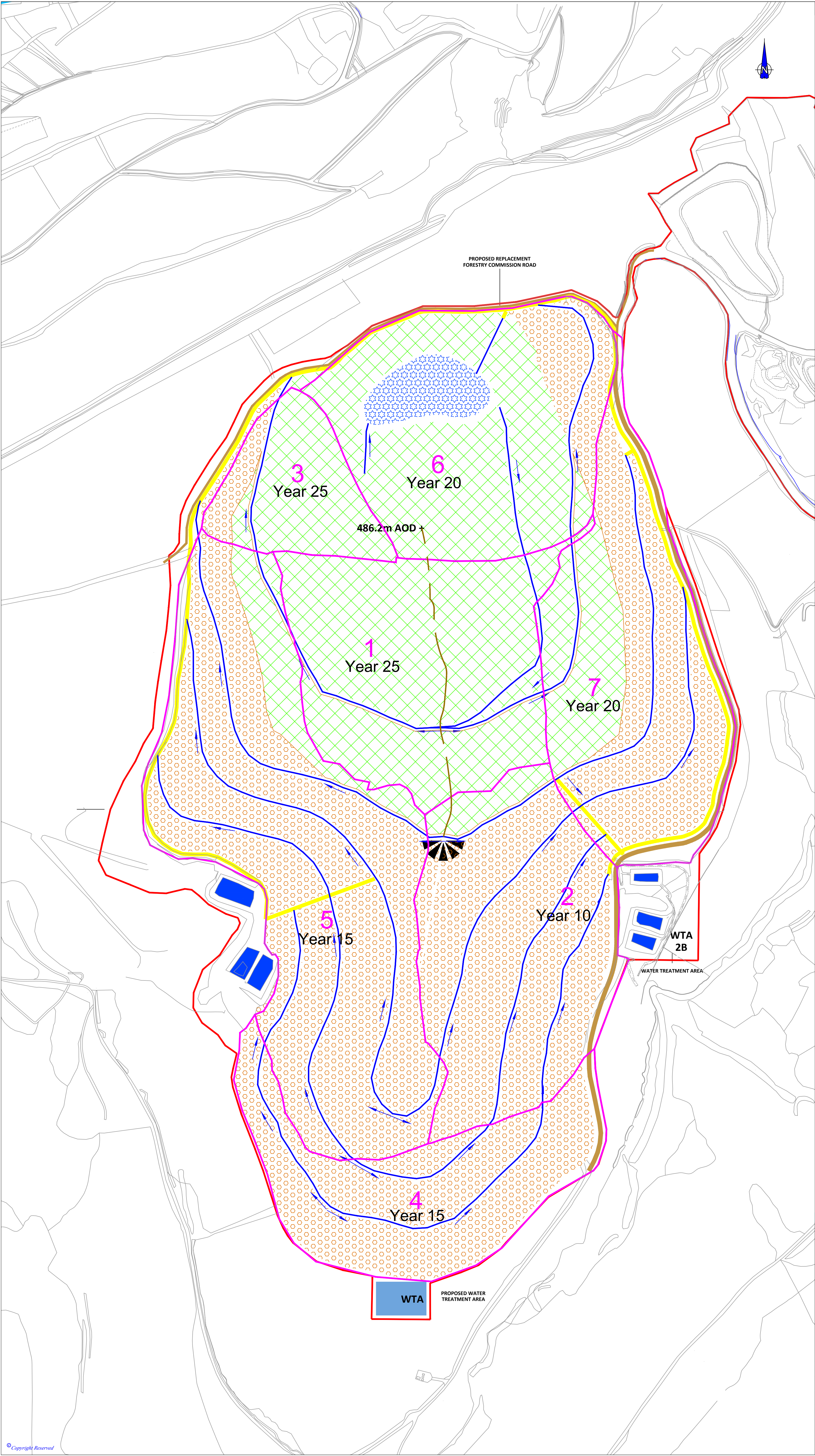
- Note:
- Berms, which will remain un-surfaced, will provide access for all ability groups from the surrounding forest roads into the restored area.
 - Landscape design to be reviewed on a 5 year basis and this is to be synchronized with the Natural Resources Wales review of their Forest Design Plan for the Resolven Block



REVISION	DETAILS	DATE	DRAWN	CHECKED	APPROVED
CLIENT					
PROJECT MINE WASTE REPOSITORY P2014/0729 - CONDITIONS 69 & 72 RESTORATION & AFTERCARE SCHEMES					
DRAWING TITLE PROPOSED LANDSCAPING SCHEME					
DRG No. CA12936-007a		REV	SUIT. CODE		
DRG SIZE A1	SCALE 1:2500 @A1	DATE	OCTOBER 2023		
DRAWN BY DNH	CHECKED BY	APPROVED BY			

DRAWING CA12936/008

Proposed restored soil profiles



DO NOT SCALE FROM THIS DRAWING

REFERENCE

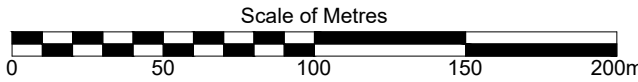
- Mine Waste Repository and Nant y Myydd Conservation Area Boundary
- Proposed alignment of Forestry Roads
- Water Treatment Area
- Proposed Drainage Berm
- Stone Armoured Channel
- Proposed Drainage Ditch
- Footpath
- Soil Profiles
 - Soil Profile 1. - 400mm Peat/ Subsoil Mix (Conservation Grassland) (26.9 Ha)
 - Soil Profile 2. - 900mm Peat/Subsoil composite (Commercial Forestry plantation and Amenity Woodland) (39.8 Ha)
 - Soil Profile 3. - 1,800mm pristine deep peat (Peat Bog) (1.2 Ha)
- Natural Dry Stone Wall Viewing Platform
- Phasing Areas 1-7

Approximate completion of progressive restoration of each Phase

Phase 2	Year 10
Phase 4 & 5	Year 15
Phase 6	Year 20
Phase 7, 1 & 3	Year 25

Note:
Soiling of cut and fill faces above and below berms, and along the verges to forest roads is not identified. These will receive 100 mm peat / subsoil composite with the colliery discard scarified before soil placement.

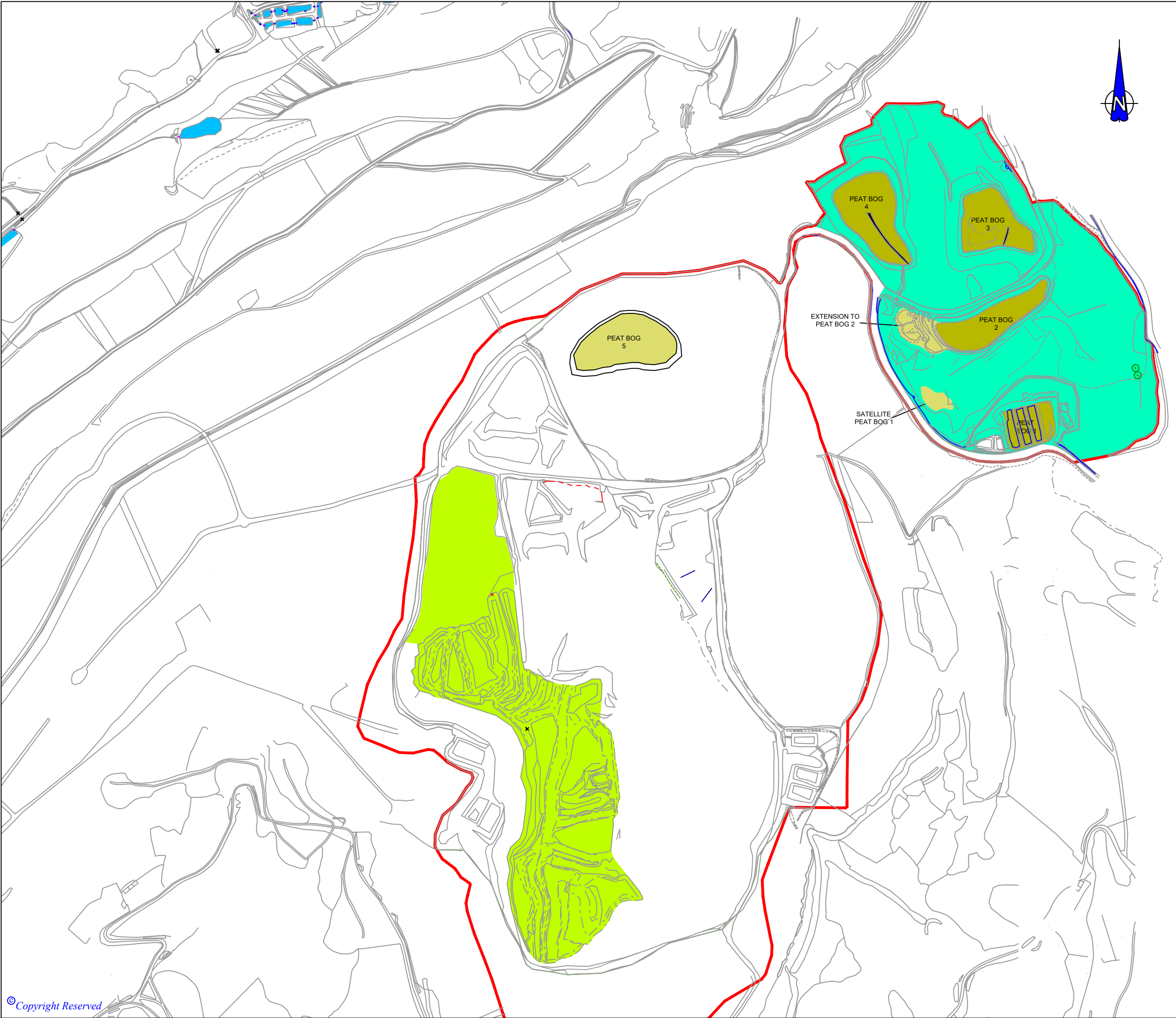
Soil disturbed within the Advanced Works Area within the Additional land to the west of the Forest Quarry 2 Extension OCCS will be retained within, and reserved for, local reinstatement.



REVISION	DETAILS	DATE	DRAWN	CHECKED	APPROVED
CLIENT					
PROJECT					
MINE WASTE REPOSITORY P2014/0729 - CONDITIONS 69 & 72 RESTORATION & AFTERCARE SCHEMES					
DRAWING TITLE					
PROPOSED RESTORED SOIL PROFILES					
DRG No.		CA12936-008		REV	SUIT. CODE
DRG SIZE		SCALE		DATE	
A1		1:2500 @A1		OCTOBER 2023	
DRAWN BY		CHECKED BY		APPROVED BY	
DNH					

DRAWING CA12936/009

Proposals for ecological conservation in the course of operating the Mine Waste Repository



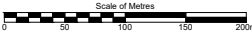
DO NOT SCALE FROM THIS DRAWING

- Legend
- Mine Waste Repository and
Nant y Mynydd Conservation Area
Boundary _____
- Conservation Area 1 - for Ground
Nesting Birds (13.5 Ha) _____
- Conservation Area 2 - Wetland, Bog and
Heath Habitat (21.3 Ha) _____
- Proposed Additional Peat Deposition
Requirement (2.35 Ha) _____

Note:

Conservation Area 1 to be reduced in the course of
the development by the removal of stored soils for use
in progressive restoration.

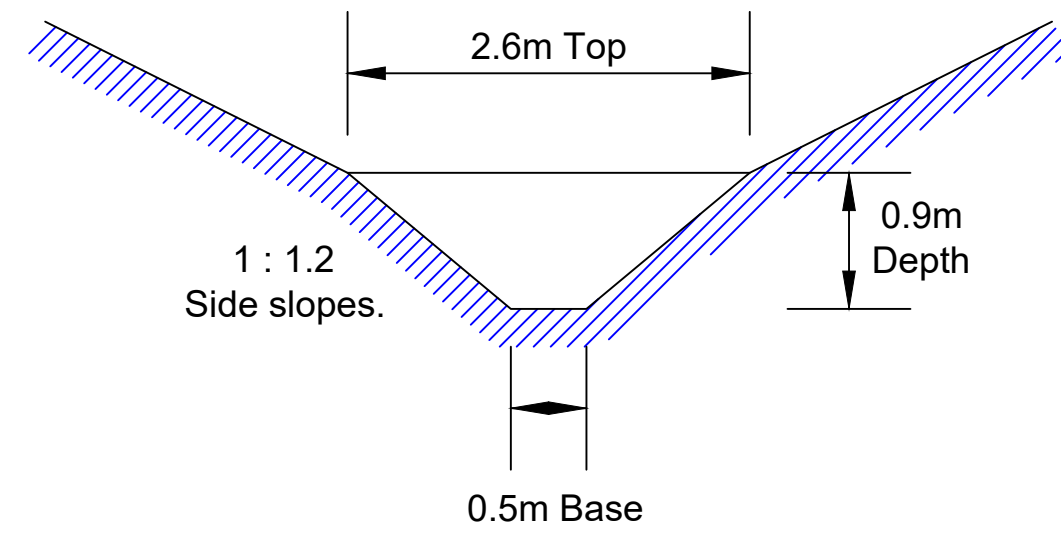
Conservation Area 2 to be augmented by the creation
for four additional bogs using peat removed from
additional land to the east of the former Forest Quarry
2 Extension OCCS prior to overtipping by colliery
discard.



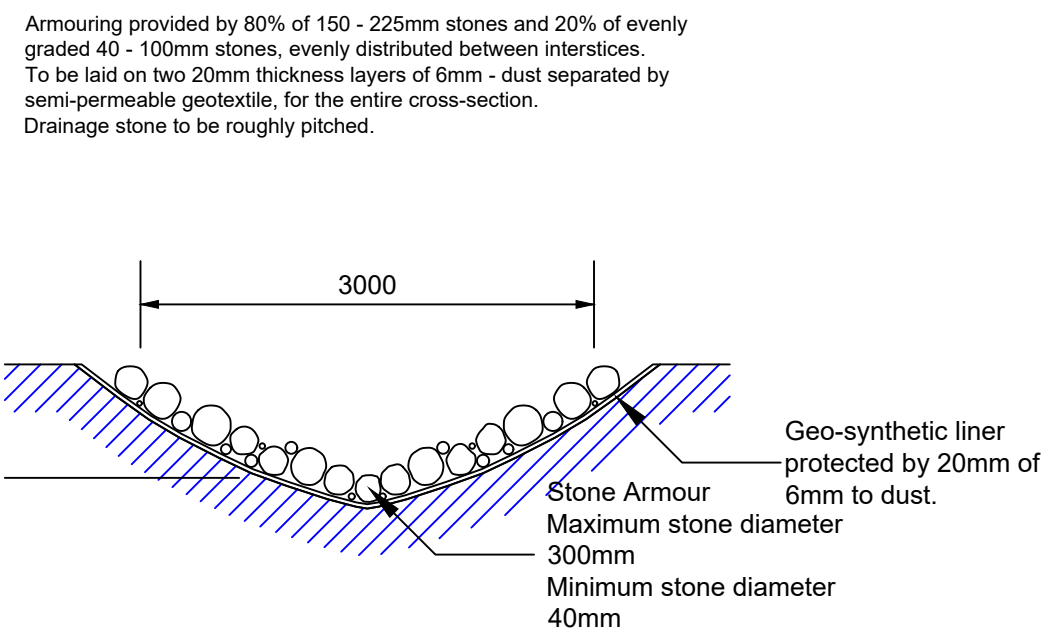
REVISION	DETAILS	DATE	DRN	CHKD	APP'D
CLIENT	 Energybuild				
PROJECT					
MINE WASTE REPOSITORY					
P2014/0729 - CONDITIONS 69 & 72					
RESTORATION & AFTERCARE SCHEMES					
DRAWING TITLE					
PROPOSALS FOR ECOLOGICAL					
CONSERVATION DURING OPERATION					
OF THE MINE WASTE REPOSTORY					
DRG No.		REV		SUIT.	
CA12936-009					
DRG SIZE		SCALE		DATE	
A3		1:2500 @ A3		OCTOBER 2023	
DRAWN BY		CHECKED BY		APPROVED BY	
DNH					
					

DRAWING CA12936/010

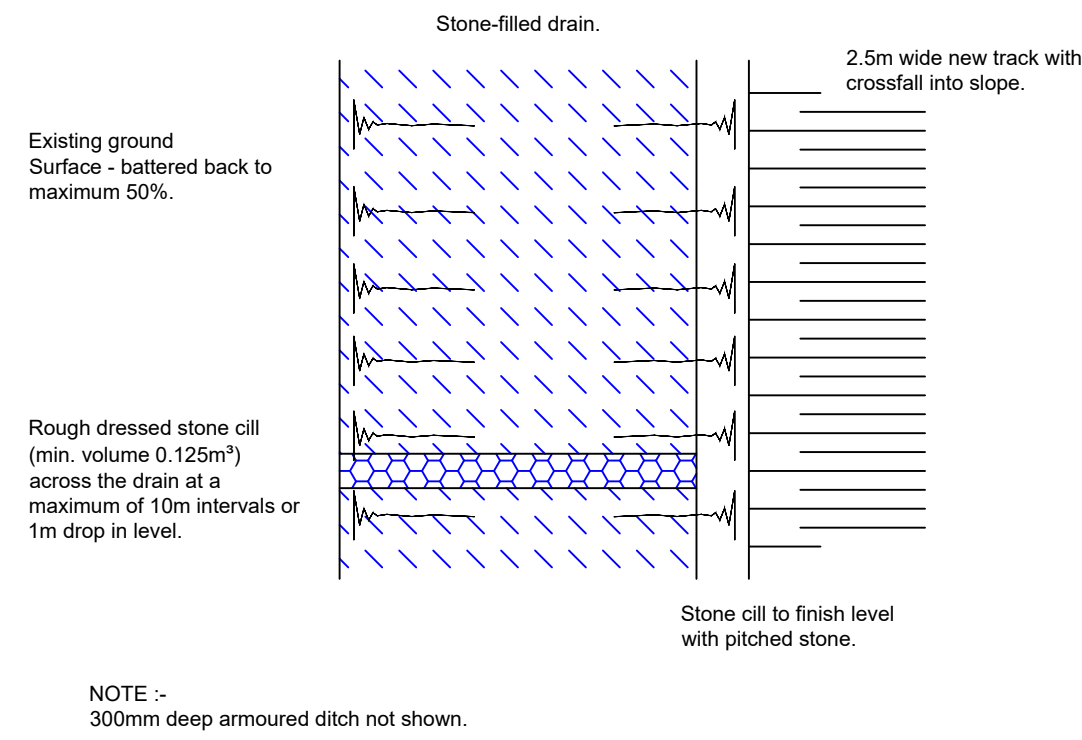
Standard details for permanent infrastructure



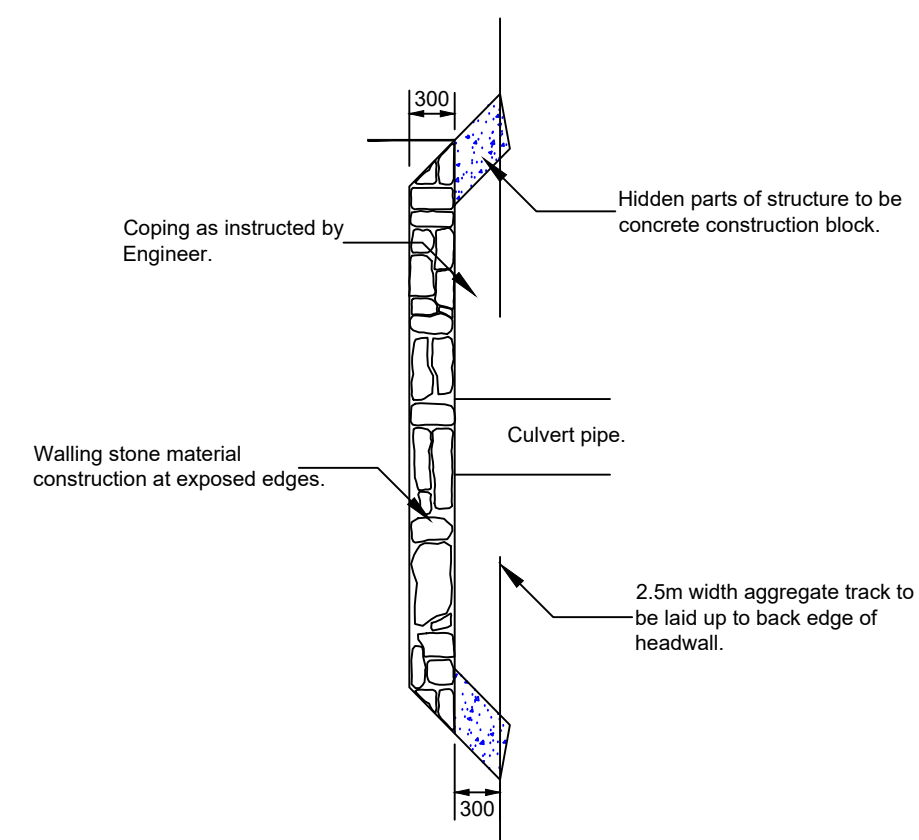
TRAPEZOIDAL DITCH
CROSS-SECTION



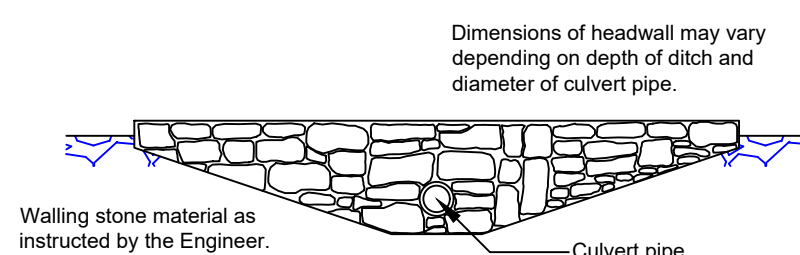
ARMOURED CHANNEL DETAIL - SECTION



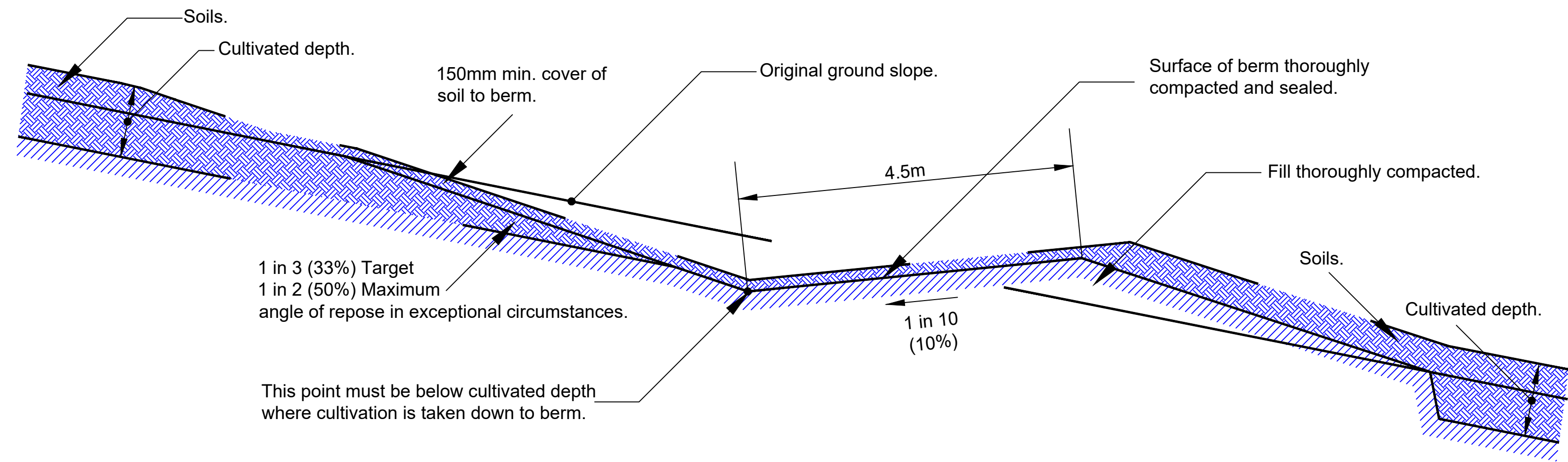
STONE ARMOURED CHANNEL DETAIL - PLAN



DRYWALL RANDOM WALLING
HEADWALL DETAIL (Plan)



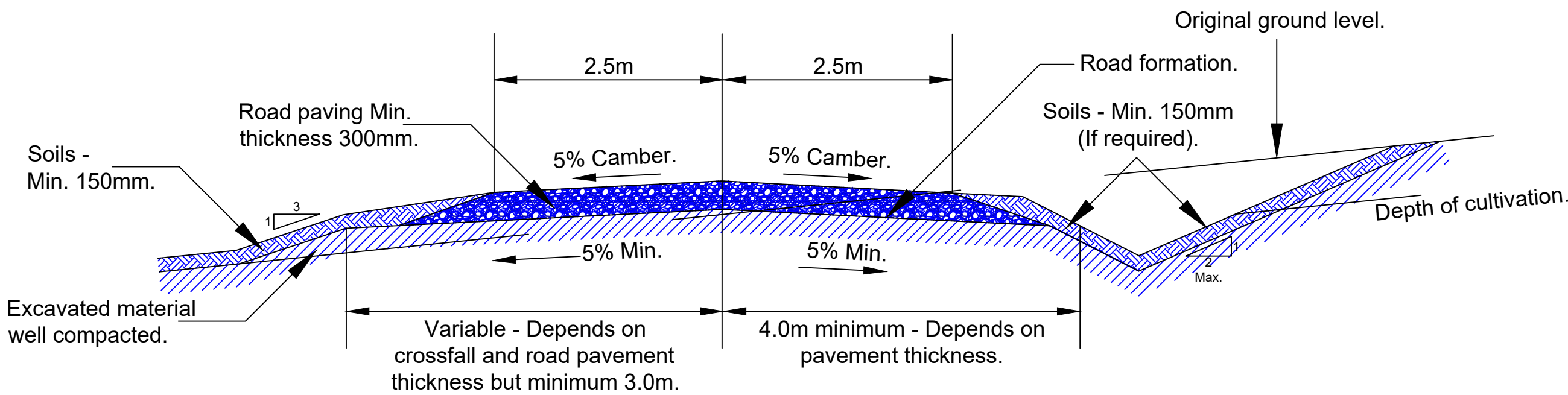
DRYWALL RANDOM WALLING
TYPICAL HEADWALL DETAIL



CONSTRUCTION OF BERM (1 in 5 SIDESLOPE SHOWN)

NOTES :-

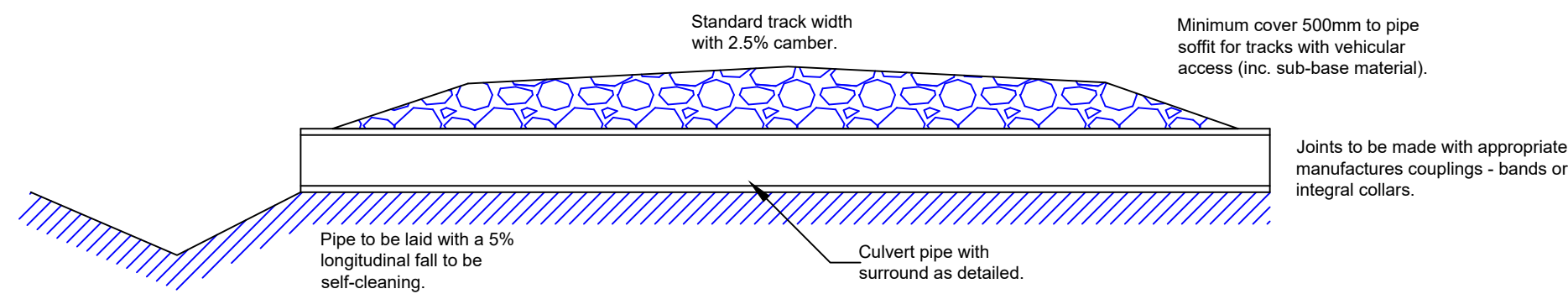
- Longitudinal gradient to be between 1.5% and 2.5%. Once gradient of a particular berm is chosen there shall be no increasing or slackening of gradients which could lead to scour and/or silting of the berm.
- Where berms connect with carrier drains the final 10 metres of the berm shall be armoured with durable stone 300mm nominal size to prevent scour at the junction of the berm and carrier drain which may involve steepening of the berm gradient over this length.



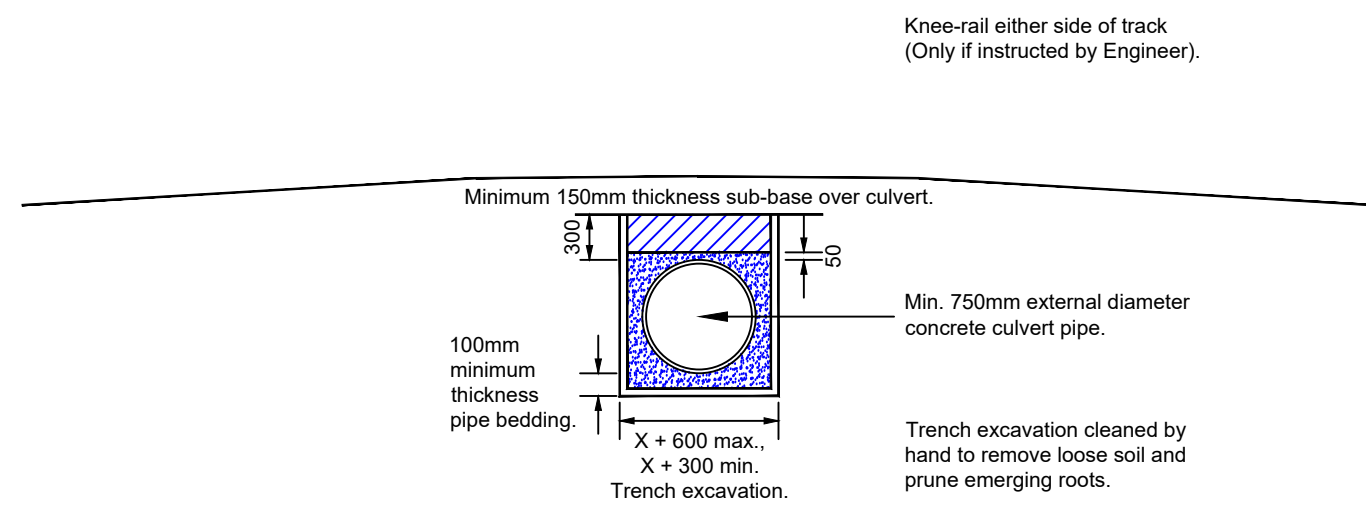
ROAD CONSTRUCTION ON GROUND WITH CROSSFALL

NOTES :-

- The finished road must be capable of withstanding full highway loading under all weather conditions and in particular be capable of supporting a fully laden 41 Tonne articulated vehicle, as described in The Construction and Use Regulations, without permanent distortion of the road surface.
- For testing purposes a fully laden 4 axle 32 Tonne vehicle shall traverse repeatedly and continuously over the whole length of the road at a maximum speed of 25 M.P.H. for a period of at least 1 hour involving at least 5 passes. The road paving and its foundations shall not exhibit any rutting, cracking or distortion or any other feature which may indicate failure of the road.
- The road paving shall be capable of withstanding the above test and shall comprise a base layer of 75mm - dust crusher run durable crushed rock, topped with a wearing layer (50mm thick) of approximately 19mm - dust durable crushed rock. The road paving shall be thoroughly compacted in layers by sufficient passes of a 6/40 Tonne vibrating roller to be able to withstand the testing by the 32 Tonne laden vehicle. The minimum thickness of road paving will be 300mm.
- Road paving thickness must reflect the CBR of the road formation (sub-grade).
- Any "soft spots" in the road formation must be removed and replaced by hard durable material which shall be thoroughly compacted.
- The minimum longitudinal gradient is to be 2%.
- The maximum longitudinal gradient is to be 8%.

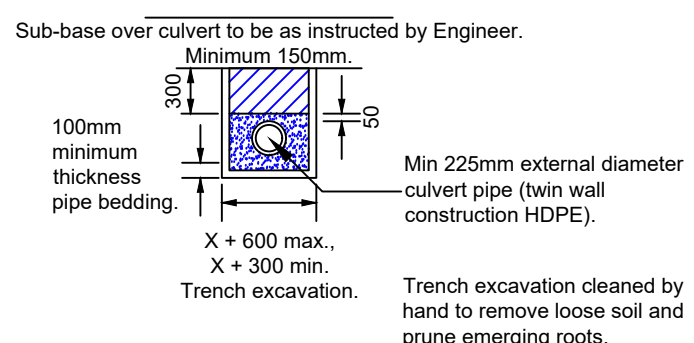


PIPE CULVERT DETAIL



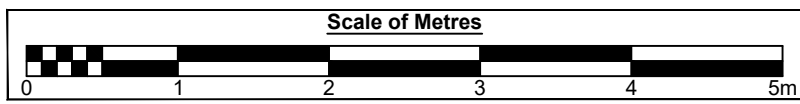
NOTE :-
X is the external pipe diameter (750 - 1250mm)

TYPICAL CULVERT SURROUND DETAIL (Concrete Pipe)
(750mm External diameter culvert illustrated)
Type S Bedding Detail



NOTE :-
X is the external pipe diameter (225 - 750mm)

TYPICAL CULVERT SURROUND DETAIL (Corrugated Plastic Pipe)
(225mm External diameter culvert illustrated)
Type S Bedding Detail

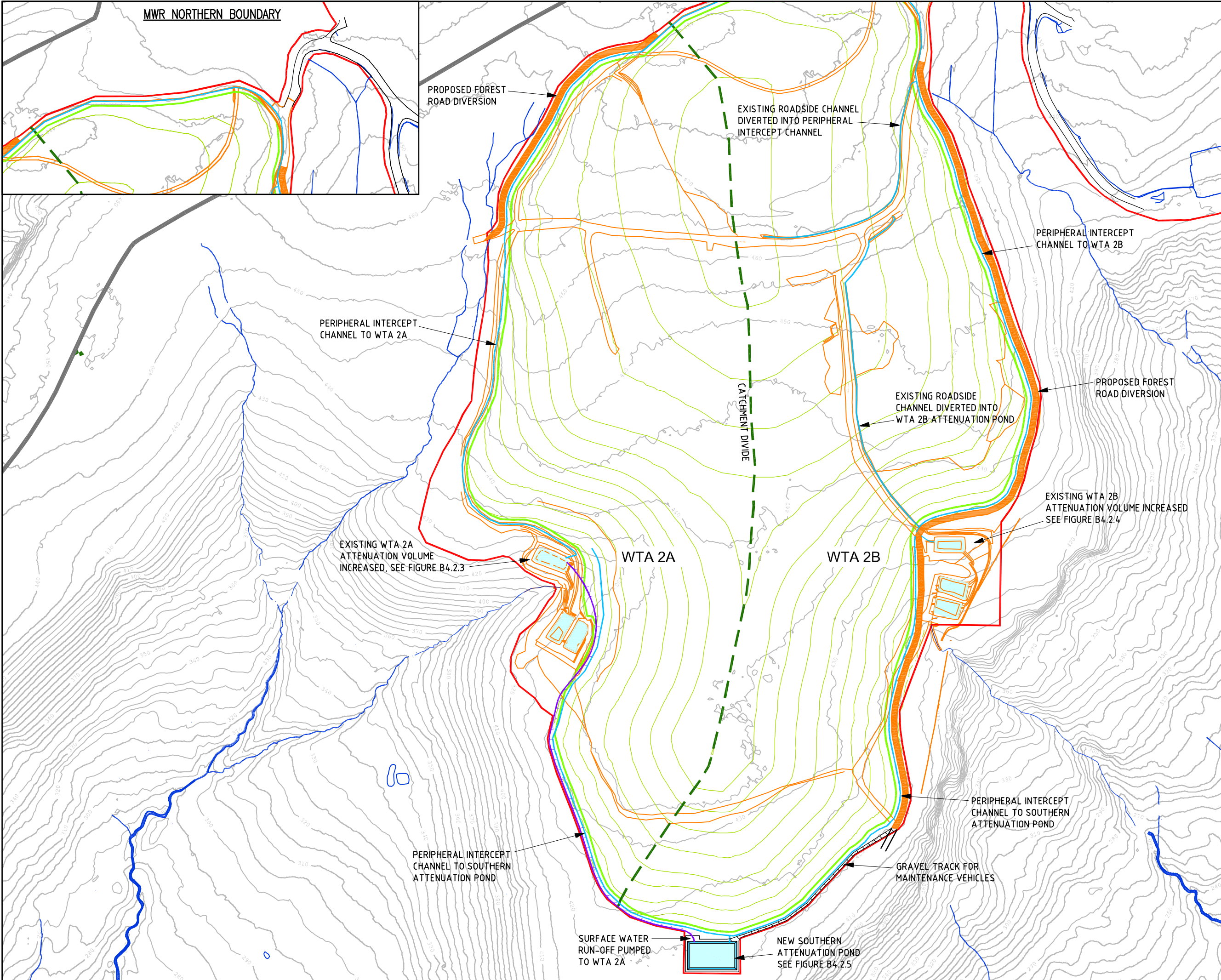


DO NOT SCALE FROM THIS DRAWING

MEMBER		DETAILS		DATE		ISSUED		BY	
CLIENT									
 Energybuild									
PROJECT									
MINE WASTE REPOSITORY P2014/0729 - CONDITIONS 69 & 72 RESTORATION & AFTERCARE SCHEMES									
DRAWING TITLE									
STANDARD DETAILS FOR PERMANENT INFRASTRUCTURE									
DRG NO.				CA12936-010		REV		SHEET CODE	
DRG SIZE		A0		SCALE		DATE		OCTOBER 2023	
DRAWN BY				CHECKED BY		APPROVED BY			
wardell armstrong									
									

FIGURE 9.15

Mine Waste Repository SW Management Plan



NOTES

SEE ENVIRONMENTAL STATEMENT
CHAPTER 6 AND DRG CA10649-006
FOR SITE RESTORATION DESIGN
SHOWING THE FINAL LANDFORM AND
SURFACE WATER DRAINAGE SYSTEM.

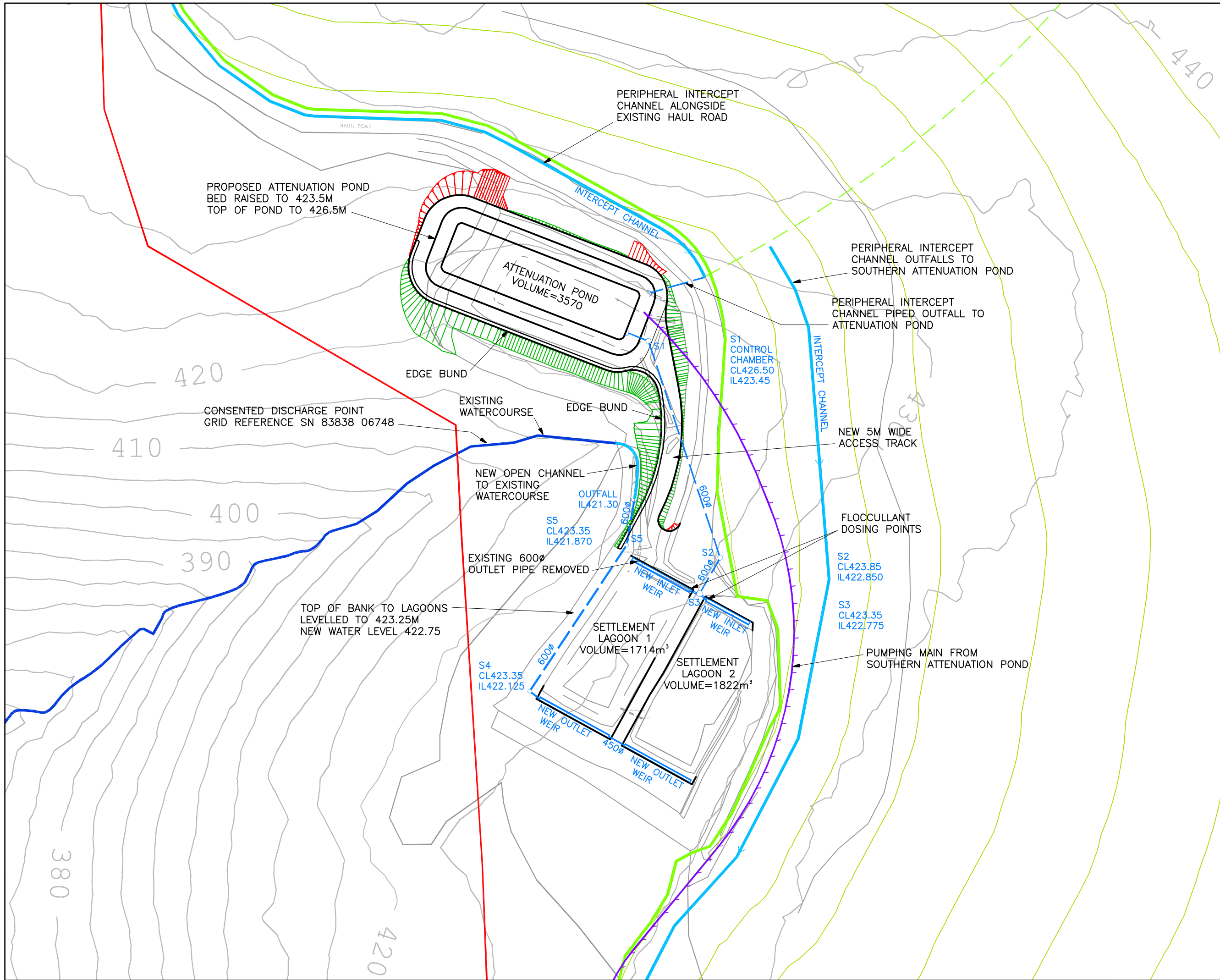
LEGEND

- PLANNING APPLICATION BOUNDARY
- EDGE OF FILL EARTHWORKS BOUNDARY
- PROPOSED FOREST ROAD DIVERSION
- EXISTING SITE FEATURES
- DRAINAGE CHANNEL
- STORM PUMPING MAIN
- EXISTING WATERCOURSE
- PROPOSED CONTOURS
- EXISTING CONTOURS

FIRST ISSUE		30oct13	
Revision Details		By	Date
UTC ASSOCIATES Property Development Consultants 20A Pantbach Road Birchgrove Cardiff CF14 1UA Tel 029 2061 2311 email: mikeuruski@utcassociates.co.uk			
Project			
ABERPERGWM MINE PLANNING APPLICATION 2013			
Title MINE WASTE REPOSITORY OPERATIONAL SURFACE WATER MANAGEMENT PLAN			
Scale at A3 1:5000			
Drawn		Date 8/6/2013	
Checked		Date	
Project No:		2310	
Drg No:		FIGURE 9.15	

FIGURE 9.16

Mine Waste Repository WTA 2A Layout



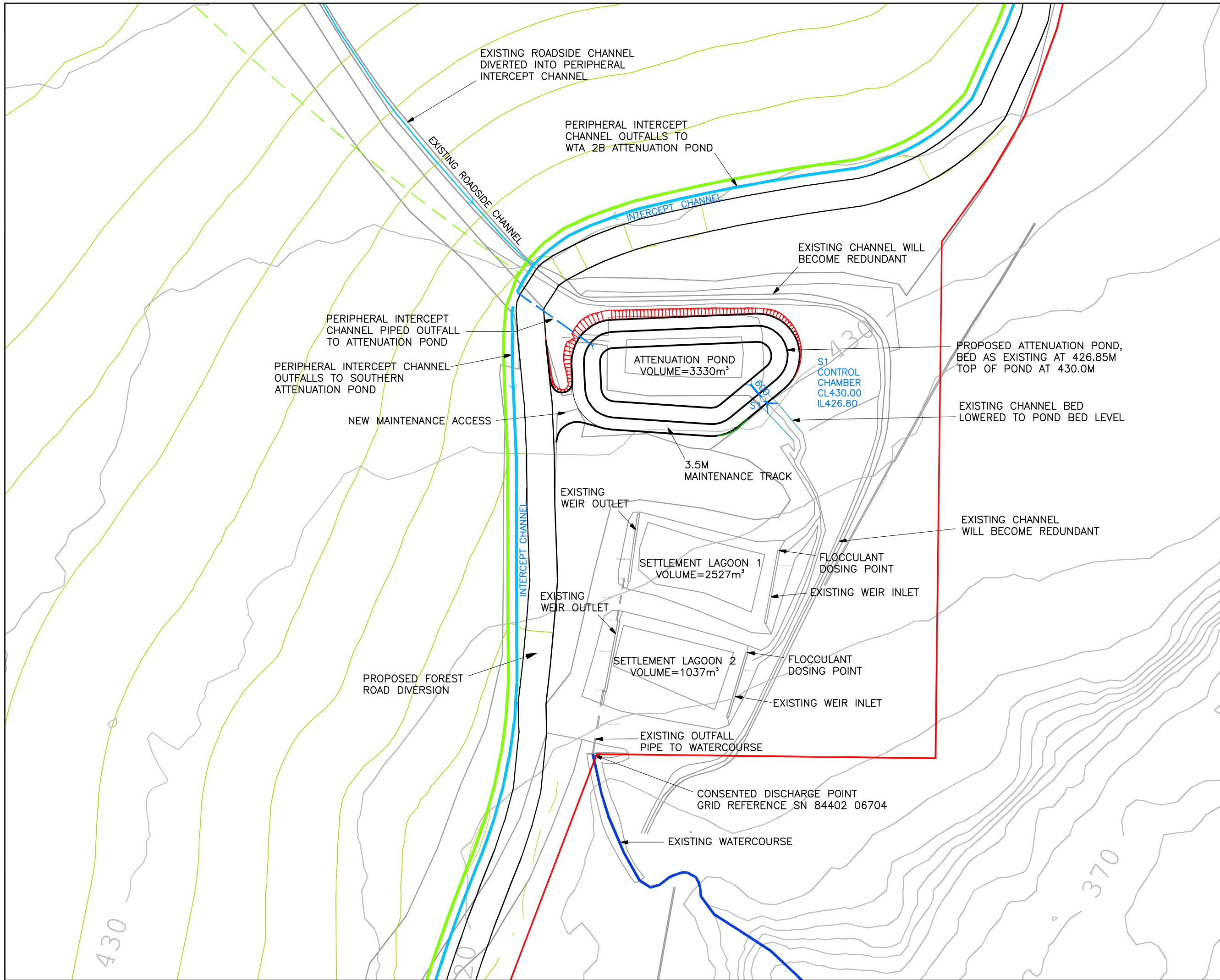
LEGEND

- PLANNING APPLICATION BOUNDARY
- EDGE OF FILL EARTHWORKS BOUNDARY
- PROPOSED MINE WASTE REPOSITORY CONTOURS
- DRAINAGE CHANNEL
- STORM PUMPING MAIN
- SW DRAINAGE PIPE
- STORM OUTLET HEADWALL
- EXISTING WATERCOURSE

A	FIRST ISSUE	30oct13
Revision Details		By Date
UTC ASSOCIATES Property Development Consultants 20A Pantbach Road Birchgrove Cardiff CF14 1UA Tel 029 2061 2311 email: mikeuruski@utcassociates.co.uk		
Project		
ABERPERGWM MINE PLANNING APPLICATION 2013		
Title MINE WASTE REPOSITORY WTA 2A LAYOUT		
Scale at A3 1000		
Drawn	Date	
Checked	Date	
Project No:	2310	
Drg No:	FIGURE 9.16	

FIGURE 9.17

Mine Waste Repository WTA 2B Layout



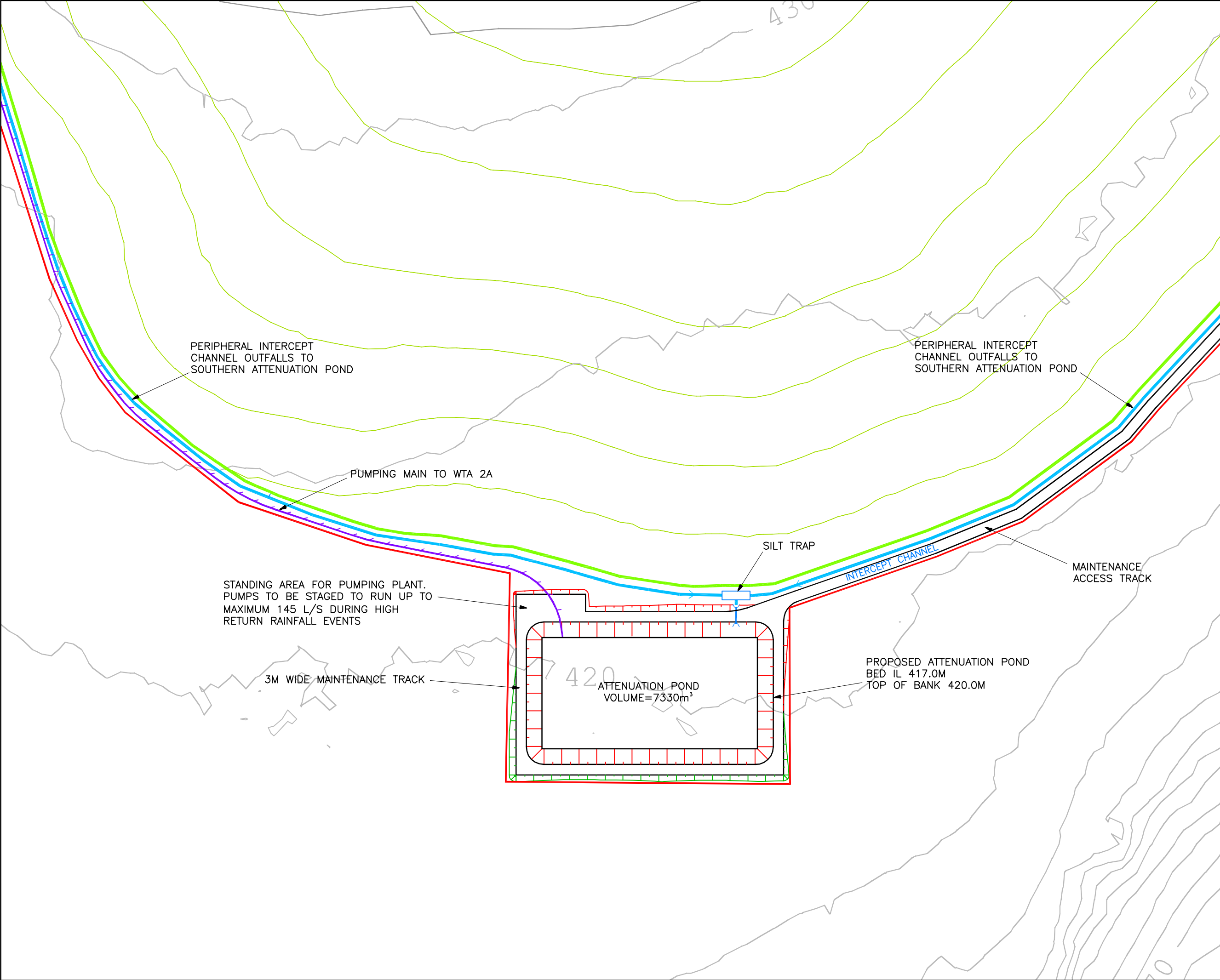
LEGEND

- PLANNING APPLICATION BOUNDARY
- EDGE OF FILL EARTHWORKS BOUNDARY
- PROPOSED MINE WASTE REPOSITORY CONTOURS
- DRAINAGE CHANNEL
- STORM PUMPING MAIN
- SW DRAINAGE PIPE
- STORM OUTLET HEADWALL
- EXISTING WATERCOURSE

A	FIRST ISSUE	30oct13
Revision Details	By	Date
UTC ASSOCIATES Property Development Consultants 20A Pantbach Road Birchgrove Cardiff CF14 1UA Tel 029 2061 2311 email: mikeuruski@utcassociates.co.uk		
Project		
ABERPERGWM MINE PLANNING APPLICATION 2013		
Title		
MINE WASTE REPOSITORY WTA 2B LAYOUT		
Scale at A3		
1:1000		
Drawn	Date	
Checked	Date	
Project No:		2310
Drg No:		FIGURE 9.17

FIGURE 9.18

Mine Waste Repository Attenuation Pond



- LEGEND**
- PLANNING APPLICATION BOUNDARY
 - EDGE OF FILL EARTHWORKS BOUNDARY
 - PROPOSED MINE WASTE REPOSITORY CONTOURS
 - DRAINAGE CHANNEL
 - STORM PUMPING MAIN
 - SW DRAINAGE PIPE
 - STORM OUTLET HEADWALL
 - EXISTING WATERCOURSE

A	FIRST ISSUE	30oct13
Revision	Details	By Date

UTC ASSOCIATES
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20A Pantbach Road
Birchgrove
Cardiff CF14 1UA
Tel 029 2061 2311
email: mikeurusi@utcassociates.co.uk

Project

**ABERPERGWM MINE
PLANNING APPLICATION
2013**

Title

**MINE WASTE REPOSITORY
ATTENUATION POND**

Scale at A3

1:1000

Drawn	Date
Checked	Date

Project No:

2310

Drg No:

FIGURE 9.18

STOKE-ON-TRENT

Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM

Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON

41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

BRISTOL

Temple Studios
Temple Gate
Redcliffe
Bristol
BS1 6QA
Tel: +44 (0)117 203 4477

BURY ST EDMUNDS

Armstrong House
Lamdin Road
Bury St Edmunds
Suffolk
IP32 6NU
Tel: +44 (0)1284 765 210

CARDIFF

Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE

Marconi Road
Burgh Road Industrial Estate
Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH

Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW

24 St Vincent Place
Glasgow
G1 2EU
Tel: +44 (0)141 428 4499

LEEDS

36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON

Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

NEWCASTLE UPON TYNE

City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO

Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International office:

ALMATY

29/6 Satpaev Avenue
Hyatt Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310