



East Pit East Revised

Planning Application P2012/1073

Restoration & Aftercare Scheme to satisfy
Condition 74

Condition 74: Restoration & Aftercare Scheme

Introduction

The following submission provides details of the Restoration and Aftercare Scheme for Phases 3A, 3B 4 & 5 of the East Pit Surface Coal Mine Site as shown on Drawing LAR-B-09/K and as required by Condition 74 of the Approval of Full Permission of P2012/1073 of the 18th June 2015.

Drawing LAR-B-09/K (Figure 1), to which this Condition refers to, encompasses the East Pit East Revised (EPER) operational mine site (the Site) where Commoner's rights have been suspended and the land outside where they have not. It has been agreed that for those parts of Phase 3A, all of Phase 4 and the parts of Phase 5 within the Site (where the rights had not been suspended, and the land remains in agricultural use and not disturbed by the mining operations) can be excluded from the provisions made in this submission. Hence, the following is only concerned with Phase 3A, the whole of 3B and the remaining parts of Phase 5 within the Site. The detailing of the scheme for Phase 2 is already covered by the submission for Condition 73 approved on 5th November 2018.

Within the Site, the western and eastern parts of the feature known as the Western Overburden Mound (WOM) are within Phase 5, with its central-eastern part being within Phase 3A. Other parts of Phase 3A include the water treatment facility in the north west corner of the WOM. Phase 3B is in the north east corner of the WOM. The remaining Phase 5 encompassing the former coal stocking area, the access road and water treatment complex in the south west, the former coal washing facility on the south east slopes of the WOM, the regraded parts of the Southern Overburden Mound (SOM) and the land around the proposed lake to be formed in the residual mine void.

Under the scheme approved on 22nd December 2016 for Condition 68 much of the WOM and the peripheral areas of the Site have been excluded from disturbance on account of their intrinsic nature conservation features and are shown as 'retained land' (Figure 2). Whilst these areas are excluded from the physical restoration works, they are part of the scheme's wider after use under Conditions 68 and 69b but are also covered by aftercare provisions in Condition 74.

a) After Use

The wider planning consent boundary known as the Lakes at Rhosaman scheme encompasses Common Land that has remained in agricultural use and the redundant railhead outside of the curtilage of the operational mine Site. Whilst these areas are included in the portrayal of the phased development and restoration of the scheme on Figure 1, their uses have not changed during the development of the scheme, and as such are not considered further for the purpose of Condition 74.

The after uses of the restored operational mine Site are the return of Common Land for agricultural grazing, the development of a Country Park for recreation and a small area retained as development land. To enable this, it has been agreed that the distribution of Common Land and Non-Common Land within Celtic Energy's land holding is reconfigured as shown on Figure 3.

The Country Park is to be on the Non-Common Land, retained by Celtic Energy on land to the east of the Site, centred around the Lake created from the water filled final mine working void. Elsewhere, except for the infrastructure of the former mine's offices and plant servicing facilities in the west of the Site (which will remain in Celtic Energy's ownership as potential development land), the greater part of the Site is to be returned to Common Land.

The restored Site will comprise both land that was disturbed during the mining phase and land that remained 'undisturbed' (Figure 2); although some of the latter was disturbed during previous operations but is now vegetated. The undisturbed land is referred here as the 'retained land' which was surplus to operational requirement, had an environmental buffer function, landscape and/or nature conservation values meriting its retention.

The Common Land and the Country Park along with their respective agricultural and recreation roles are to have a dual function of also conserving and enhancing the particular habitat and species features associated with the ecological Enhancement and Receptor Areas (EERAs) and the undisturbed retained land within the Site.

b) The Removal of Buildings, Plant and Machinery, Access Roads and Concrete Infrastructure

The location of buildings, access and fixed infrastructure are shown on Figures 4 and 5. Except for those associated with maintenance of machines involved with restoration and aftercare, and management of such operations, the retention of the access from New Road, and the car park and service-yard hard-standings, all other buildings, plant and machinery no longer required will be removed prior to the completion of the restoration works.

Concrete structures and hard surfaces will be broken up and the inert materials, where they are no longer required or capable of being used in a sustainable manner, will be disposed of on site in accordance with appropriate regulations. Any material deemed unsuitable for such disposal will be removed from site in the appropriate manner and with the prior approval of the Planning Authority.

The water treatment facilities will be decommissioned at a time when discharge from the site does not pose a threat to external drainage and in agreement with the NRW. At the earliest opportunity the concrete lined water treatment ponds and flow-tanks (Figures 5a, 5b & 5c) will be drained and the concrete broken up and disposed in situ within the pond voids. These areas will then be backfilled/covered with soils recovered from the nearby soil bunds. These works will be subject to protected species (Otter) licensing by NRW.

c) The Final Proposed levels of the Reclaimed Land to Prevent Ponding and Erosion by Surface Water and to Conform with the Surrounding Land

The proposed final restored surface contour levels within the Site are shown at 5m intervals and those of the adjacent excluded land are shown at 10m (Figure 6).

The restored surfaces comprise a rolling upland landform that integrates into the surrounding landscape and provides a drainage network that is designed to manage flow volumes into receiving water courses outside the current operational site boundary (see Section g). As a precautionary measure, a network of drainage grips has been installed across the extensive

backfilled slopes above the western side of the Lake. Some localised areas of minor ponding for nature conservation purposes are to be provided in the final land shaping.

d) Details of Re-spreading of Overburden, Subsoil and Topsoil Previously Stripped from the Site, Including Depths and Placement

Overburden

The step-like form of the north west corner of the Western Overburden Mound (WOM) was reshaped by bulldozer in 2015-2016 to create a landform similar to that in the surrounding landscape. In 2019, the western face and plateau of the Southern Overburden Mound (SOM) were regraded to reshape its tiered form and to promote surface drainage.

The mine working has been progressively backfilled by truck and graded by bulldozer to create an undulating landform around the Lake and the former coal processing area. Elsewhere localised regrading has taken place to achieve the restoration contours (Figure 6).

Soil and Soil Forming Material

Owing to the historical shortage of recovered natural soils, the Site is to be restored mainly with 'soil forming material' (SFM) with the small amount of available top- and sub-soil being deployed locally. The areas to be covered with soil materials, and the volumes and depths are shown on Figure 7.

Common Land -

The depth of SFM coverage is 500mm over the former coal stocking yard, 200mm-300mm over the plateau of the SOM and 500mm elsewhere.

Country Park -

The depth of SFM is to be 700mm in the broadleaved woodland around the Lake and 300mm to 500mm elsewhere.

e) The Ripping of any Compacted Layers of Final Cover to Ensure Adequate Drainage and Aeration, Such Ripping Shall Take Place Before Placing the Soil Materials

On completion and approval of the back-filling, and the grading to final contour, the overburden is to be decompacted (prior to the spreading of soils and sequentially as the soil layers are progressively replaced) using a D8 Bulldozer with either 3-winged tines or a single rock-ripper tine (depending on rock content) to a depth of 0.3m. This is to be undertaken in all restored areas, except for ponds and watercourses, the lichen-bryophyte mosaic, and the plateau of the SOM.

Any large boulders/stones or other deleterious material greater than 300mm in any dimension on the surface and liable to intrude significantly into the final soil cover will be removed using an excavator mounted stone-rake according to MAFF 2000, Sheet 16 (Appendix 1).

f) The Machinery to be Used in Soil Re-spreading Operations and the Method of Soil Replacement

Soil Recovery From Storage Mounds

Soil recovery from the storage mounds will be by 40 tonne tracked 360° excavator to load 40 tonne articulated dump trucks (ADT) to transport the soil material to the point of restoration. The method of soil recovery will be as set out in MAFF 2000, Sheet 3 (Appendix 1).

Soil Replacement

Sequential ripping of each overburden receiving a soil cover will be by D9 bulldozer drawn 3-winged tines or a wide-tracked D6 with multiple stub-tines with over-lapping passes as set out in MAFF 2000, Sheet 19 (Appendix 1).

Soil replacement will either be by excavators or wide-tracked bulldozers depending on gradient and topographical complexity. Generally, gradients of 1:8 or shallower and with a simple surface topography, soil replacement will be by 20 tonne tracked 360° excavators which sequentially spread the soil material tipped onto the prepared (ripped where required) overburden strip (without the dumper trucks running over ripped overburden). This method of soil placement is set out in MAFF 2000, Sheet 4 (Appendix 1).

Steeper gradients than 1:8 and/or complex surface topography, soil replacement will be by low ground pressure D6 bulldozers which sequentially spread the soil material tipped onto the prepared (ripped where required) overburden strip (without the dumper trucks running over ripped overburden). The principles of this method of soil placement is set out in MAFF 2000, Sheet 15 (Appendix 1).

Where the land use is to be semi-improved and acid grassland, surface stones >150mm diameter will be removed with an excavator mounted stone-rake as in MAFF 2000, Sheet 16 (Appendix 1), and the stone arisings used for surfacing trackways and drainage grips.

Where woodland is to be established, stone on the soil surface does not need to be removed.

g) Grassland Seeding & Woodland Planting

The seeding of grassland and planting of trees and shrubs (see Appendix 2) is to take place on disturbed ground in the Common Land and the Country Park after the spreading of soils and preparation of the ground have been completed.

Common Land -

Acid Grassland

Areas of upland acidic grassland along the north west and east facing slopes of the WOMound within Phase 5 (Figure 8) were established in 2015 and 2016 for landscape and nature conservation.

Semi-Improved Grassland

Within the reinstated Common Land within Phase 5 a semi-improved type of grassland is to be established on the former coal stocking ground, the western access corridor, the regraded slopes and plateau of the SOM for the purpose of livestock grazing (Figure 8).

Woodland

Within Phase 5, three blocks of woodland trees and shrubs were planted on the western slope of the WOM in February 2017 (Figure 8) for landscape and nature conservation purposes.

Riparian Woodland

Three small blocks of riparian woodland are to be planted within Phase 5 along the drainage channel to be formed to take drainage from the western slope of the WOM alongside the former coal stocking yard to link to the retained woodland block to the south (Figure 8). Also, five small blocks are to be planted along the watercourse on the southern margin of the SOM (Figure 8).

Country Park -

Upland Acidic

Areas of upland acidic grassland for landscape and nature conservation in Phases 3B and 5 are to be established in the Country Park to the west and eastern sides of the proposed Lake (Figure 8).

Woodland

Broadleaved woodland is to be planted above the maximum water line around the south western and western sides of the Lake for landscape and nature conservation (Figure 8). Below the maximum water line, for about 10m, the area will be seeded to grassland and scrub will be allowed to naturally regenerate as broadleaved wet woodland.

Thorny Bank

The eastern and southern sides of the Lake in Phase 5 will have high cliffs/steep slopes and will be fenced. In addition, a bank and a wide hedge planted with thorny species is to be planted along the eastern side of the lake to deter human and livestock access (Figure 9). Appendix 2 gives the species composition, stock size and planting method.

Lichen-Bryophyte Heath

A small area of overburden shales on the southern rim of the Lake in Phase 5 is to be left partially unsoiled for the purpose of establishing lichen-bryophyte heath (Figure 8). It is also not to be seeded or fertilised. Some of the windrowed surface soils from the plateau of the SOM is to be recovered and placed to initiate the colonisation process. Placement of the soils will be by excavator following the principles of the guidance in MAFF 2000, Sheet 4 (Appendix 1). The soils will be placed at unevenly varying depths (0 – 250 mm).

h) The Position and Erection of Fencing, Gates, and Water Supplies#, Field Layouts

see also water treatment facility section

The position of new fencing erected during the restoration works and existing fencing to be maintained during the extended aftercare period is shown on Figures 10 and 11.

Common Land -

Where necessary the existing fencing around the parts of the perimeter of the Site designated as the Common Land will be upgraded with new fencing of the Type 'A' shown in Appendix 3. Where new 'internal' fencing is needed (Figure 10), to protect the tree plantations, nature conservation features (woodland and wetlands), and the Ecological Enhancement and Receptor Areas (EERAs), this will be of the same Type 'A'. Where bridleways and footpaths

cross the fencing between the Common and the Park, self-closing gates and styles are to be provided (Appendix 3).

The retained land on the WOM and newly established SOM are to be integrated as a single grazing unit during the 5-year aftercare period without the need for fencing (Figure 12).

Country Park -

Figure 11 shows the fencing for the Country Park and Celtic Energy land. It is entirely new fencing of Type 'A' (Appendix 3). The access points from surrounding land and public roads are to have agricultural style gates (Appendix 3) or cattle grids.

The outer fencing is to define the boundary of the Park. The internal fencing is to i) protect the tree plantations, nature conservation features (areas of natural regeneration, lichen-bryophyte scree, woodland and wetlands), ii) to provide a safety barrier above the eastern and southern sides of the Lake, and fencing along the western and northern lakesides, and iii) to define potential grazing units within the Park during the aftercare period.

The potential grazing units are shown on Figure 13. The access points to the grazing units from the surrounding land are to have agricultural style gates (Appendix 3). Where bridleways and footpaths cross the fencing, self-closing gates and styles are to be provided (Appendix 3). Cattle-grids are to be installed at each end of the open access track linking Celtic's western land holding and the Country Park.

i) Provision of and position of Footpaths and Bridleways to be Reinstated or Linked with Existing Public Rights of Way, Including the Surfacing of such Routes

On completion of the restoration works and fencing, public rights of way (PROW) routes on land for the consented Lakes at Rosaman scheme will be reinstated along their original alignment. These are Footpaths Nos. 12 and 13 in the north and on Common Land, No. 34 in the southeast which follows the Common Land boundary westwards along the southern boundary, and No. 36 which follows the Country Park boundary for a short distance in the east (Figure 14). The lengths of these paths within the Common Land and Country Park will have marker posts and an unsurfaced condition suitable for providing access for walkers.

With the agreement of Neath Port Talbot County Borough Council, a series of 'permissive' footpaths and bridleways will be created. A permissive bridleway is to be routed from New Road in the west along the access road to Celtic Energy's retained land, along the retained linking trackway to the Lake within the Country Park. The trackway and bridleway would be constructed to a minimum width of 3 metres with a 150mm of compacted layer of crusher run material or similar.

Permissive footpaths are to be created linking the circular lakeside bridle way to Footpaths No. 12 in the north and No. 34 in the east with an eastwards connection to Gwilym Road (A4068) (Figure 14). The sections of these permissive paths across Common Land and Country Park will have marker posts and an unsurfaced condition suitable for providing access for walkers.

j) The Drainage of the Reclaimed Land, the Installation of Artificial Drainage where necessary, and the Position and Design of Main Outflow Ditches and Watercourses.

The in situ functional watercourses within the operational site will be retained (Figure 15). These mainly collect surface runoff drainage from the Western and Southern Overburden Mounds which is fed through constructed water treatment facilities at the northern, eastern and western boundaries before discharging into off-site watercourses. Drainage also enters the site from the higher land to the south. One watercourse takes drainage westwards around the base of the southern slope of the SOM to the western WTA. Another, skirts around the east side of the SOM and drains into the southern end of the mine void, and a third drains eastwards and off-site.

New watercourses are to be formed during the restoration of the operational Site. These, depending on gradient, are to comprise clay lined ditches/swales planted with rush (slope less than 1 in 40), loose stone lined ditches (slopes 1 in 40 to 1 in 25), reinforced ditches with block stone (slopes 1 in 25 to 1 in 12), and ditches/cascades with cemented stone (where slopes greater than 1 in 12) (Figure 15). Where practicable, they will be constructed with variable bank profiles, channel widths, small waterfalls and pools in order to provide landscape and habitat diversity.

On the western slopes of the Western Overburden Mound, a new watercourse with sequence of stone cascades and rush filled swales was created in 2015 to take drainage from the north western corner of the plateau to the outfall of the water treatment facility. A further watercourse will be constructed to take drainage from the western side of the plateau. This is to be reinforced with block stone on the slope and clay lined with rush from the bottom of the slope to southwards to the existing off-site discharge point. Drainage from the southern part of the plateau is to be collected by a new rock reinforced ditch which joins a new clay and rush lined ditch discharging via a rock and rush cascade into the Lake (the former mine void). The upper drainage from the eastern part of the plateau was partly formed in 2017 as a rock cascade with rush swales. This is to be completed as a rock reinforced watercourse discharging into the western shore of the Lake.

Several short lengths of rock reinforced drains are to be installed around the steeper lakesides to take local collects and discharge into the Lake.

Two overflow structures are to be constructed to maintain the maximum water level no higher than 175m AOD. One is in the north and the other in the south east of the Lake. The outflows are to be reinforced rock with the connecting channels to the off-site discharge points lined with loose stone armouring. The detail of each outfall and connecting channels are consented under Planning Application Reference P2017/0703.

k) The Creation of Water Features Designed to Maximise Ecological Diversification -

The remodelling of the former water treatment facilities (Figure 16) provides an opportunity to enhance the nature conservation value of the Site through the promotion of marginal wetland habitats and biodiversity. From experience elsewhere, the wetlands will quickly colonise with marginal and aquatic flora and fauna.

The decommissioning of the extensive water treatment facility on the south western boundary of the operational Site provided is on a significant scale and provides for the commitment to an Ecological Enhancement and Receptor Area-A. On decommissioning, the eight unlined ponds are to be remodelled as a wetland complex by removing the artificial structures such as “T”-pies and replacing with spillways and local regrading of the pond sides for marginal vegetation to colonise (Figure 16a). The provision for drinking water will be made in one of the ponds. The current chain-link fencing would be removed and replaced with stock-proof fencing.

Ponds in two of existing water treatment facilities on the northern site boundary on decommissioning are to be retained primarily as habitat for Otter (Figures 16b & 16c). Subject to Licensing by the NRW, the concrete structures would be removed/capped (Figures 5b & 5c) with the ponds at their eastern ends retained and enhanced for Otter (to be agreed with the NRW). The current chain-link fencing would be removed in both cases and replaced with stock-proof fencing.

Three ponds in the existing water treatment facility on the south eastern site boundary on decommissioning are to be retained and enhanced primarily as habitat for Otter. Subject to Licensing by the NRW, the “T”-pipes and the plastic-liner along the outfall are to be removed (Figure 16d). The current stock-proof fencing would be retained.

The two settling ponds in the former coal stocking yard are to be combined in to one, desilted with the sides regraded to create marginal wetland habitat and as a source of drinking water for livestock (Figure 16e). The current chain-link fencing would be removed and replaced with stock-proof fencing. In addition, a new pond at the southern base of the Western Overburden Mound (Figure 16e) will be created with shallow margins as another source of drinking water for livestock.

1) Aftercare

On the completion of restoration works (grading, soiling and seeding and planting, fencing etc) the EPER Site is subject to a statutory aftercare period of 5 years. This is extended by a Section 106 Agreement to total of 20 years for new woodland plantings, the management of the mitigation works for the development (Tairgwaith SINC and the EERAs) and the management of nature conservation habitat and species features within the retained land. It needs to be noted that the following aftercare provisions for the Common Land are recommendations as the work and programme may have to change to be compliant with future stewardship schemes like the current Glastir scheme for Welsh Commons. Similarly, those for the Country Park may also be varied according to the needs of Phase 2 of the Lakes at Rhosaman consented scheme.

Included in the aftercare are provisions for the maintenance and replacement of fencing, gates and styles, the maintenance of the trackway across the Common and joining the Country Park to the Celtic retained land in the west, and the access track from the Park to Gwilym Road in the east, the maintenance of outfalls, new drainage channels and culverts, and the modified ponds and the lakeside.

The aim of the aftercare period is to ensure the features involved achieve functionality, resilience and sustainability for the intended land uses and nature conservation features. The following programme of works, monitoring and reporting are provisional as they will be dependent on the current baseline. From experience, once the required habitat conditions are achieved, significant changes are slow to happen. It is anticipated that once the target conditions have been achieved only the necessary periodic work to maintain them in a suitable condition will be required. Similarly, the monitoring and reporting would be tailored to appropriate intervals. Important, will be the regular ‘integrity’ monitoring to confirm the presence of the habitat and its extent.

i) Aftercare of Restored Land

The provisional aftercare, monitoring, reporting and review provisions for the restored grassland, woodland and scree on the Common and Country Park land are given in detail in Appendix 4.

The newly established acid and semi-improved grasslands (Figure 8) are subject to a 5-year statutory period where the integrity of the grasslands is maintained by not grazing during the aftercare period and the application of fertiliser (as necessary). Thereafter grazing should only be in compliance with the prevailing agricultural stewardship schemes such as the current Glastir scheme (<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>). Annual assessments and reports are to be submitted to the Planning Authority for review. Each following year’s management proposals and actions will be discussed with the local authority at each of the annual review.

The new woodland (Figure 8) is subject to the 20-year aftercare programme where its integrity is maintained by fencing and the initial three herbicide treatments and replacement of stock failures. Periodic assessments and reports are to be submitted to the Planning Authority for review. Any future and necessary management proposals and actions will be discussed with the local authority at each of the annual review.

The new rock/scree and wetland habitats (Figure 8) as nature conservation features are subject to the extended 20-year aftercare period. The aftercare requirement is minimal with periodic scrub control as the main action required. Again, periodic assessments and reports are to be submitted to the Planning Authority for review and management proposals and actions will be discussed.

Common Land -

The acid grasslands sown on the Western Overburden Mound (WOM) in 2015 and 2016 will have completed their aftercare by 2022 and for the remaining duration of the 20 year aftercare period are to be integrated into the eventual grazing management programme for the combined wider WOM and Southern Overburden Mound (SOM) sowings and the retained marshy and acid grassland (Figure 12).

The woodland planting in 2017 will by 2022 have completed four years of aftercare. The small areas of scree established in 2016 on the eastern slope of the WOM and already in the 4th year of the extended aftercare but are not needed to be fenced should a stewardship grazing scheme be implemented.

Country Park -

Following the completion of the 5-year statutory aftercare, the new acid grassland within the Park is to be maintained as amenity grassland by occasional low intensity grazing and not organised into grazing units.

The woodland aftercare along western side of the Lake will begin its 20 years in 2022, as will the rock and scree habitats where fencing will be provided for safety reasons.

ii) Aftercare of Mitigation Land

The provisional programmes for the extended aftercare of 20 years, including monitoring, reporting and review provisions, for the mitigation management of the Tairgwaith SINC and the three Ecological Enhancement and Receptor Areas (EERAs) (Figure 17) are also given in detail in Appendix 4. The objective of the mitigation is to provide compensation and enhancement for the ecological effects of the mining operation within the Lakes at Rhosaman.

Celtic Energy Land -

The Tairgwaith SINC occurs on Common Land outside of the EPER Site in the south west of the permitted Lakes at Rhosaman scheme. The SINC is designated for its grassland assemblages but owing to neglect they are being overtaken by scrub. A detailed provisional programme and actions are given in Appendix 4. The aftercare actions required are simply scrub removal and the resumption of an appropriate grazing regime. Assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

Common Land -

The original intention of EERA-A was to be a "trial" in diversifying marshy grassland flora on an area of Common Land. This was "... not directly required to offset any predicted impact as a result of the proposed (mine) extension." (SLR, Supplementary Ecological Information Report, para 2.12.1 EERA A, 2013). Subsequent changes to the restored landform meant that it would have to be located on undisturbed Common Land where the grazing rights had not been suspended. The inability to secure agreement for the necessary changes in livestock management with the graziers meant that the trial had to be abandoned.

Instead, it was agreed that appropriate biodiversity enhancement of the Site could be achieved through the promotion of marginal wetland habitats for flora and fauna. The decommissioning of the extensive water treatment facility on the south western boundary of the operational Site provided such an opportunity to achieve this on a significant scale (see Section k above for proposed works).

Common & Country Park Land -

EERA-B, the mitigation and enhancement actions for common lizard populations, extend from marshy grassland on the Common Land in the north, through marshy grassland within the Park to the marshy and acid grasslands in the south east corner of the Common Land. The aftercare comprises a programme to extend the range of the lizard by creating and maintaining mown 'rides' and artificial refugia (Appendix 4). Periodic assessments and reports

are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed annually with the local authority.

EERA-C comprises two areas of translocated marshy grassland within the Common Land on the eastern slope of the WOM and which are subject to the extended 20-year aftercare period. The principle action needed during this period, whilst the plant communities are recovering, is to exclude grazing and reduce runoff pollution by fencing with buffer zones (Figure 10). Ultimately, it is expected that these areas will become part of the combined single WOM-SOM grazing unit where grazing is to be at a low level. Periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

iii) Aftercare of Retained Land

The aim of the aftercare for the nature conservation features associated with the retained land (Figure 2) is to maintain and enhance the condition of the habitat (marshy grassland, lichen-bryophyte heath, acid grassland, exposed rock/scree habitat and scattered scrub and scrub-woodland), and their supporting function for the species features. To enable delivery of the objectives owing to the wide range of feature species occurring and their differing preferences for habitat conditions, the approach adopted below has been to prioritise the management actions based on the species historic distributions (Table 1).

Table 1: Retained Habitat Features and Prioritised Supported Species*

Retained Feature	Habitat	Location of Habitat Feature	Prioritised Species Features
Marshy Grassland/Purple Moorgrass		Eastern fringe of East Pit Mine Site	Barn owl, Bats
Flushes		Eastern fringe of Marshy Grassland	
Mosaic Bryophyte/Lichen Heath/Marshy Grassland		Plateau of Western Overburden Mound	Lapwing, Skylark, Linnet
Scrub/Woodland		Scattered around the operational areas	Barn owl, Song thrush, Linnet
Inland Rock & Scree		Northern Slopes of Southern Overburden Mound	Lichen, Bryophytes
Acid Grassland		Northern and Southern Ends of Marshy Grass Fringe	Common lizard, Small heath butterfly
Wetlands/Ponds*		Northern and Eastern Boundaries	Otter

*See Mitigation EERA-A & EERA-B works above for Other Wetlands and Common Lizard

Common Land -

Lichen-bryophyte-heath with marshy grassland is the most extensive and fragile habitat feature within the Site (Figure 18). It occurs within the Common land on the Western

Overburden Mound and a smaller area on the north slope of the Southern Overburden Mound. This scarce habitat feature is of importance for nature conservation for its patchwork of lichen and bryophyte communities, the patches of neutral grassland and the more extensive swathes of rush dominated vegetation. The open habitat and short vegetation mosaic support numbers of birds of concern, including the Skylark and Lapwing (Figure 19). Locally, scrub development provides habitat for the Linnet and other bird species. The tussocky marshy grassland is good habitat for short tailed vole hunted by Barn owl and Fox.

The whole WOM plateau is to be treated as a single entity where controlled low intensity grazing is to be used to maintain short sward for Skylark and Lapwing, and scrub encroachment sufficient for the Linnet. Mechanically, 10 scrapes are to be created for Lapwing and Snipe, and when appropriate to create other bare areas of overburden to initiate new areas for lichen-bryophyte colonisation as the current patches become neutral grassland. No inorganic or organic fertilisers and herbicides are to be applied to agriculturally improve the vegetation, no supplementary feeding is to be allowed and no cutting is to be deployed.

The provisional management details are set out in Appendix 4 where grazing is to be controlled and conform during the aftercare period to the prevailing stewardship recommendations for common land. The prescription for the lichen-bryophyte heath is to take preference over that for other components within the proposed single combined WOM-SOM grazing unit (Figure 12). Appropriate periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

The retained marshy grassland in the south east of the SOM (Figure 18) is to be integrated into the single grazing unit with the retained acid grassland and the sown semi-improved grassland (Figure 12). The retained marshy grassland in the north east of the Site is to be integrated as a North Eastern Grazing Unit (Figure 12) with the 'orphaned' grassland abutting Gwilym Road. The provisional management details are set out in Appendix 4 where grazing is to conform during the 20-year aftercare period to the prevailing stewardship recommendations for marshy grassland on common land. Appropriate periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

The small area of scree with lichen-bryophyte heath on the north slope of the Southern Overburden Mound (Figure 18) is to be left unfenced provided that a stewardship like grazing regime is adopted for the combined single WOM-SOM grazing unit. The main action required time to time is likely to be scrub removal. Periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

Woodland, mainly as scrub-woodland, and scrub occur as isolated small clumps or widely scattered open areas within other habitats on retained land around the Site. There are two significant clumps within the Common Land, one located at the northern foot of the WOM near to the water treatment facility and along the northern boundary and the other on the Common Land is to the south west and on the access road between the offices and the mine working (Figure 18). The main action needed is to fence these areas to exclude grazing. Periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

In addition to the proposed wetland complex EERA-A in the south west of the Site, two ponds are to be created, one in the restored former coal stocking yard and the other in the coal preparation facility (Figure 16e). These will serve the dual purposes of wetland habitats and livestock drinking ponds. They will be left to naturally colonise and the main action needed in time will be scrub control. The retained ponds at the two former water treatment facilities on the northern Site boundary (Figures 16b & 16c) will be stock-proofed fenced as Otter habitat. In addition to NRW Licence requirements, periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

Country Park -

The retained marshy grassland in the Country Park (Figure 18) comprises remnant field systems, with boundary hedgerows, which have not been in agricultural use for some decades. These rush dominant severed enclosures provide a tussocky habitat suitable for voles and shrews, the food source for the Barn owl, and damp grasslands with hedges, scrub and trees providing feeding areas and commuting routes for bat species (Figure 19). For these reasons, the aim is for these marshy grasslands to be managed during the extended aftercare period to maintain their integrity and in a condition favourable for Barn owl and bat foraging. A further species feature of conservation importance is the supposed colony of Small Heath Butterfly (Figure 19); the larval food plant being fescues and bent short grassland species usually associated with dry neutral/acid soil conditions.

The provisional management details are set out in Appendix 4 where grazing is to be controlled and conform during the aftercare period to the prevailing stewardship recommendations for grasslands on common land. A provisional prescription for the marshy grassland the proposed Eastern grazing unit (Figure 13) are set out in Appendix 4. Appropriate periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

A flush was identified mid-way along the retained eastern marshy grassland fringe within the Eastern grazing unit (Figure 18). A provisional programme for this feature is set out in Appendix 4. Periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

Woodland, mainly as scrub-woodland, and scrub occur as isolated small clumps or widely scattered open areas within other habitats on retained land around the Site. There are two main clumps within the Country Park. One is a linear woodland alongside the southern outfall from the Lake is recorded as an 'ancient woodland' site and the other comprises two small adjacent clumps at the northern foot of the Southern Overburden Mound (Figure 18). The prime action is to fence around these features with a sufficient buffer to facilitate further colonisation and diversification of the woodland/scrub for birds, bats and invertebrates. The programme for this feature is set out in Appendix 4. Periodic assessments and reports are to be submitted to the Planning Authority for review. Each year's management proposals and actions will be discussed with the local authority.

Wetland, the retained pond within the former water treatment facility on the eastern Site boundary will be stock-proofed fenced as Otter habitat. In addition to NRW Licence requirements, periodic assessments and reports are to be submitted to the Planning

Authority for review. Each year's management proposals and actions will be discussed with the local authority.

iv) Aftercare of Fencing & Gates etc.

Where required for the purpose of the land uses and nature conservation objectives, the fencing and gates (including those on footpaths and bridleways, erected at restoration and associated with the integrity of the Site are to be maintained in a safe and functional condition throughout the extended aftercare period. They would be replaced/renewed as necessary following an annual inspection each March. The assessments and reports are to be submitted to the Planning Authority for annual review and to discuss future management actions.

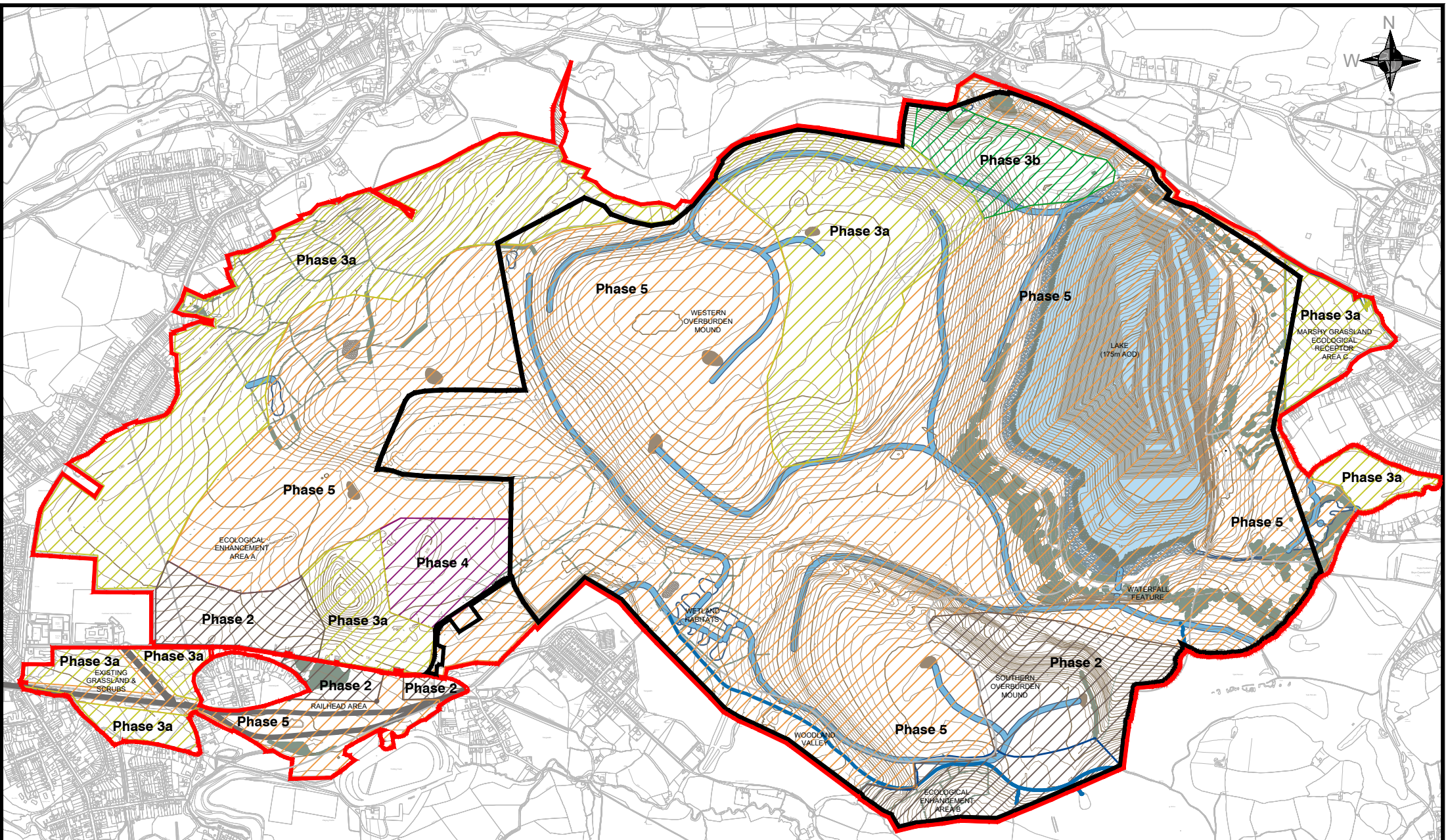
v) Aftercare of Tracks & Paths

The access tracks and their way markers are to be maintained in a serviceable condition throughout the extended aftercare period and resurfaced with run of crusher material as necessary following an annual inspection each March. The assessments and reports are to be submitted to the Planning Authority for annual review and to discuss future management actions. Where excessive erosion has been caused by use of the non-surfaced paths, remedial works would be undertaken.

vi) Aftercare of Main Outflow Ditches and Watercourses.

The internal and outflow drainage infrastructure are to be maintained in a serviceable condition throughout the extended aftercare period and repaired as necessary following an annual inspection each September and following abnormal rainfall events. Annual inspections of the condition of the internal and outflow drainage infrastructure are to be submitted to the Planning Authority, along with reports of management action undertaken.

Figures



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FIGURE 1

Legend

-  Consented Boundary (Lakes at Rhosaman)
-  Operational Boundary (East Pit East Revised)

Restoration Phases

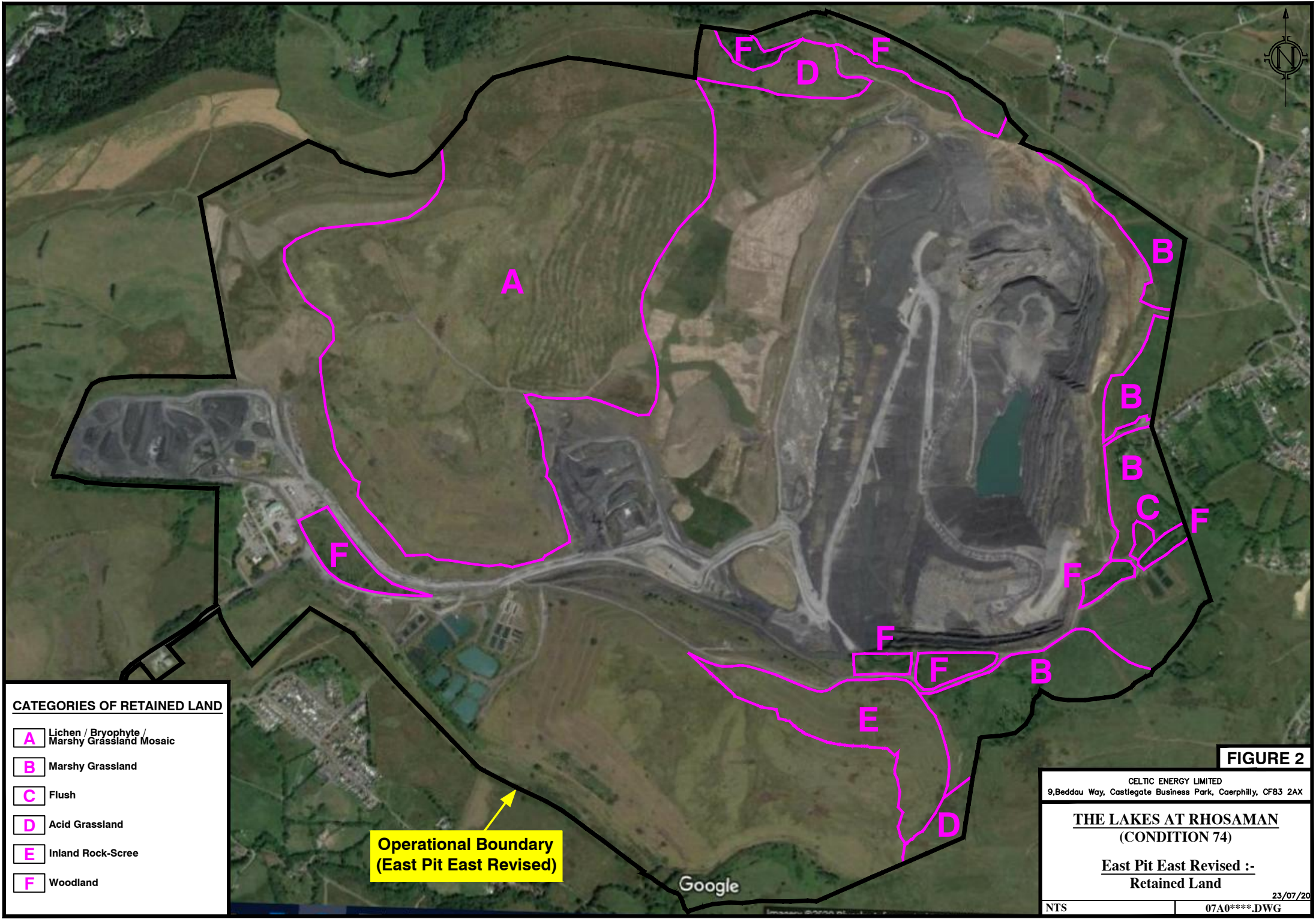
- | | |
|--|---|
|  Phase 2 |  Phase 4 |
|  Phase 3a |  Phase 5 |
|  Phase 3b | |

CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Coerphilly, CF83 2AX

THE LAKES AT RHOSAMAN
(CONDITION 74)

East Pit East Revised :-
Restoration Phasing Scheme
(LAR-B-09/K)

Scale (1:15,000) 07A0***.DWG 23/07/20



CATEGORIES OF RETAINED LAND

- A Lichen / Bryophyte / Marshy Grassland Mosaic
- B Marshy Grassland
- C Flush
- D Acid Grassland
- E Inland Rock-Scree
- F Woodland

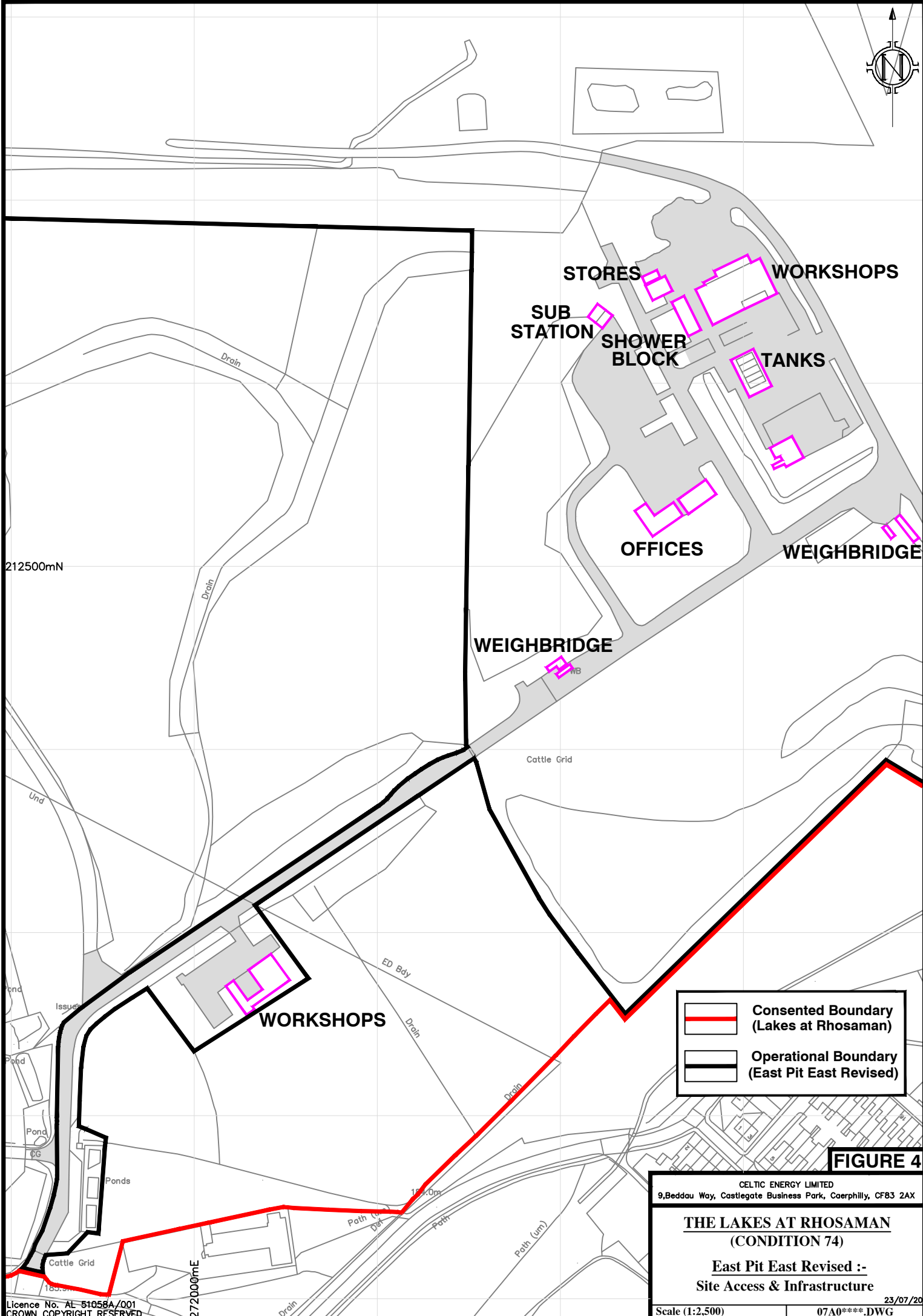
**Operational Boundary
(East Pit East Revised)**

FIGURE 2

CELTIC ENERGY LIMITED
9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

**THE LAKES AT RHOSAMAN
(CONDITION 74)**

**East Pit East Revised :-
Retained Land**



	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

FIGURE 4

CELTIC ENERGY LIMITED 9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
THE LAKES AT RHOSAMAN (CONDITION 74)	
East Pit East Revised :- Site Access & Infrastructure	
Scale (1:2,500)	23/07/20 07A0****.DWG

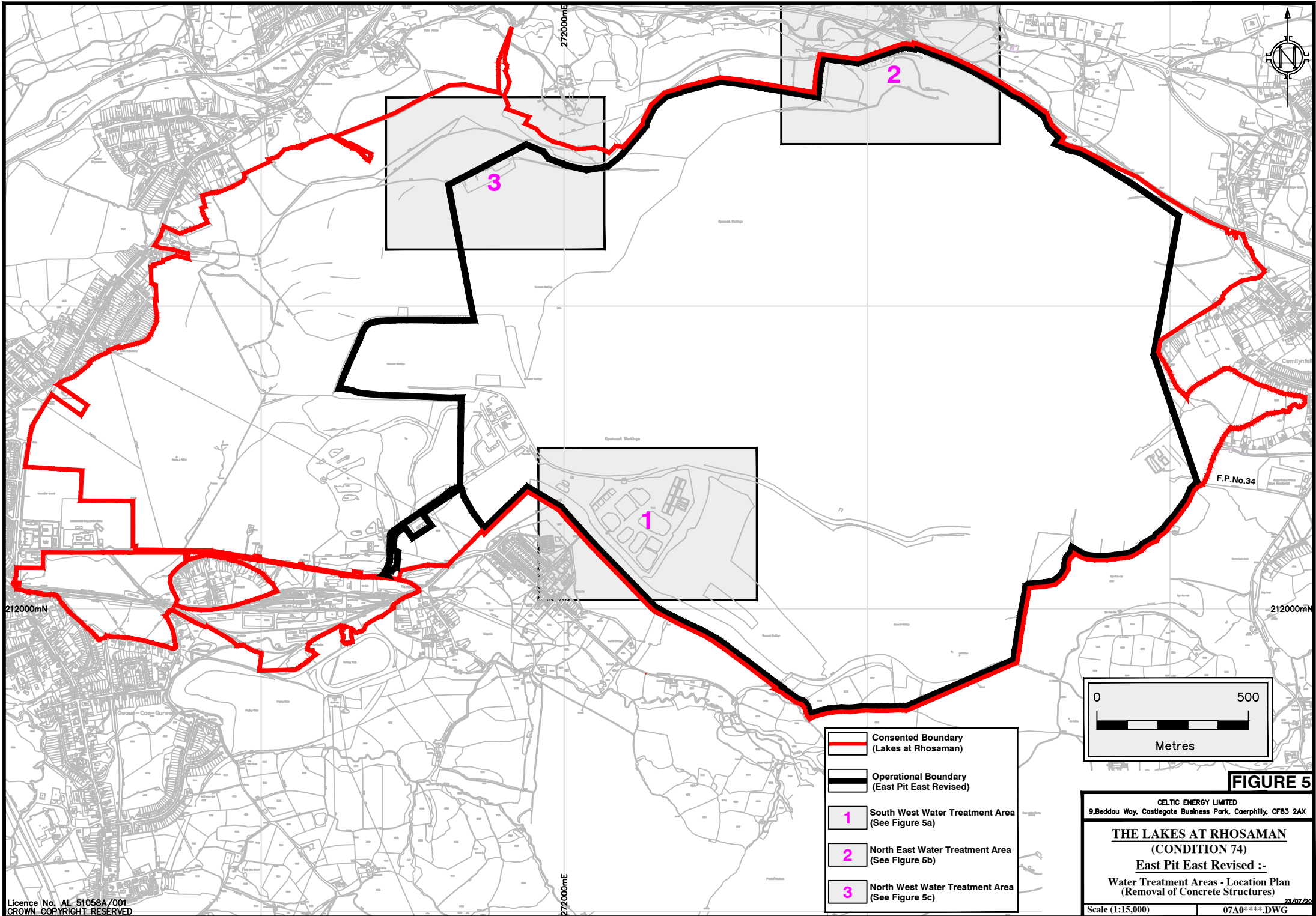


FIGURE 5

CELTIC ENERGY LIMITED
9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

THE LAKES AT RHOSAMAN
(CONDITION 74)
East Pit East Revised :-
Water Treatment Areas - Location Plan
(Removal of Concrete Structures)

Scale (1:15,000) 07A0****.DWG

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**4No. CONCRETE FLOW TANKS
TO BE DRAINED. CONCRETE TO BE
BROKEN UP & DISPOSED OF IN SITU
WITHIN POND VOIDS. AREA TO BE
BACKFILLED WITH SOILS.**

**10No. CONCRETE LINED LAGOONS
TO BE DRAINED. CONCRETE TO BE
BROKEN UP & DISPOSED OF IN SITU
WITHIN POND VOIDS. AREA TO BE
BACKFILLED WITH SOILS.**

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200.6m

Cwmnonhir
Terrace

ROSEDALE ROAD

Club

197

LAUREDALE ROAD

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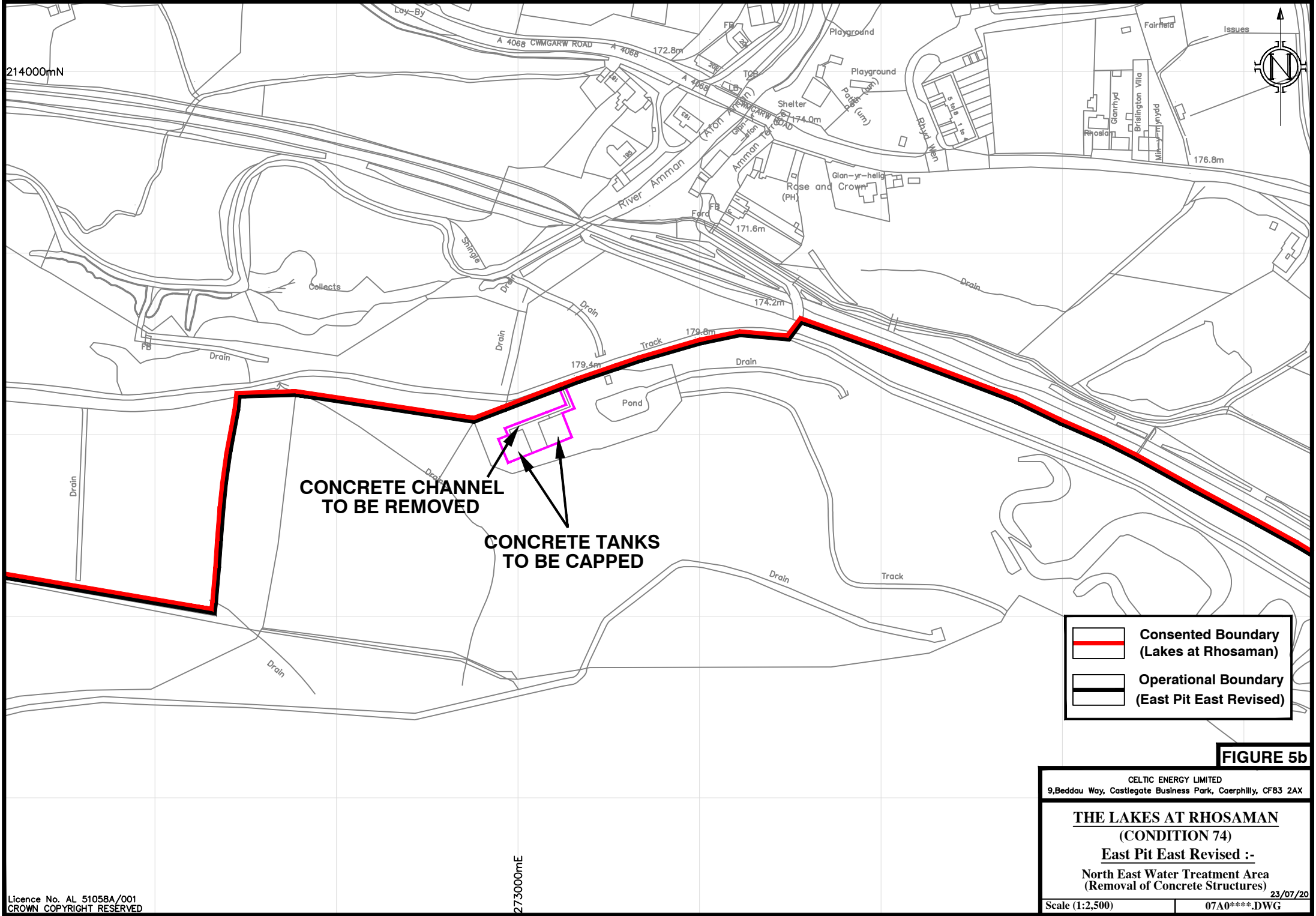
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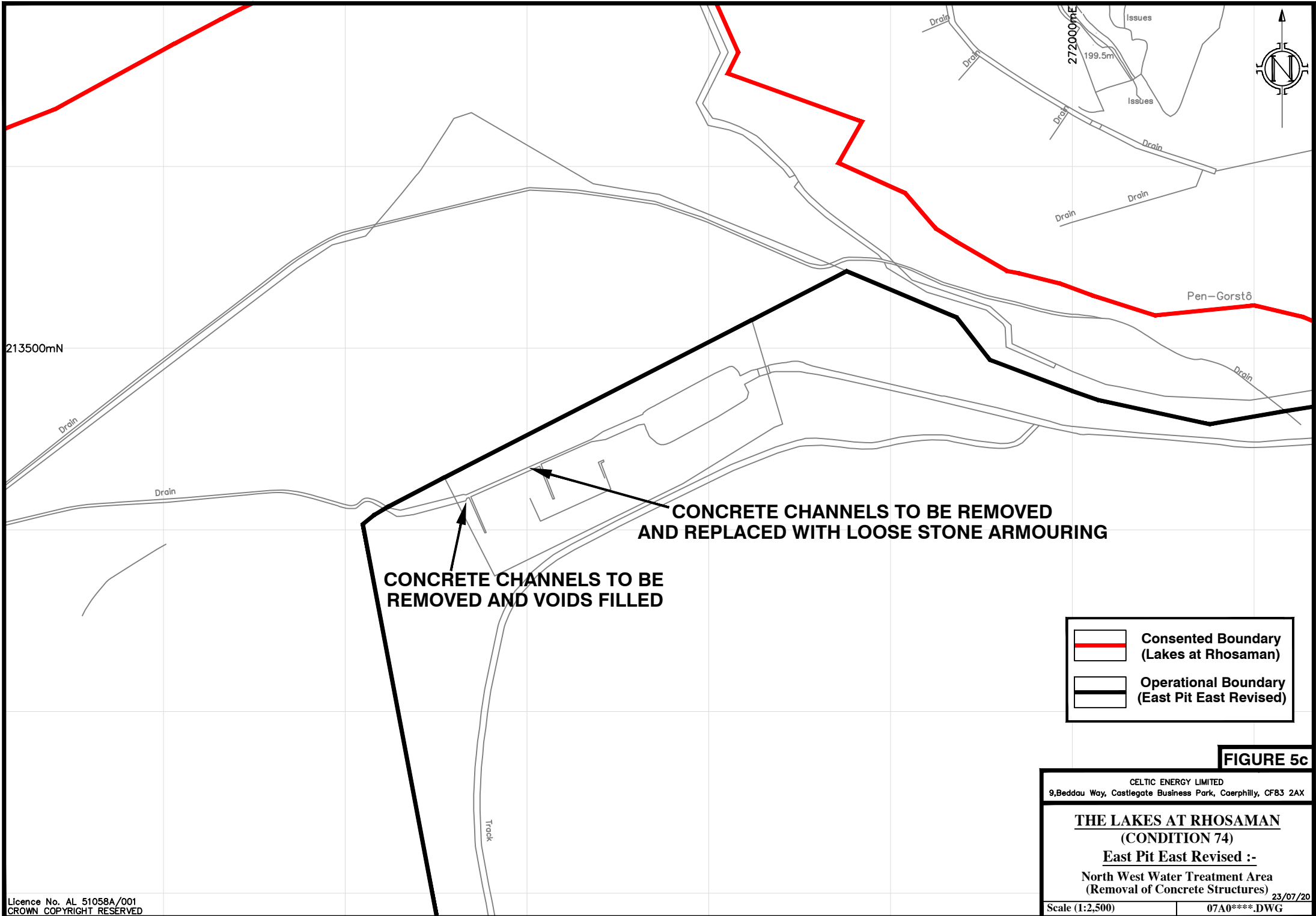
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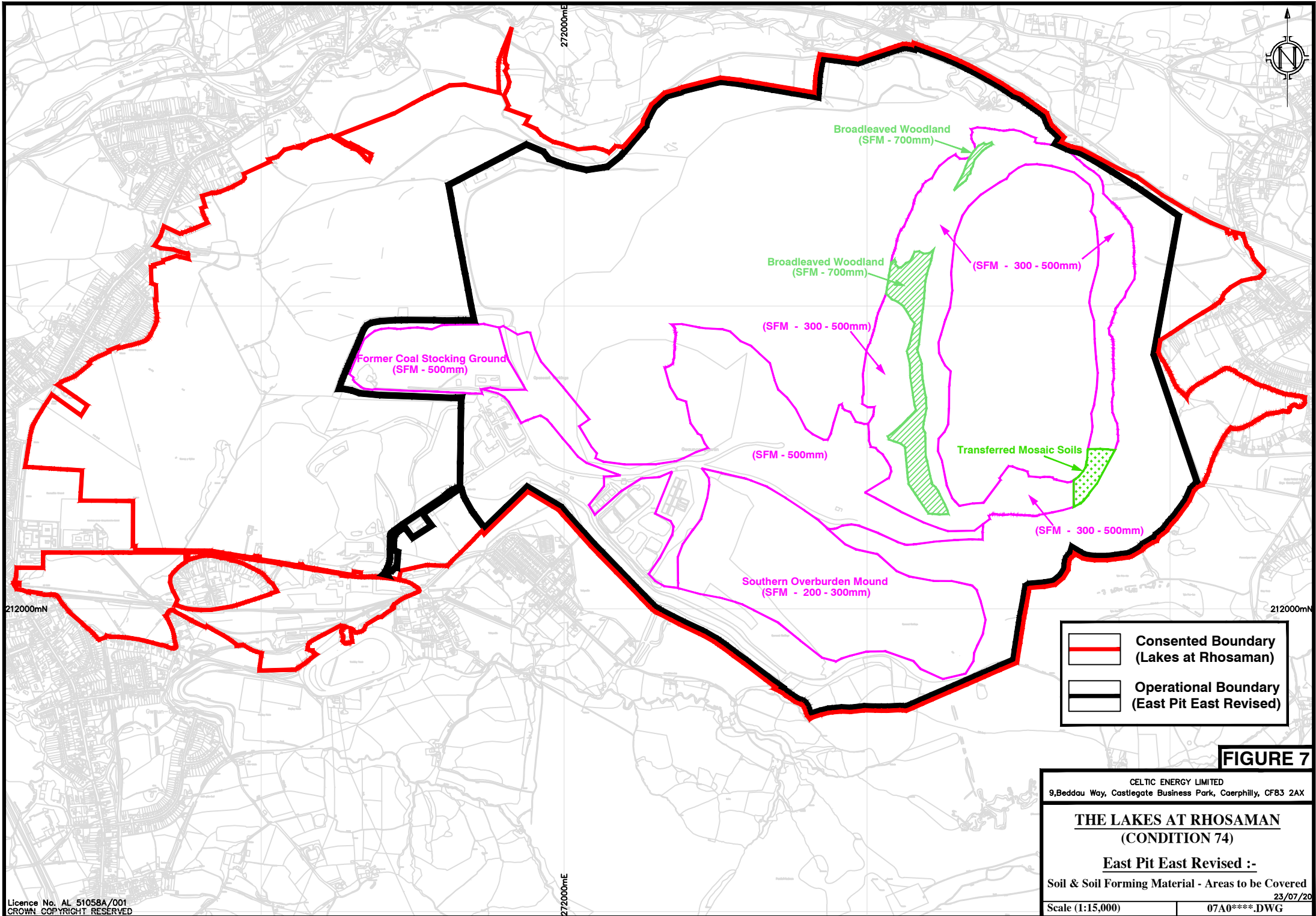




	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

FIGURE 5c

CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
<u>THE LAKES AT RHOSAMAN</u> (CONDITION 74) <u>East Pit East Revised :-</u> North West Water Treatment Area (Removal of Concrete Structures)	
Scale (1:2,500)	23/07/20 07A0****.DWG



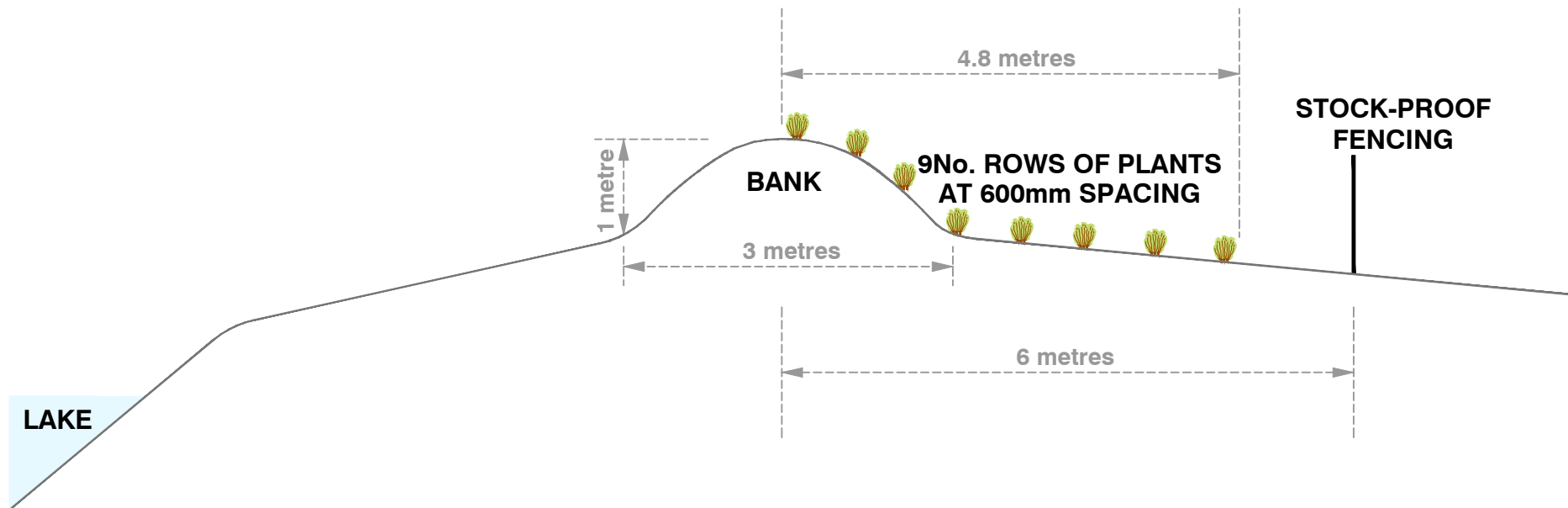
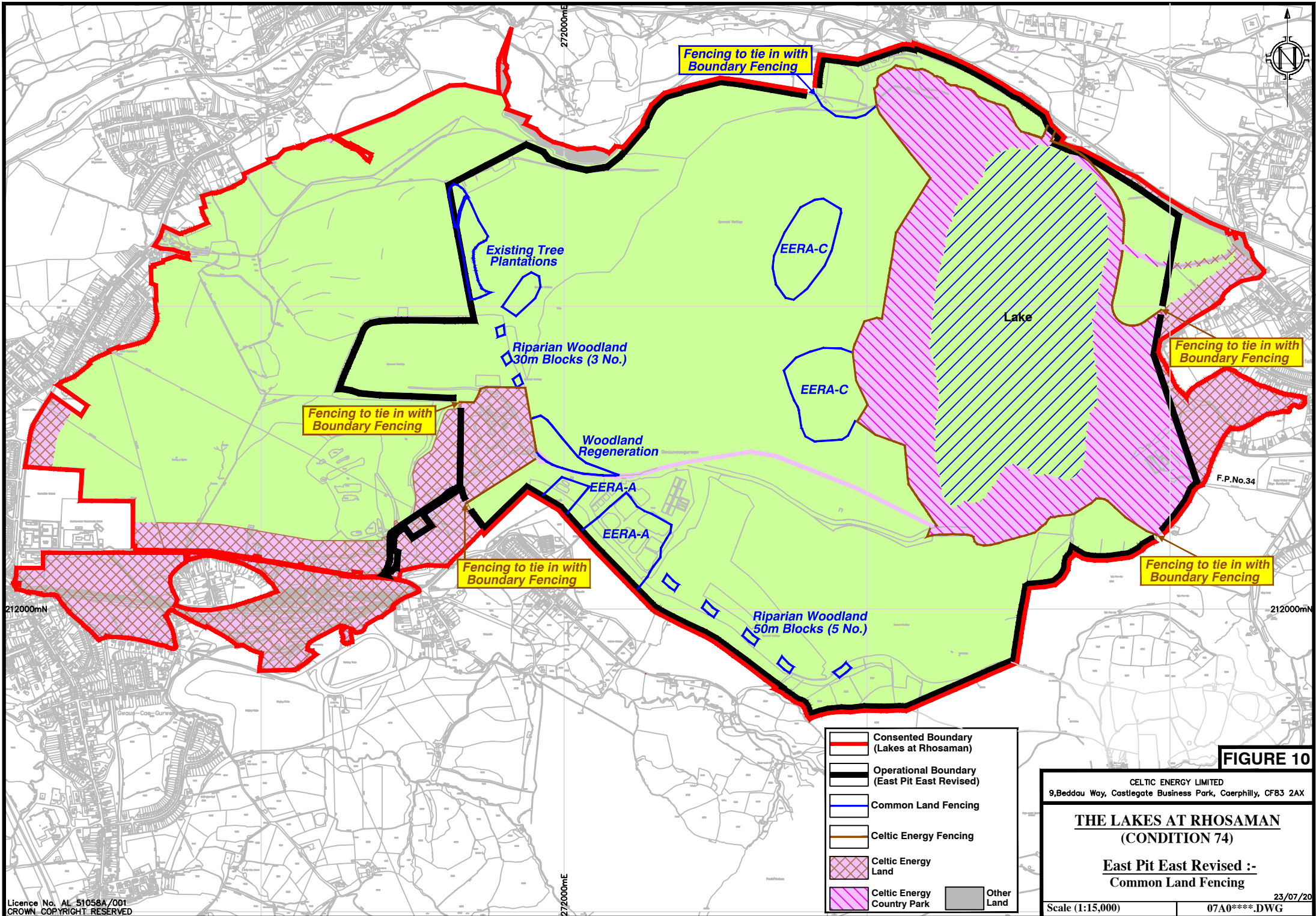


FIGURE 9

CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
THE LAKES AT RHOSAMAN (CONDITION 74)	
East Pit East Revised :- Planted & Fenced Barrier Along Eastern Side of Lake	
NTS	07A0****.DWG

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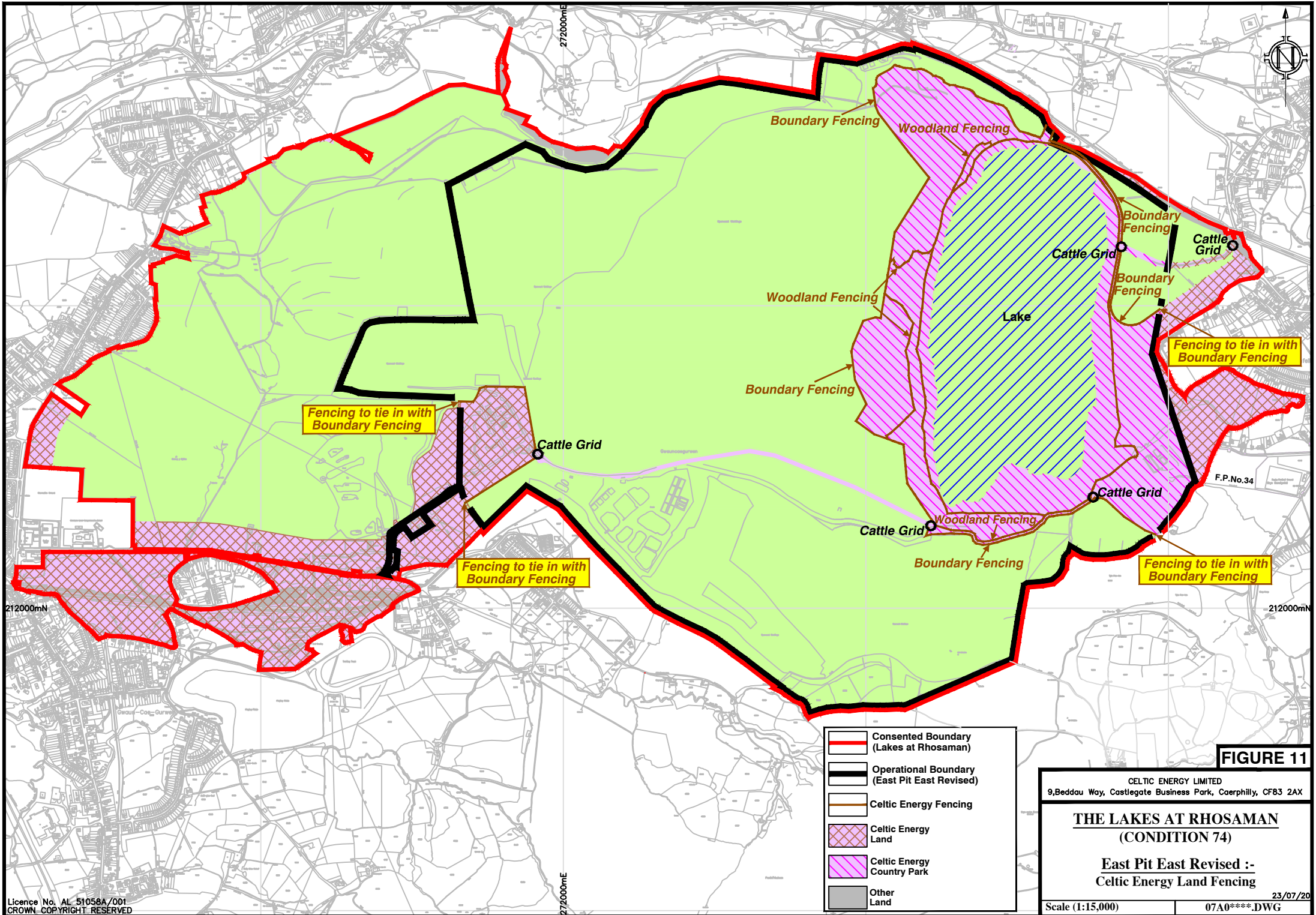


FIGURE 11

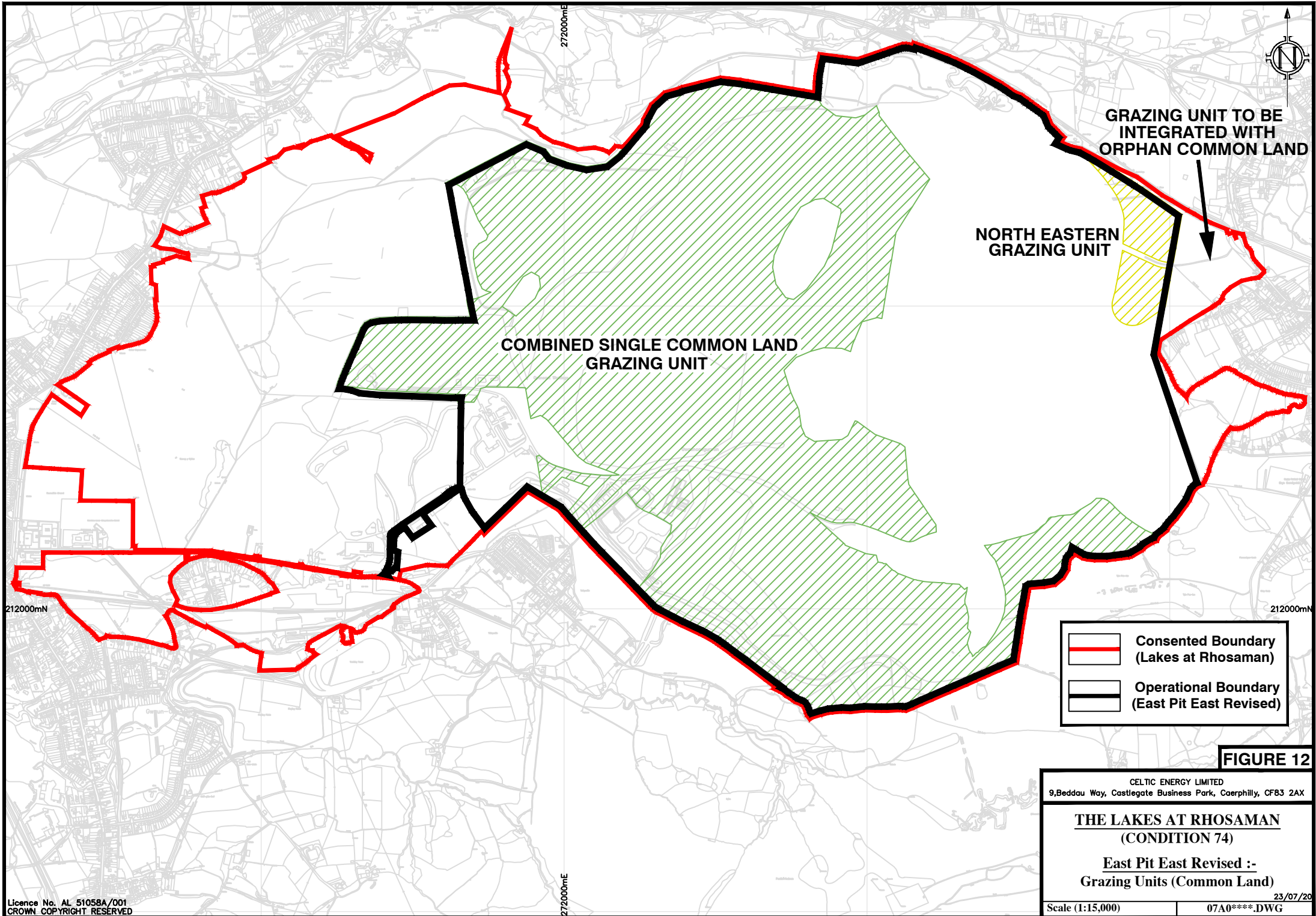
CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Coerphilly, CF83 2AX

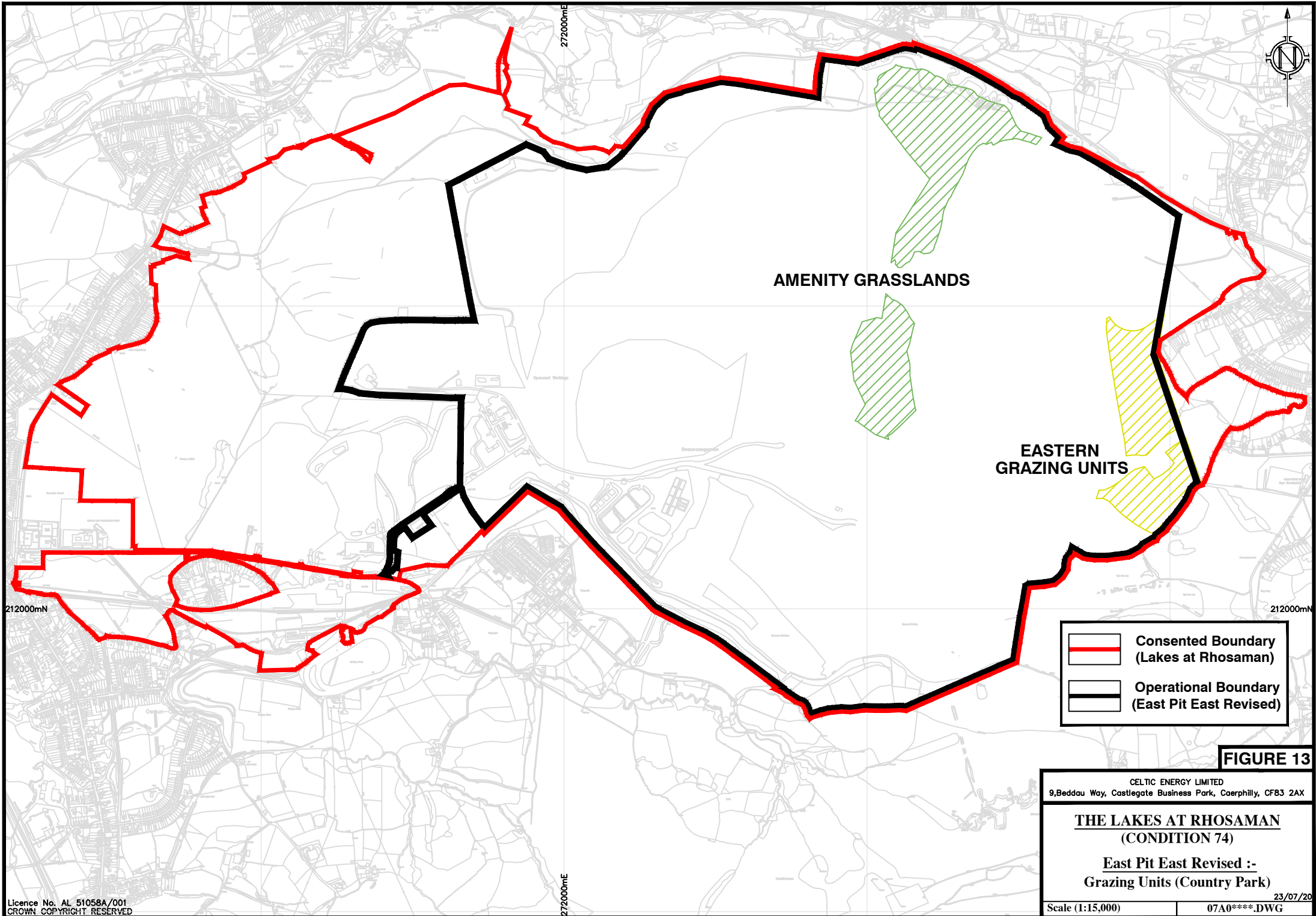
THE LAKES AT RHOSAMAN
(CONDITION 74)

East Pit East Revised :-
Celtic Energy Land Fencing

Scale (1:15,000)

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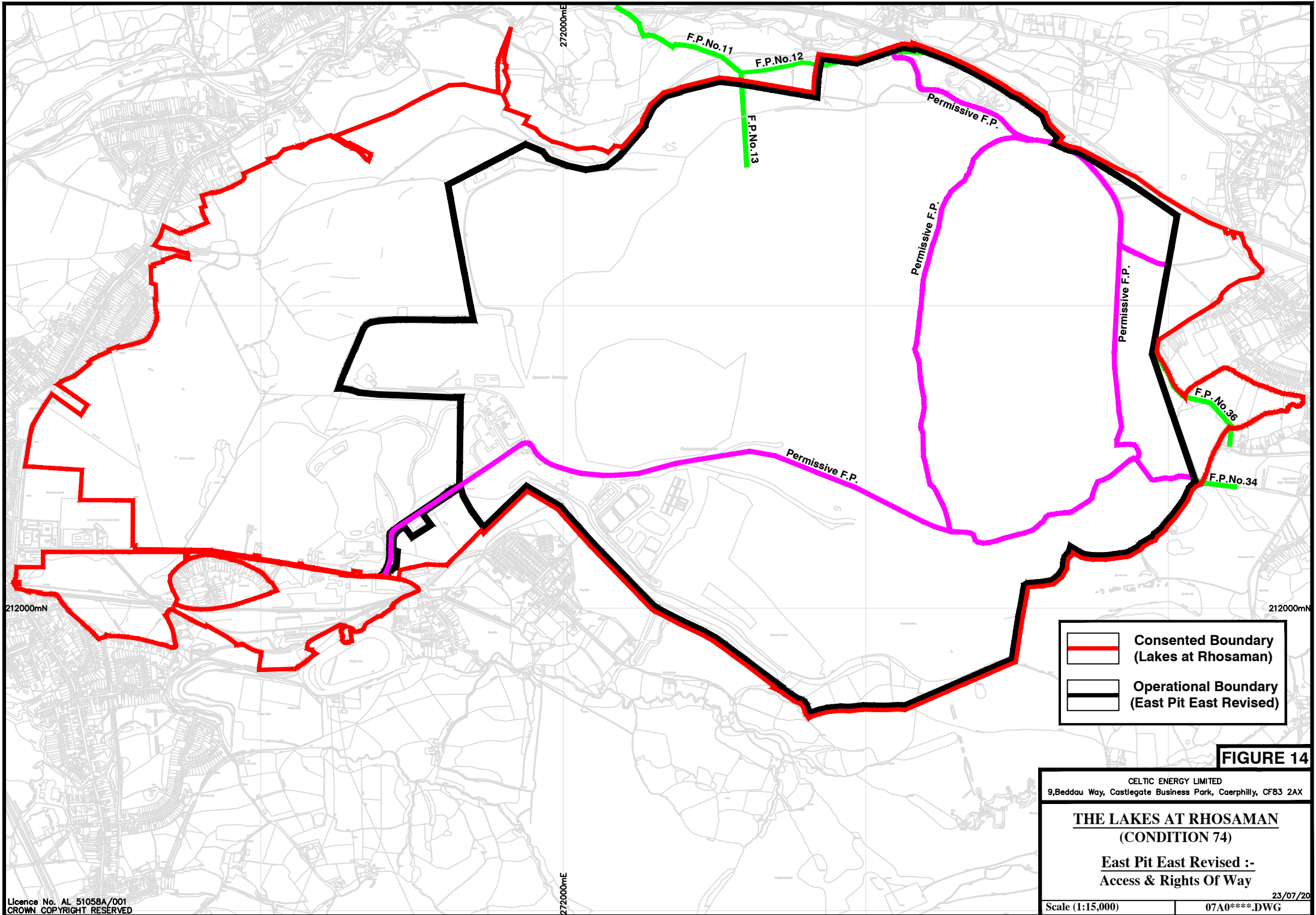




	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

FIGURE 13

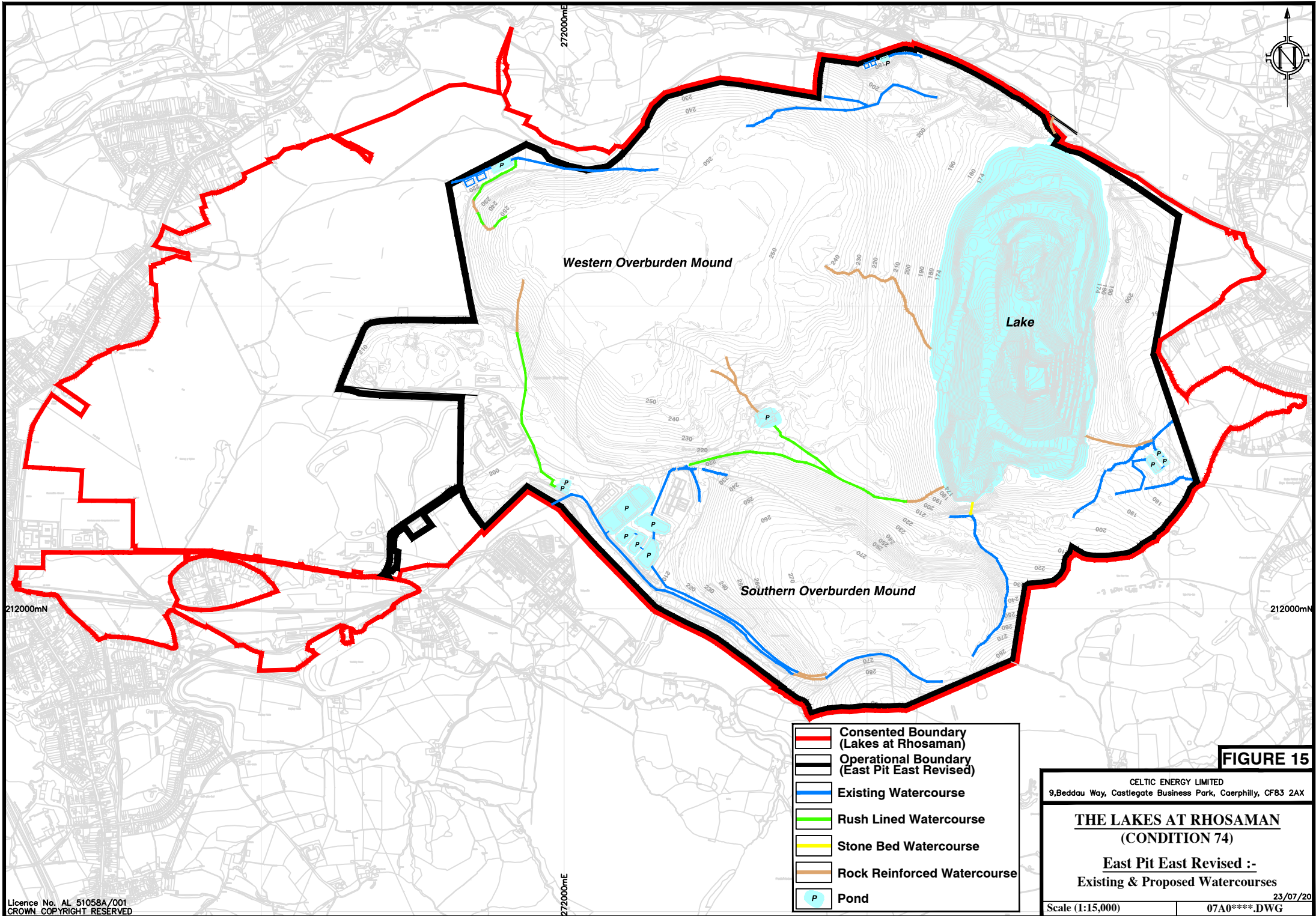
CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
<u>THE LAKES AT RHOSAMAN</u> (CONDITION 74)	
East Pit East Revised :- Grazing Units (Country Park)	
Scale (1:15,000)	23/07/20 07A0****.DWG

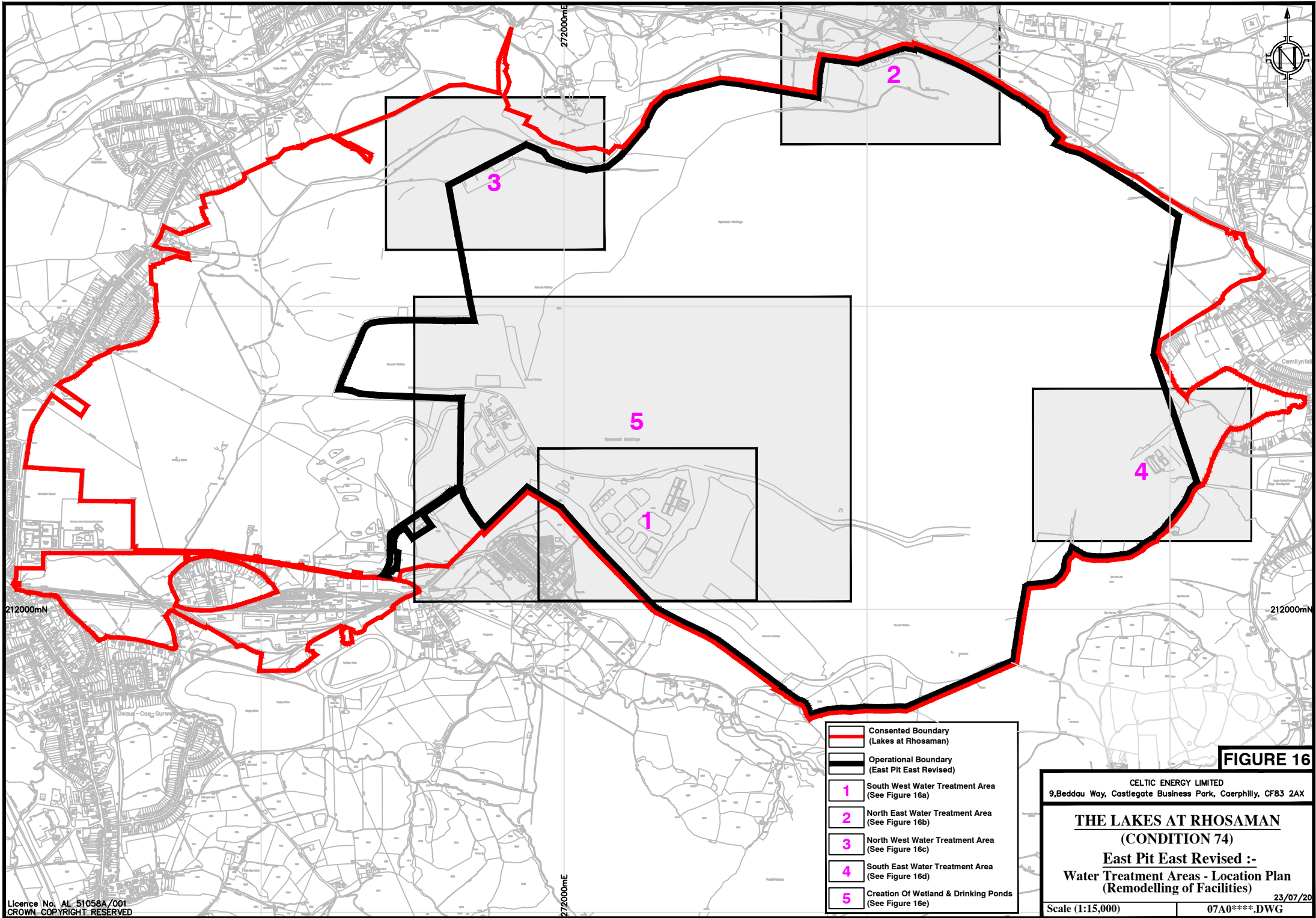


	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

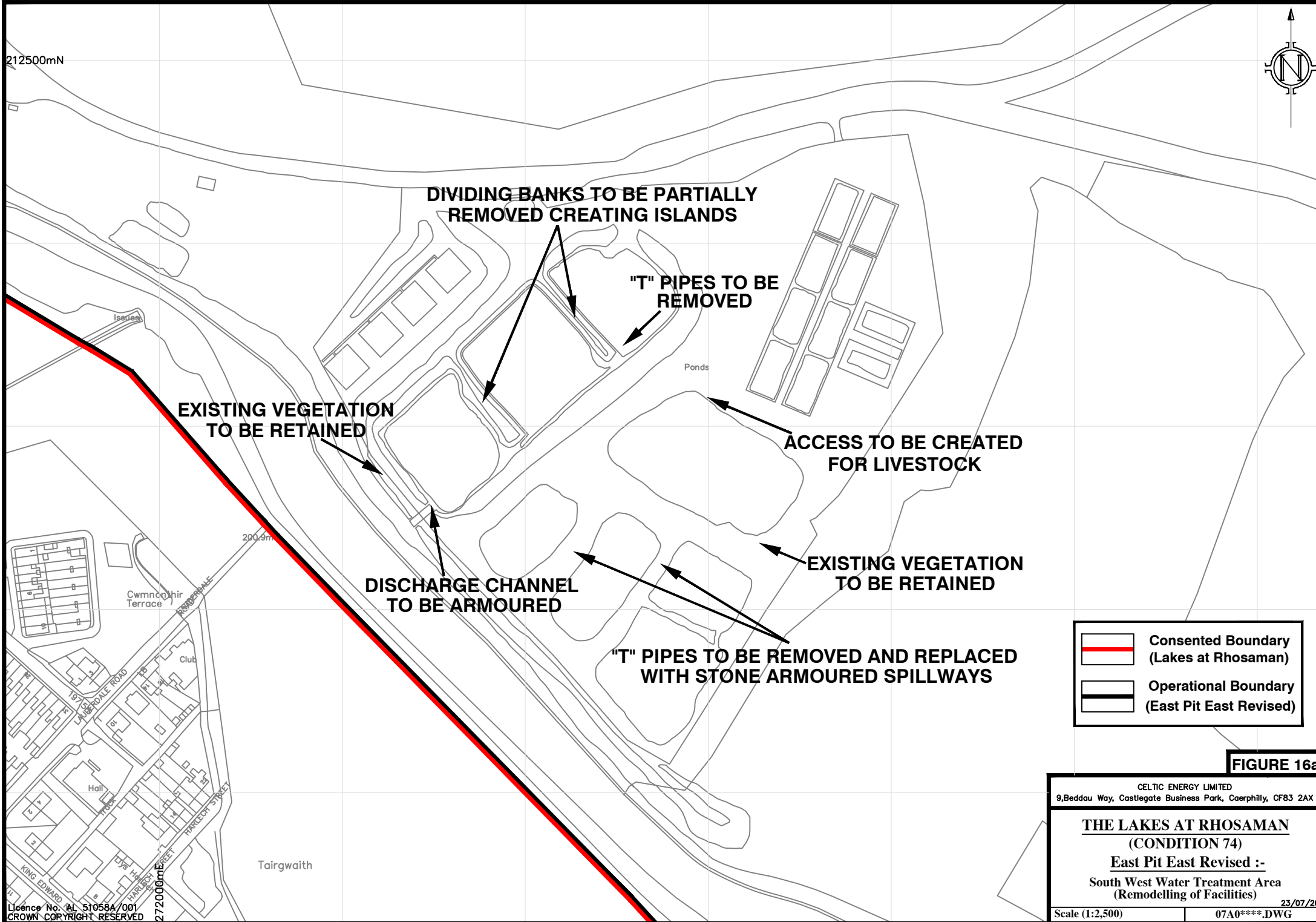
FIGURE 14

CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
<u>THE LAKES AT RHOSAMAN</u> (CONDITION 74)	
East Pit East Revised :- Access & Rights Of Way	
Scale (1:15,000)	23/07/20 07A0****.DWG





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	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

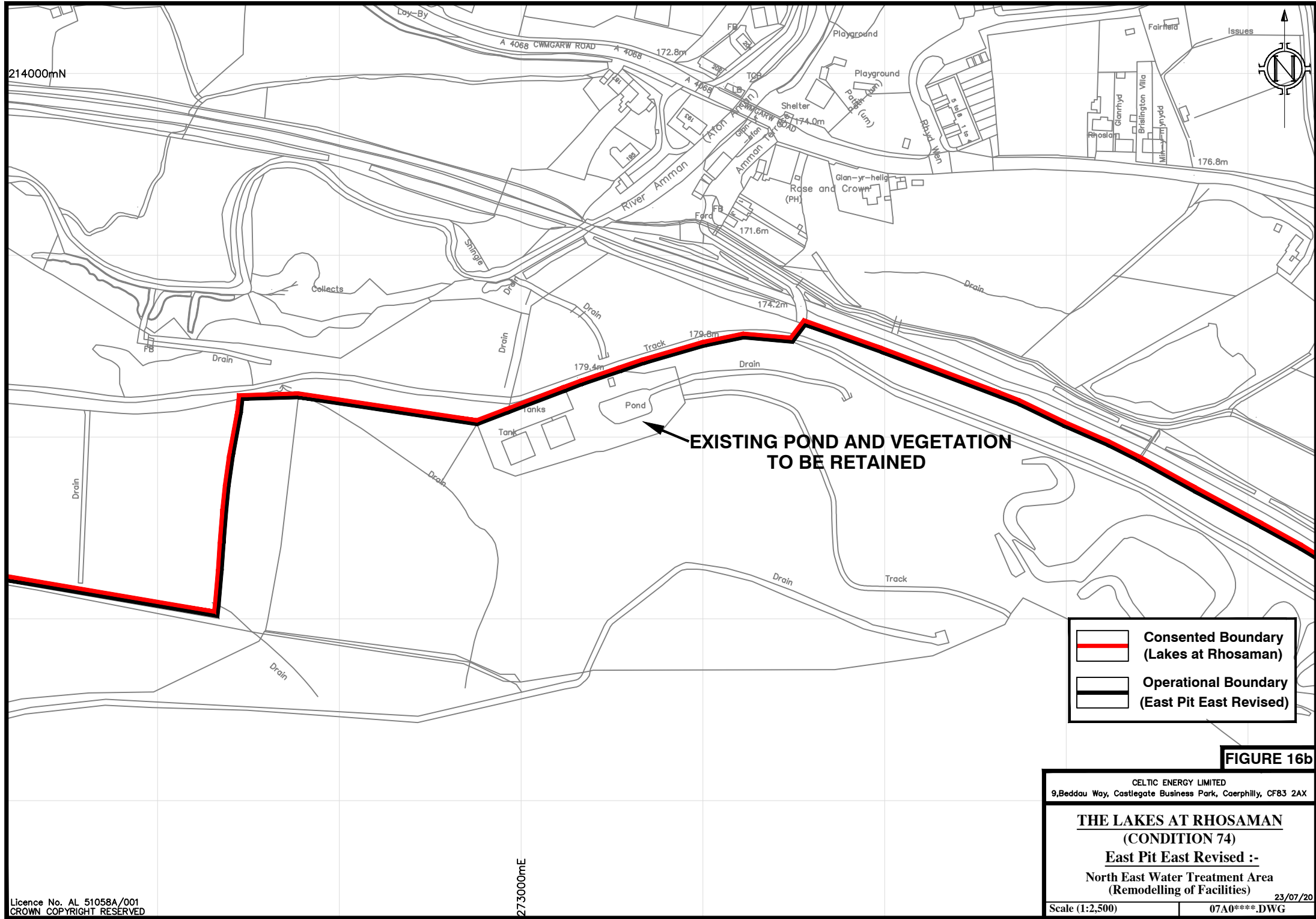
FIGURE 16a

CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

THE LAKES AT RHOSAMAN
(CONDITION 74)
East Pit East Revised :-
South West Water Treatment Area
(Remodelling of Facilities)

Scale (1:2,500)07A0***.DWG

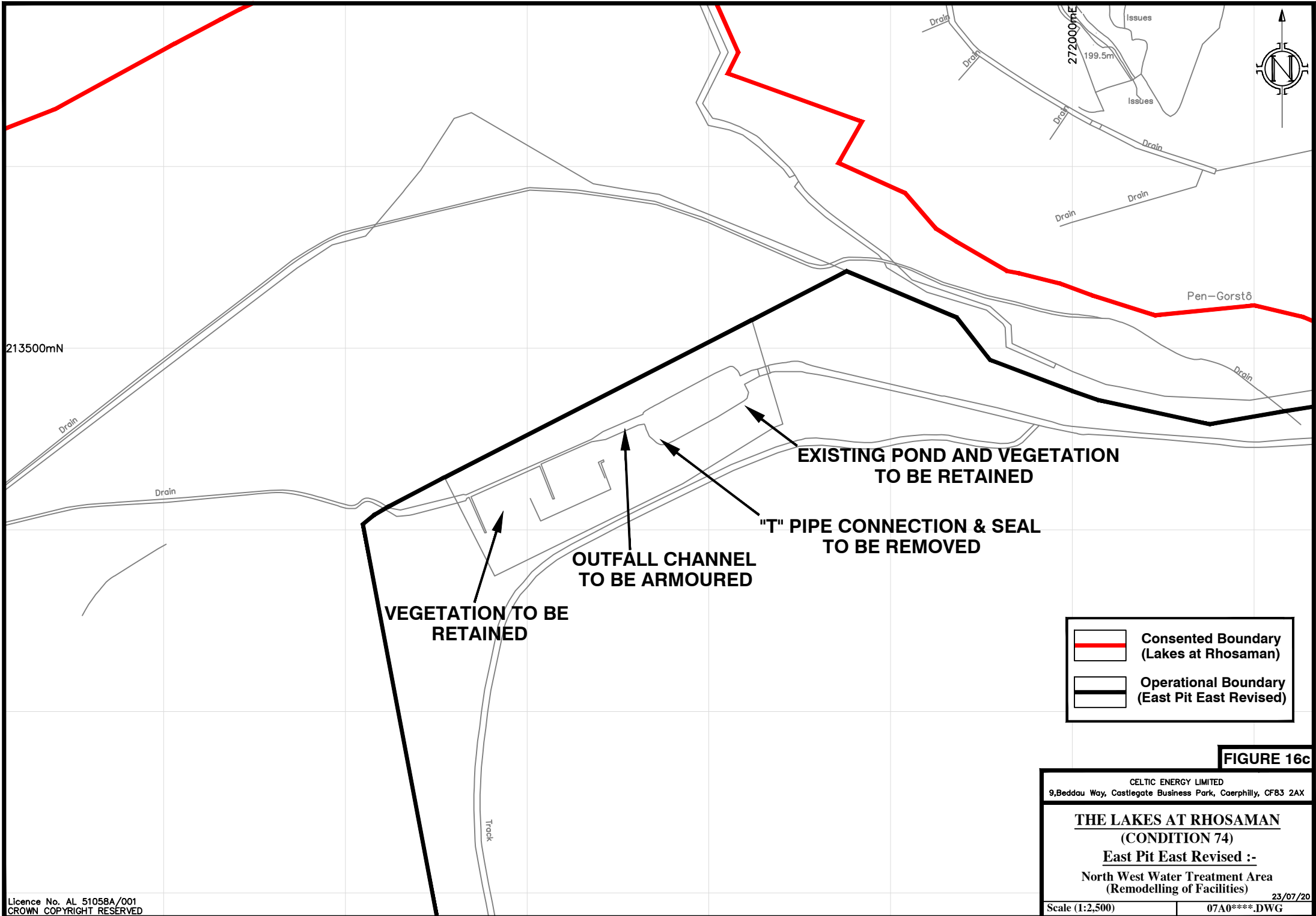
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	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

FIGURE 16b

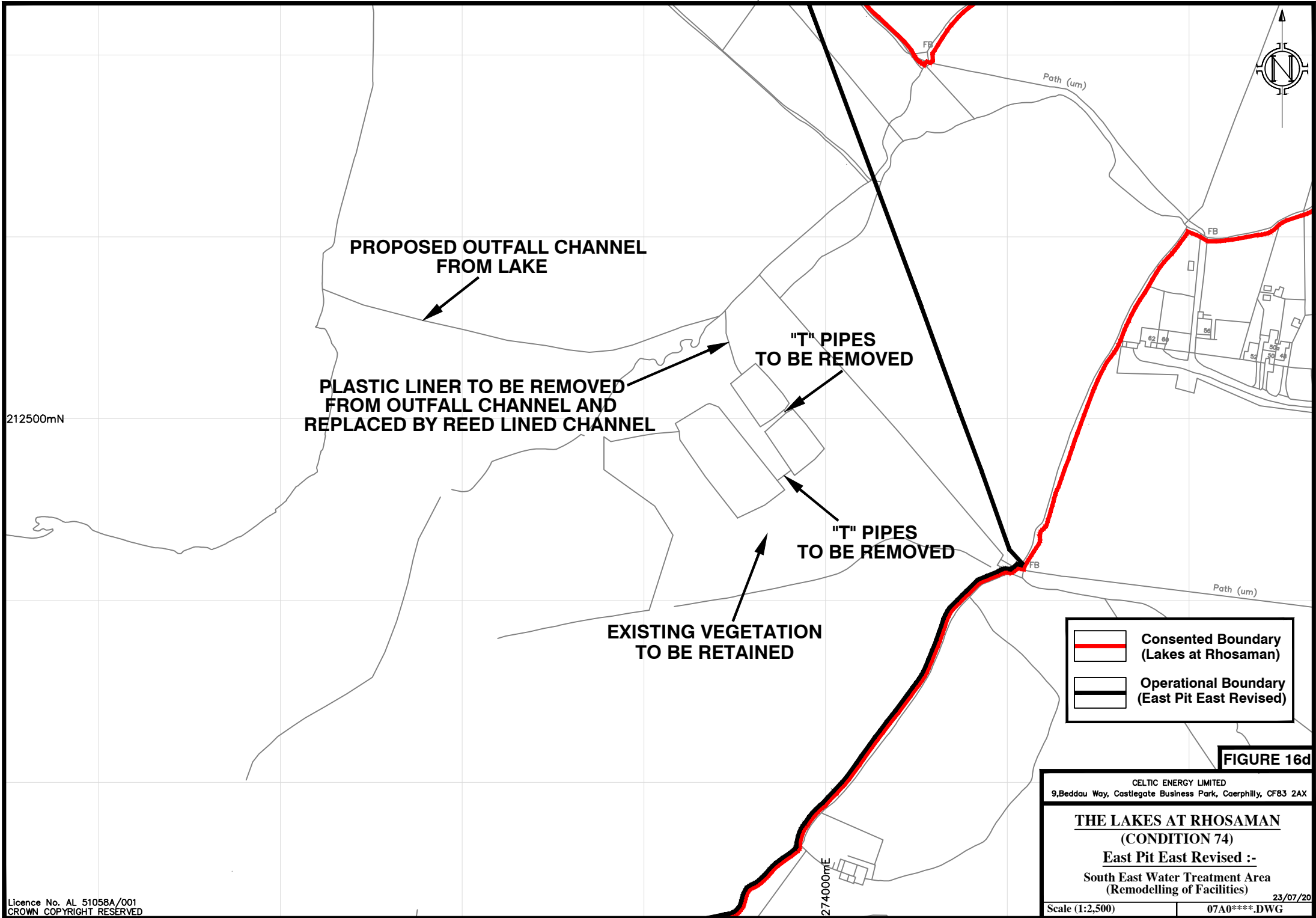
CELTIC ENERGY LIMITED 9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
THE LAKES AT RHOSAMAN (CONDITION 74)	
East Pit East Revised :-	
North East Water Treatment Area (Remodelling of Facilities)	
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	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

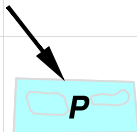
FIGURE 16c

CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
THE LAKES AT RHOSAMAN (CONDITION 74) East Pit East Revised :- North West Water Treatment Area (Remodelling of Facilities)	
Scale (1:2,500)	23/07/20 07A0****.DWG





**TWO PONDS TO BE COMBINED TO FORM
ONE POND, DE-SILTED & REGRADED
TO CREATE WETLAND HABITAT**



**NEW POND TO BE CREATED AT
SOUTHERN BASE OF WESTERN
OVERBURDEN MOUND**



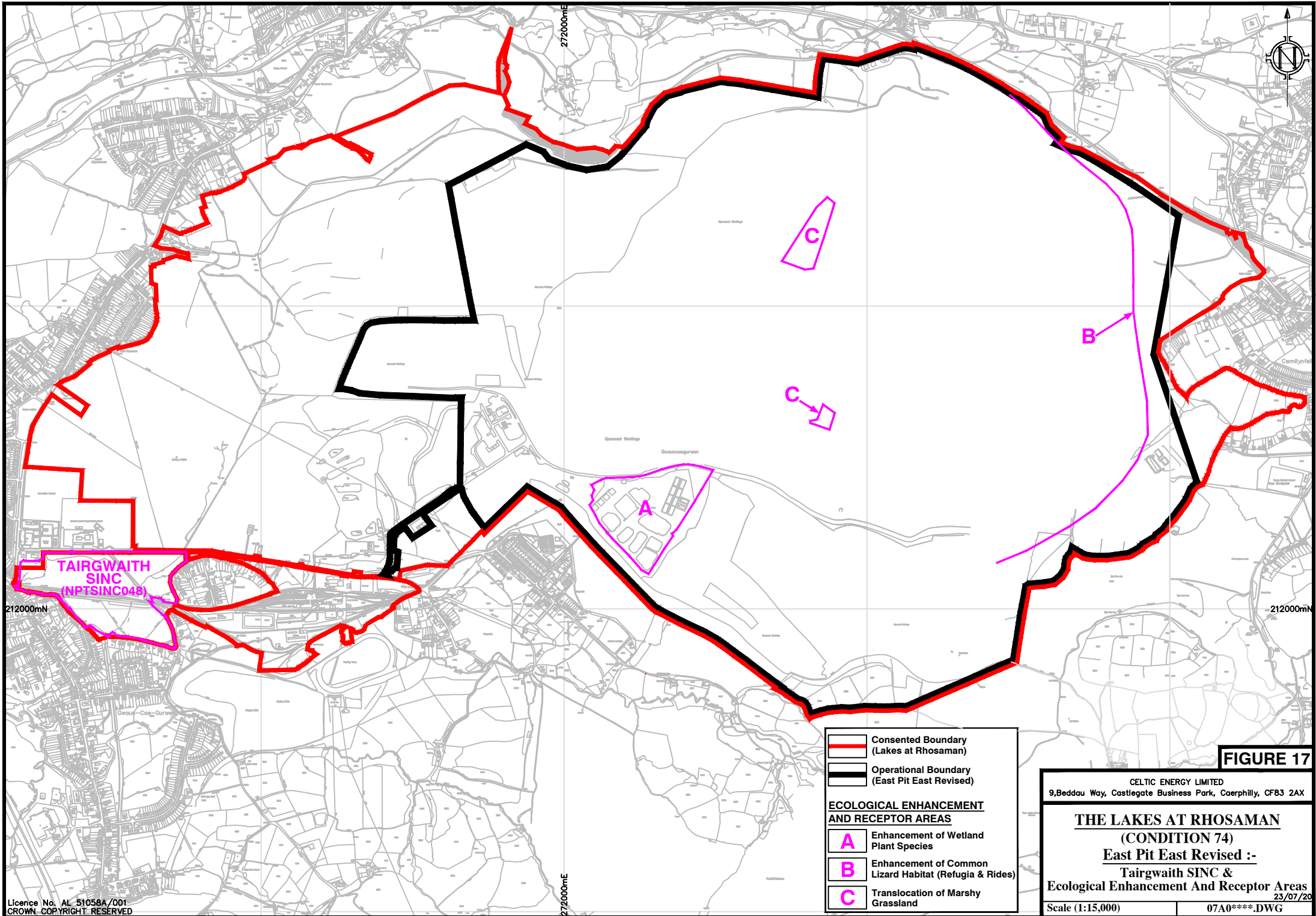
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	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

FIGURE 16e

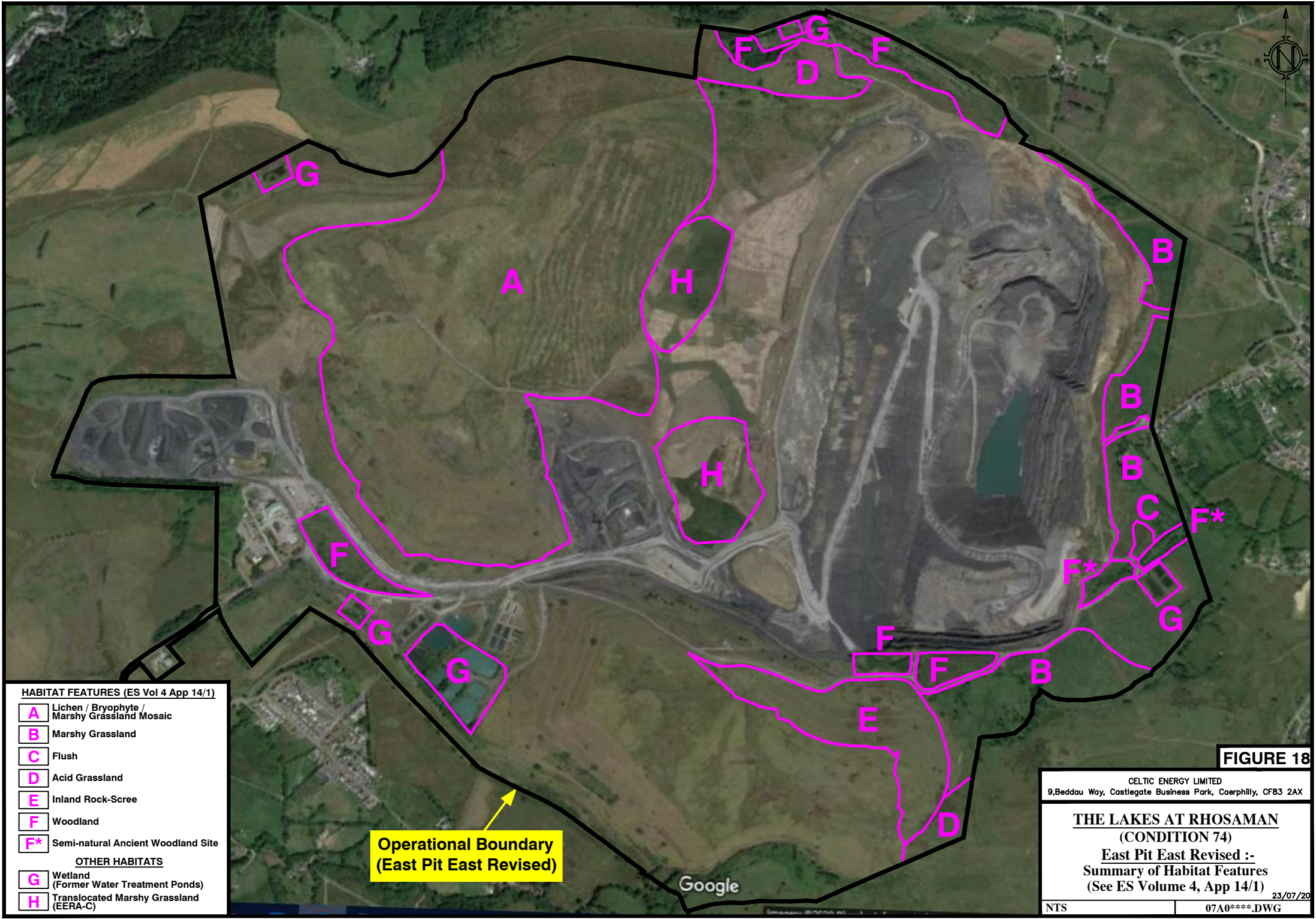
CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
<u>THE LAKES AT RHOSAMAN</u> (CONDITION 74)	
East Pit East Revised :- Creation of Wetland & Drinking Ponds	
Scale (1:5,000)	23/07/20 07A0****.DWG

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	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)
ECOLOGICAL ENHANCEMENT AND RECEPTOR AREAS	
A	Enhancement of Wetland Plant Species
B	Enhancement of Common Lizard Habitat (Refugia & Rides)
C	Translocation of Marshy Grassland

FIGURE 17	
CELTIC ENERGY LIMITED 9,Beddau Way, Castlegate Business Park, Coerphilly, CF83 2AX	
THE LAKES AT RHOSAMAN (CONDITION 74) East Pit East Revised :- Taigrwaith SINC & Ecological Enhancement And Receptor Areas	
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HABITAT FEATURES (ES Vol 4 App 14/1)

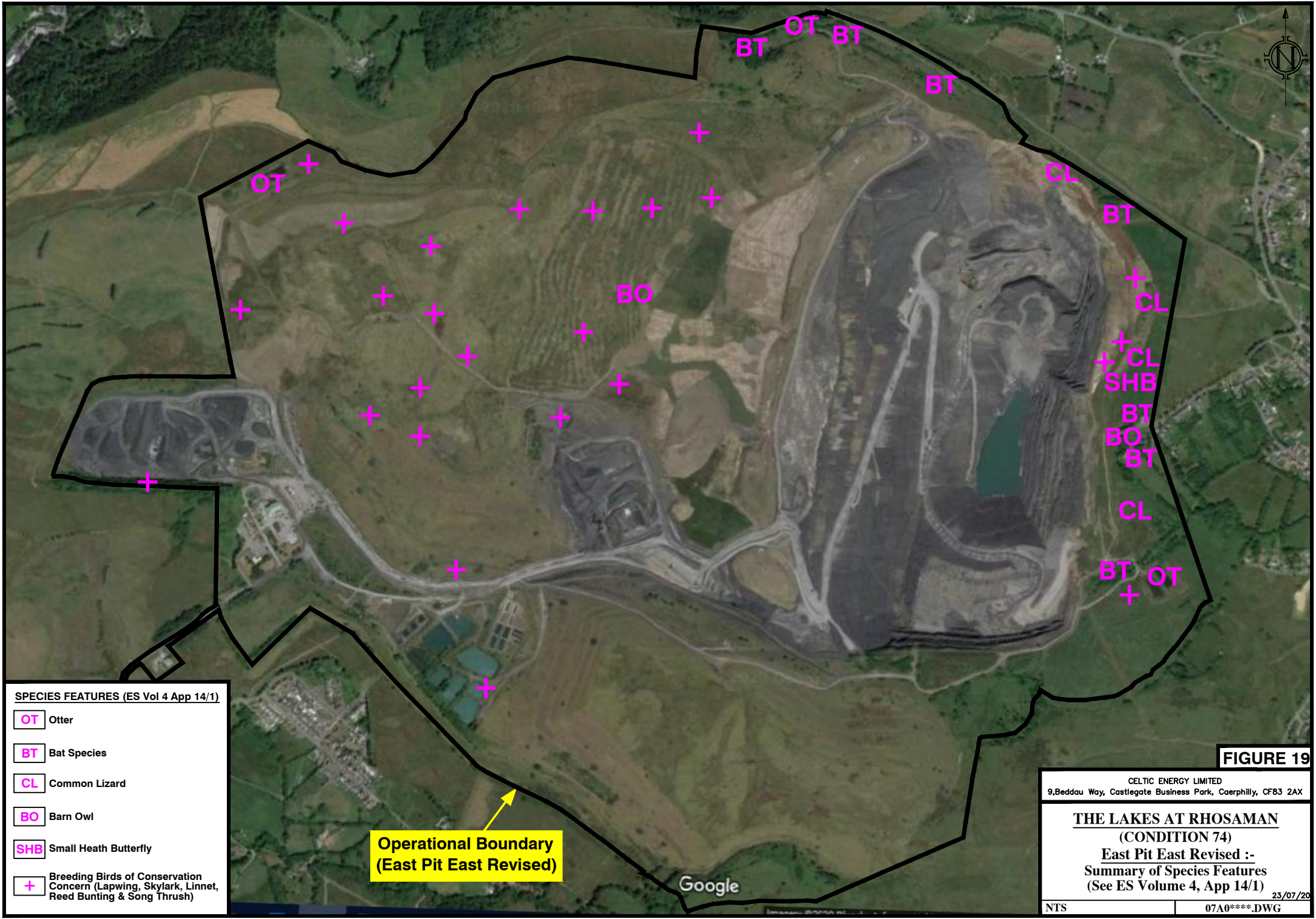
- A** Lichen / Bryophyte / Marshy Grassland Mosaic
- B** Marshy Grassland
- C** Flush
- D** Acid Grassland
- E** Inland Rock-Scree
- F** Woodland
- F*** Semi-natural Ancient Woodland Site

OTHER HABITATS

- G** Wetland (Former Water Treatment Ponds)
- H** Translocated Marshy Grassland (EERA-C)

**Operational Boundary
(East Pit East Revised)**

FIGURE 18



SPECIES FEATURES (ES Vol 4 App 14/1)

- OT** Otter
- BT** Bat Species
- CL** Common Lizard
- BO** Barn Owl
- SHB** Small Heath Butterfly
- +** Breeding Birds of Conservation Concern (Lapwing, Skylark, Linnet, Reed Bunting & Song Thrush)

**Operational Boundary
(East Pit East Revised)**

FIGURE 19

CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

**THE LAKES AT RHOSAMAN
(CONDITION 74)
East Pit East Revised :-
Summary of Species Features
(See ES Volume 4, App 14/1)**

23/07/20

Appendix 1



GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 3:

Excavation of Soil Storage Mounds with Excavators and Dump Trucks

Issued by the Farming and Rural Conservation Agency, Cambridge

April 2000

MAFF FOREWORD

Standards of restoration of minerals and waste sites have steadily improved in recent years, with operators increasingly aware of their environmental responsibilities. The industry is putting forward more imaginative restoration concepts to a variety of afteruses, and is more aware than ever that it will be judged on the standard of that restoration, and the sustainability of the development.

Sustainable mineral development means balancing economic, environmental and social needs, whilst using resources wisely. The UK Strategy for Sustainable Development recognises the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development*.

Improved restoration standards have sometimes enabled planning permission to be given for best and most versatile agricultural land to be worked for minerals, on the basis that it can be restored in a way that safeguards its long-term agricultural potential**. Inherent in these high standards of restoration is the requirement to handle soils in such a way that damage to their structure is minimised. It is the aim of this Guide to provide comprehensive advice on soil handling “Good Practice” to operators, soil moving contractors, consultants and planning authorities.

The Guide is in the form of 15 Sheets giving advice on soil stripping, the forming and taking down of soil storage mounds, and soil replacement operations using excavators, earth scrapers or bulldozers. There are also four Guidance Sheets on remedial works involving the removal of stones and damaging materials, and decompaction during the replacement operations.

This document should be cited as MAFF (2000), Good Practice Guide for Handling Soils (version 04/00). FRCA, Cambridge.

Any views expressed in the guidance are those of the consultant and do not necessarily represent the view of the Ministry of Agriculture, Fisheries and Food.

*(DETR, A Better Quality of Life, May 1999, paragraphs 6.66 and 8.50)

**MPG7 (November 1996, paragraph 3).

Acknowledgements

The Guide was written and prepared by Dr R N Humphries of Humphries Rowell Associates, Charnwood House, Loughborough, LE11 3NP, UK. The art work was by R Shenton of H J Banks & Co.

SHEET 3 EXCAVATION OF SOIL STORAGE MOUNDS WITH EXCAVATORS & DUMP TRUCKS

The purpose of this Guidance Sheet is to provide a model method for best practice where excavators and dump trucks are used to excavate soil storage mounds. This Guidance Sheet comprises 4 pages of text, 3 figures and a user response form.

The model may need to be modified according to site conditions or requirements of the Planning Authority. Where this is the case, deviation from the model should be recorded with reasons. The guidance does not specify the type, size or model of equipment, but this should have been agreed as part of the planning conditions or as a reserved matter. The machines should be of a kind which will cause the minimum compaction whilst being operationally efficient (eg wide tracked), and must be well maintained at all times.

Persons involved in the handling of soils, overburden etc., and in the construction or removal of mounds or tips, must comply with the Health and Safety at Work Etc. Act 1974 and its relevant statutory provisions, and in particular those aspects which relate to the construction and removal of tips, mounds and similar structures. This requirement takes preference over any suggested practice in the Sheets.

The user of these guidelines is solely responsible for all liabilities that might arise. No liabilities are accepted for any losses of any kind arising from the use of this guidance.

This soil handling method uses back-acting excavators to load the soil in to dump trucks (articulated or rigid bodied) for transport to the replacement areas.

The soil handling method can affect the agricultural quality of the restoration through severe soil deformation (compression and smearing). This is primarily caused through trafficking, the effects of which increases with increasing soil wetness.

The advantage of this model method, if correctly carried out, is that it should avoid severe deformation of the soil as trafficking is minimised. However, where the soil has been stored in multi-tier mounds there will be a need for decompaction treatment during the excavation operation (see below and Sheet 18).

The key operational points to ensure avoidance of severe soil deformation are as follows:

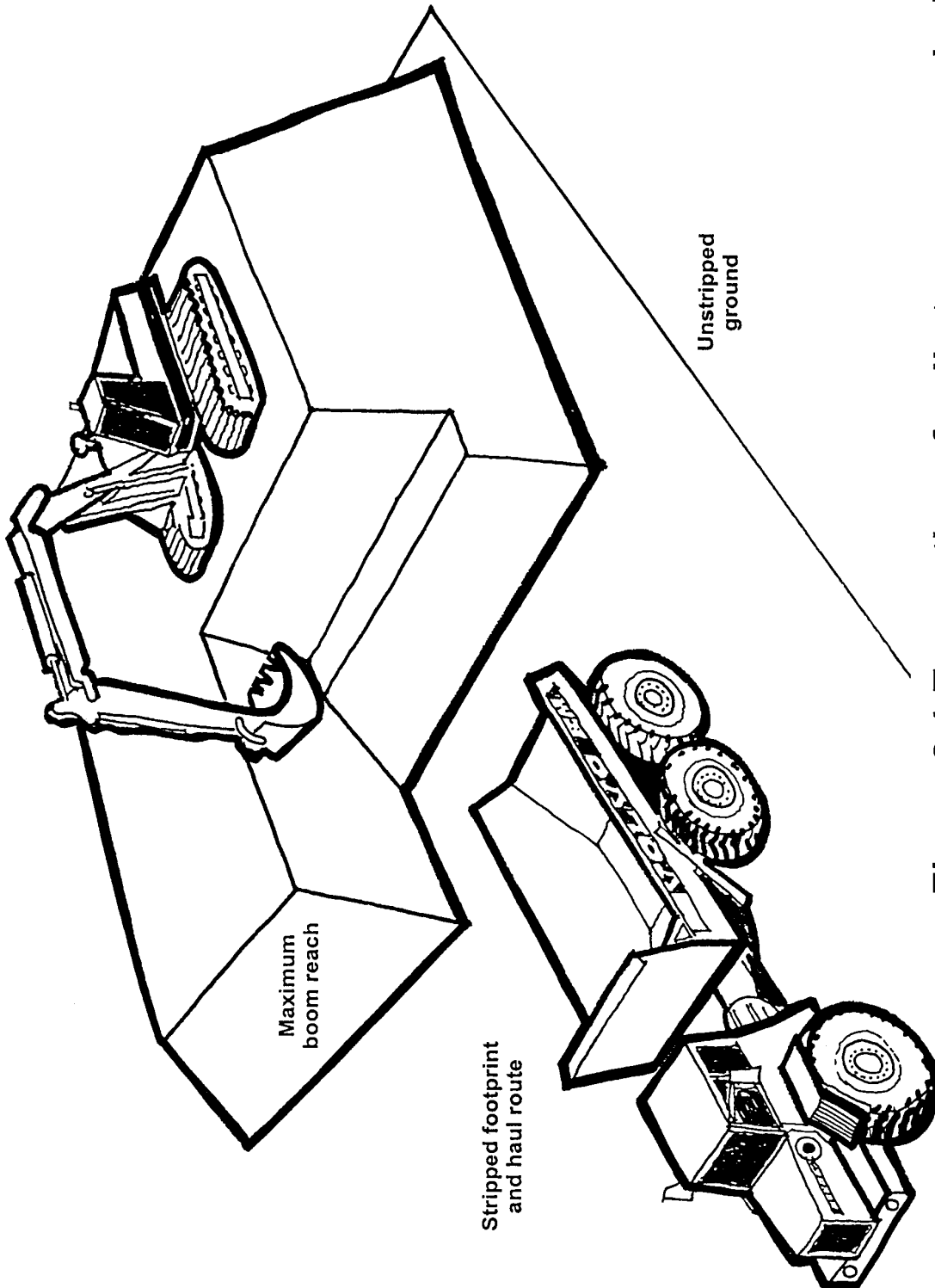
- (i) To minimise compaction:
 - the dump trucks must only operate on the 'basal'/non-soil layer, and their wheels must not on any circumstances run on to the soil in store.
 - the excavator should only operate on the soil mound.
 - the machines are to only work when ground conditions enable their maximum operating efficiency.
 - when excavating the multi-tier mounds, excavate tier by tier starting with the uppermost, trafficking is to be confined to the upper surface of the next tier.
 - if compaction has been caused then measures are required to treat it before it is loaded into the trucks (see below and Sheet 18).
- (ii) To minimise soil wetness and rewetting:
 - the mound should be shaped to shed water before rainfall occurs and whenever replacement is suspended.
 - measures are required to protect the face of the soil layer from ponding of water and maintain the basal layer in a condition capable of supporting dump trucks.

The Excavation Operation

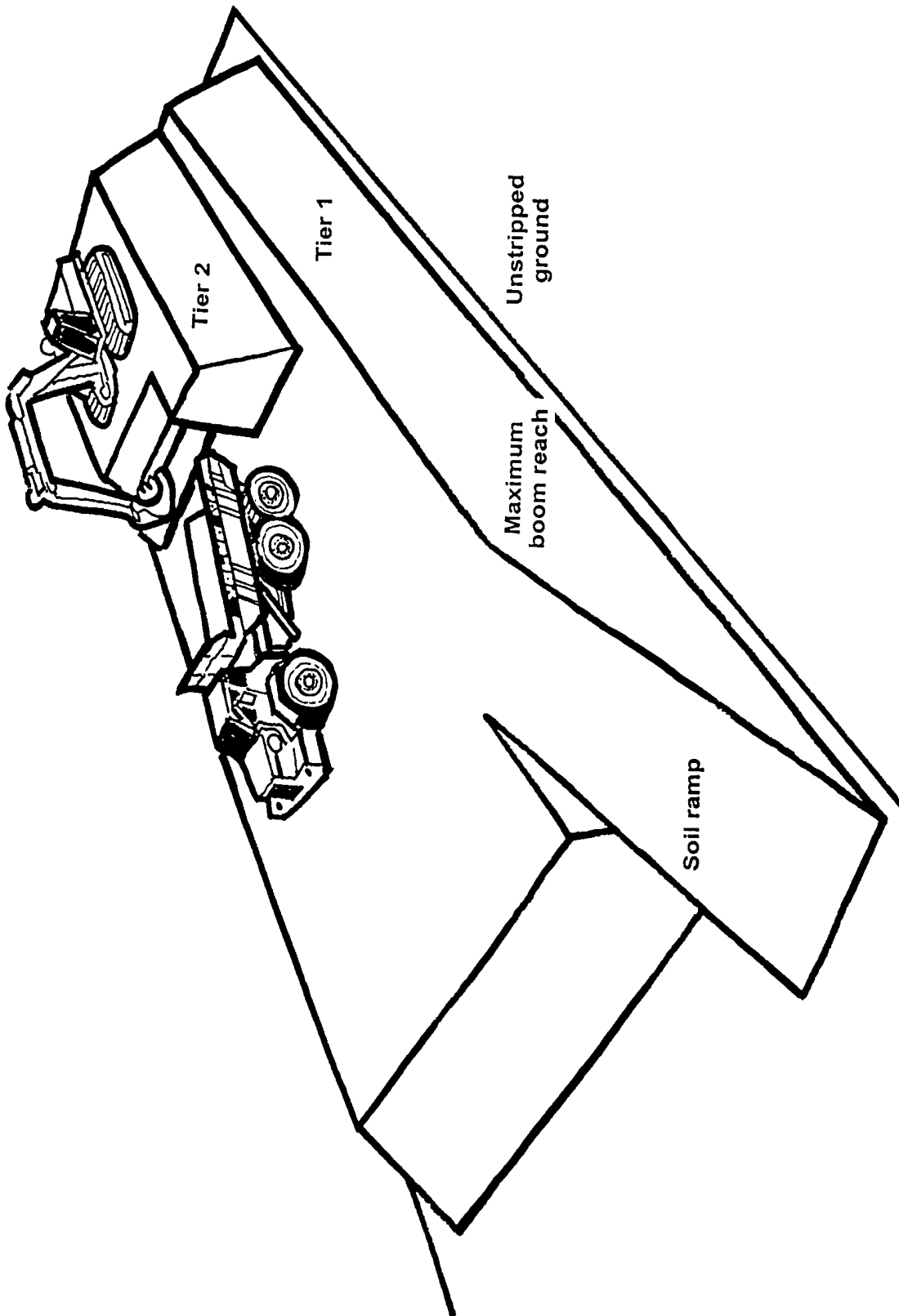
- 3.1 The dump trucks are to travel only on haul routes and in operational area, and both must be maintained. In the case of single tier mounds they must only operate on the basal layer. Detailed daily records should be kept of operations undertaken, and site and soil conditions.
- 3.2 The trucks should enter the storage area and draw alongside the active excavation face. If back-acting excavators are used, they will need to stand on top of the mound to load trucks (Figure 3.1). The mound is to be dug to the base before moving progressively back along its axis.
- 3.3 With multi-tier mounds, the soil should be excavated tier by tier starting with the uppermost tier. This will necessitate the running of the trucks on the stored soil. Excavation should be in the same height of tiers as originally built so that the same surfaces are used for trafficking to minimise further compaction (Figure 3.2). Having removed an upper tier the trafficked layer must be decompacted. This can be achieved by progressively digging the surface as described on Sheet 18 in advance of loading the next layer. It is essential that the digging is effective and this needs to be systematically tested before soil is loaded. The process is repeated for each soil tier.
- 3.4 Any exposed edges/surfaces should be shaped on the onset of rain during the day. All surfaces should be shaped to shed water at the end of each day.
- 3.5 Work should stop in wet conditions with measures undertaken to prevent ponding at the base of the mound and on the basal layer. At the start of each day ensure there is no ponding on the basal layer and operating areas.

Operational Variations

- 3.6 Front loading machines may be used to excavate single tier soil mounds provided that they only operate on the basal layer with the dump trucks (Figure 3.3).
- 3.7 Front loading machines are only to be used for multi-tier mounds if the compacted inter-tier layer has been decompacted at the building stage.



**Figure 3.1 Excavation of soil storage mound with excavators and dump trucks:
Single tier mound**



**Figure 3.2 Excavation of soil storage mound with
excavators and dump trucks:
Multi-tier mounds**

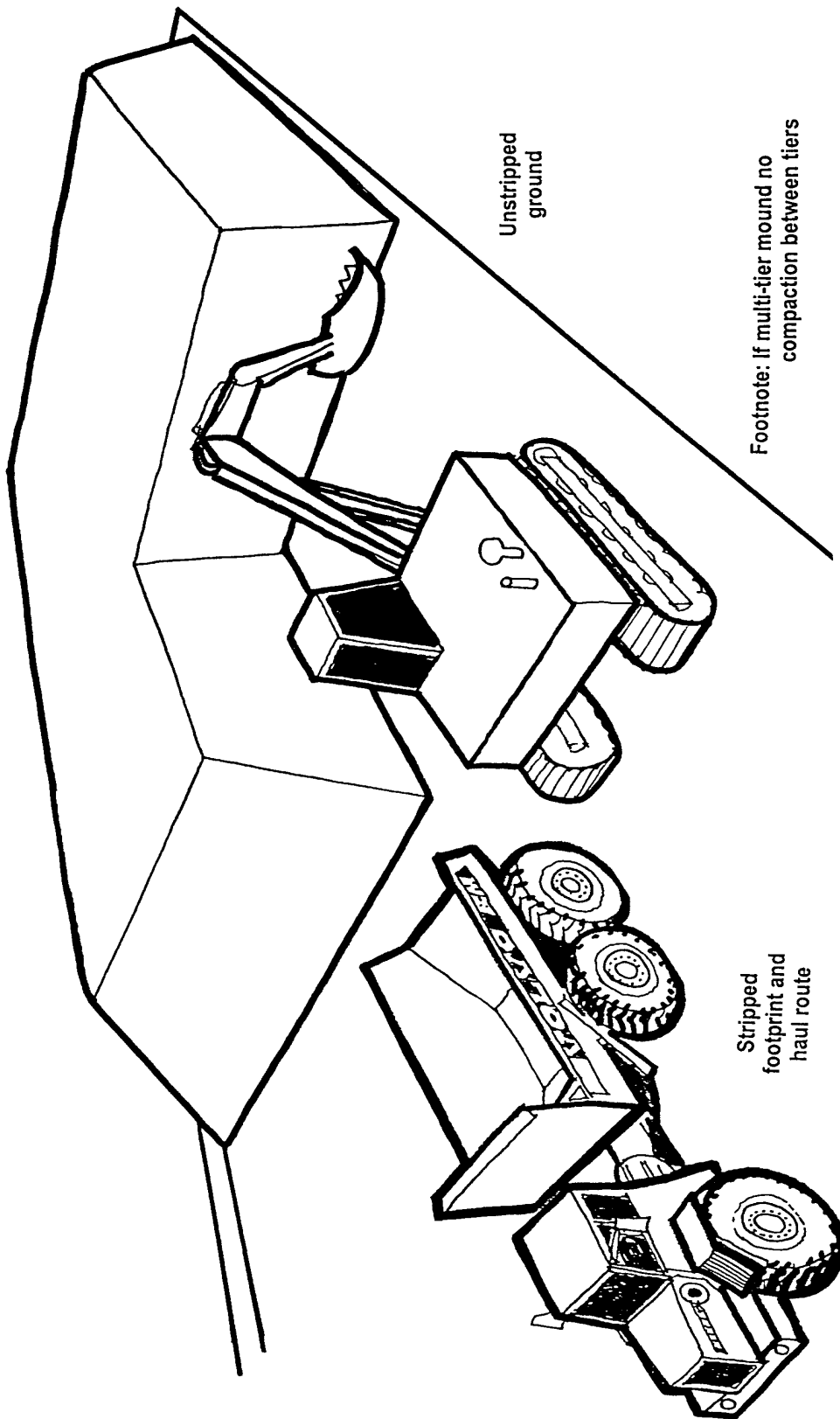


Figure 3.3 Excavation of soil storage mounds with front loading shovels and dump trucks: Single and multi-tier mounds

SHEET 3

Version: 04/00

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GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 4:

Soil Replacement with Excavators and Dump Trucks

Issued by the Farming and Rural Conservation Agency, Cambridge

April 2000

MAFF FOREWORD

Standards of restoration of minerals and waste sites have steadily improved in recent years, with operators increasingly aware of their environmental responsibilities. The industry is putting forward more imaginative restoration concepts to a variety of afteruses, and is more aware than ever that it will be judged on the standard of that restoration, and the sustainability of the development.

Sustainable mineral development means balancing economic, environmental and social needs, whilst using resources wisely. The UK Strategy for Sustainable Development recognises the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development*.

Improved restoration standards have sometimes enabled planning permission to be given for best and most versatile agricultural land to be worked for minerals, on the basis that it can be restored in a way that safeguards its long-term agricultural potential**. Inherent in these high standards of restoration is the requirement to handle soils in such a way that damage to their structure is minimised. It is the aim of this Guide to provide comprehensive advice on soil handling “Good Practice” to operators, soil moving contractors, consultants and planning authorities.

The Guide is in the form of 15 Sheets giving advice on soil stripping, the forming and taking down of soil storage mounds, and soil replacement operations using excavators, earth scrapers or bulldozers. There are also four Guidance Sheets on remedial works involving the removal of stones and damaging materials, and decompaction during the replacement operations.

This document should be cited as MAFF (2000), Good Practice Guide for Handling Soils (version 04/00). FRCA, Cambridge.

Any views expressed in the guidance are those of the consultant and do not necessarily represent the view of the Ministry of Agriculture, Fisheries and Food.

*(DETR, A Better Quality of Life, May 1999, paragraphs 6.66 and 8.50)

**MPG7 (November 1996, paragraph 3).

Acknowledgements

The Guide was written and prepared by Dr R N Humphries of Humphries Rowell Associates, Charnwood House, Loughborough, LE11 3NP, UK. The art work was by R Shenton of H J Banks & Co.

SHEET 4 SOIL REPLACEMENT WITH EXCAVATOR & DUMP TRUCK

The purpose of this Guidance Sheet is to provide a model method for best practice where soils are to be replaced by excavators and dump trucks. This Guidance Sheet comprises 7 pages of text, 4 figures and a user response form.

The model may need to be modified according to site conditions or requirements of the Planning Authority. Where this is the case, deviation from the model should be recorded with reasons. The guidance does not specify the type, size or model of equipment, but this should have been agreed as part of the planning conditions or as a reserved matter. The machines should be of a kind which will cause the minimum compaction whilst being operationally efficient (eg wide tracked), and must be well maintained at all times.

Persons involved in the handling of soils, overburden etc., and in the construction or removal of mounds or tips, must comply with the Health and Safety at Work Etc. Act 1974 and its relevant statutory provisions, and in particular those aspects which relate to the construction and removal of tips, mounds and similar structures. This requirement takes preference over any suggested practice in the Sheets.

The user of these guidelines is solely responsible for all liabilities that might arise. No liabilities are accepted for any losses of any kind arising from the use of this guidance.

This soil handling method uses back-acting excavators in combination with dump trucks (articulated or rigid bodied). An excavator is used to spread the soil tipped from dump trucks used for transportation to replacement areas.

The soil handling method can affect the agricultural quality of the restoration through severe soil deformation (compression and smearing). This is primarily caused through trafficking, the effects of which increases with increasing soil wetness.

The advantage of this model method, if correctly carried out, is that it should avoid severe deformation of the soil as trafficking is minimised. Consequently, there should normally be no need for decompaction treatment during the replacement operation, unless the soils are in a compacted state following stripping or storage. Where compaction occurs at replacement this will need treatment during the replacement process. Also where required, it will be necessary to integrate the removal of stones or damaging materials with the replacement process. Both decompaction and removal of materials are covered in separate Guidance Sheets (16-19).

The early installation of under drainage is strongly recommended. Where required this should either be undertaken sequentially during the replacement of the soils or in the early aftercare period. Until drains are installed it is recommended that the restored land is sown and managed as grassland.

The key operational points to ensure avoidance of severe soil deformation are as follows:

- (i) To minimise compaction:
 - the dump trucks must only operate on the 'basal'/non-soil layer, and their wheels must not on any circumstances run on to the soil layer(s).
 - the excavator must only operate on the basal layer.
 - the adoption of a bed/strip system avoids the need for the trucks and excavator to travel on the soil layers.
 - the machines are to only work when ground conditions enable their maximum operating efficiency.
 - if compaction has been caused, then measures are required to treat it (see Sheets 18 & 19).

- (ii) To minimise soil wetness and rewetting:
 - the bed/strip system provides a basis to regulate the exposure of lower soil layers to periods of rain and a means of maintaining soil moisture contents. The soil profile within the active strip should be completed to the topsoil layer before rainfall occurs and before replacement is suspended.
 - measures are required to protect the face of the soil layer from ponding of water and maintain the basal layer in a condition capable of supporting dump trucks.

The Replacement Operation

- 4.1 The area to be restored is to be protected from in-flow of water, ponding etc. Wet sites must be drained in advance. Before the operation starts the basal layer should be to level and clean.
- 4.2 Prior to commencing operations a Meteorological Office forecast should be obtained which gives reasonable confidence of soil replacement proceeding without interruptions from rainfall events. If significant rainfall occurs during operations, the replacement must be suspended, and where the soil profile has been started it should be replaced to topsoil level. Replacement must not restart unless the weather forecast is expected to be dry for at least a full day.
- 4.3 All machines must be in a safe and efficient working condition at all times. The machines are to only work when ground conditions enable their maximum operating efficiency. The operation should only be carried out when the basal layer supports the machinery without ruts or is capable of repair/maintenance. The operation is to be suspended before traction becomes a problem or the integrity of the basal layer and haul routes fails.

- 4.4 The operation should follow a detailed replacement plan showing soil units to be replaced, haul routes and the phasing of vehicle movements. The soil units should be defined on the site with information to distinguish types and layers, and thickness. Detailed daily records should be kept of operations undertaken (including the removal of stones and other damaging materials, and the results of any assessment of the need for additional decompaction and effectiveness of decompaction work undertaken), and site and soil conditions.
- 4.5 The excavator and dump trucks are only to stand, work and travel on the basal/formation layer.
- 4.6 The soil layers above the base/formation layer are to be replaced in sequential strips with the subsoil layer(s) replaced first, followed by the topsoil layer; each layer being replaced to the specified thickness. The next strip is not to be started until the profile in the current strip is completed. This is often referred to as the 'bed or strip system'. The system involves the progressive sequential laying of the materials in strips across the area to be restored (Figure 4.1).
- 4.7 The initial strip width and axis is to be demarcated. Strip width is determined by excavator boom length less the stand-off to operate; typically about 5-8m. Effective boom length can also reduce with profile heights greater than 1m; at 1.5m the effective reach of the standard boom may result in only 2m wide strips. A wide bucket with a blade and not teeth should be used to spread the soil.
- 4.8 Reverse dump truck up to edge of the current strip and tip the lowest layer (subsoil) soil, without the wheels riding onto the strip (Figure 4.1). The dump truck should not drive away until all the soil is deposited within the strip without spillage over the basal layer; this may require assistance from the excavator to 'dig away' some of the tipped soil (Figure 4.2). The excavator is to spread the tipped soil to full thickness by digging, and the pushing and

pulling action of bucket. Each load of soil should be spread following tipping, before another is tipped. Should the spread soil comprise of large blocks (>300mm), normally these should be broken down by using the excavator bucket to 'slice' the blocks into smaller pieces (see Sheet 18) before the next load is spread. The process is repeated from left to right until the strip is completely covered with the required depth of the soil layer (Figure 4.3). Alternatively, decompaction by ripping should be undertaken once the strip is complete (see Sheet 19). Decompaction work must be completed before the next soil layer is placed.

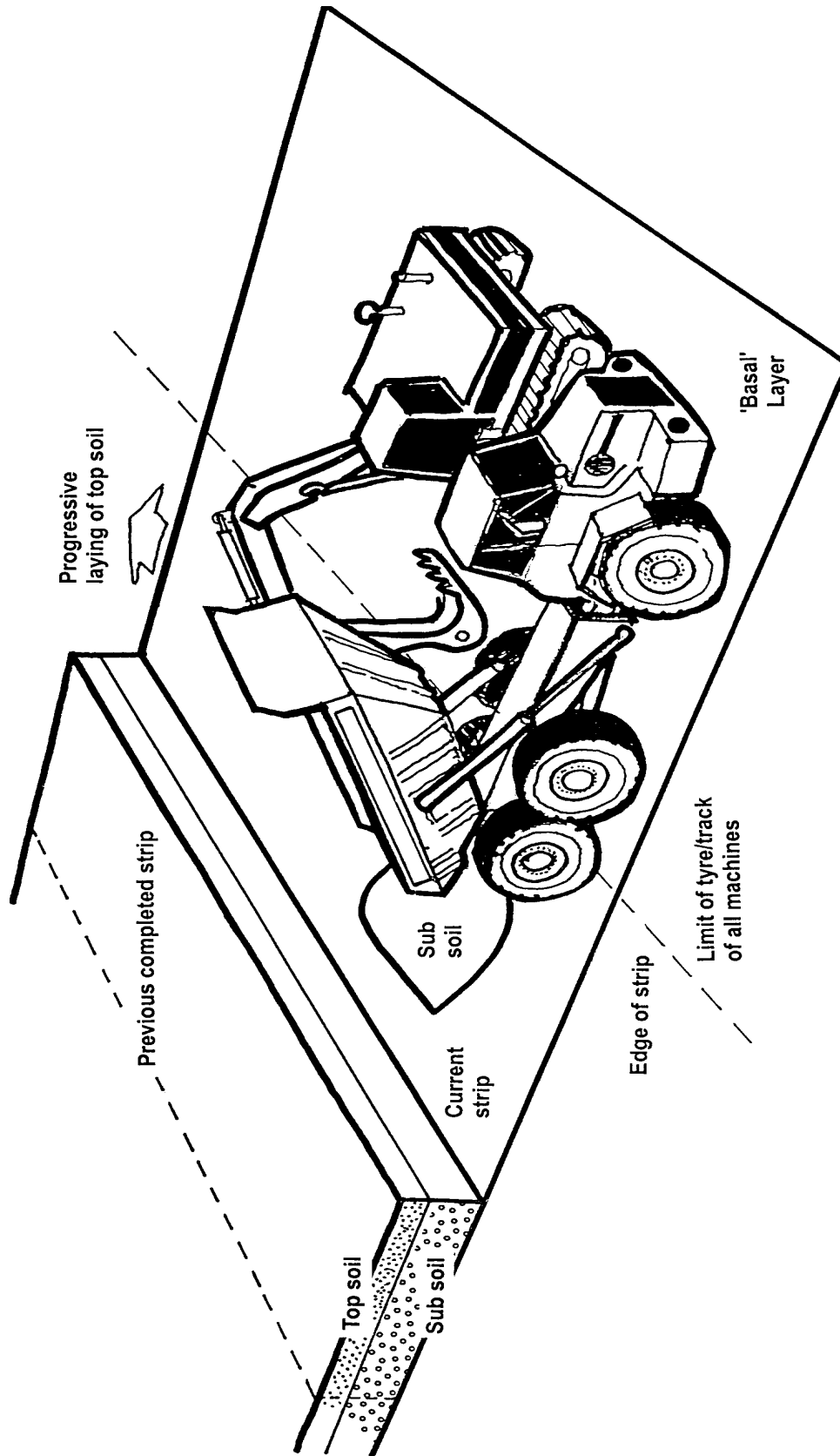
- 4.9 Level boards and soil pits should be used to verify soil thickness in each strip and overall levels. Allowances (ie. a bulking factor) should be made for any settlement that may take place of the replaced loose soil.
- 4.10 Where stones are to be removed as part of the replacement process, normally the method described in Sheet 16 should be used once the strip is complete. An alternative method and one suited to removing potentially damaging materials (eg wire ropes) is described in Sheet 17. These operations must be completed before the next soil layer is placed.
- 4.11 On completion of the lowest (subsoil) layer, repeat the process spreading the next layer (subsoil/topsoil) (Figure 4.4). Tip the soil by reversing to the outer edge of strip/soil previously laid, but without the truck wheels riding onto the already placed layer. The soil is to be spread by the excavator to full thickness by digging, and the pushing and pulling action of bucket described above, and undertaking any necessary decompaction work and removal of stones if using Sheets 16 to 19. Repeat the process progressively (left to right) along the strip and undertake any removal of damaging materials or decompaction. Level boards should be used to verify soil thickness in strip and overall levels.
- 4.12 Where the profile is made up of further soil layers (subsoil/topsoil) the process outlined above should be repeated on completion of the strip.

- 4.13 On completion of topsoil layer the processes outlined above should be repeated for the next strips until the area to be restored is completed. Before the operation starts the basal layer should be to level and clean.
- 4.14 At the end of each day the current strip must be completed if rain is forecast. If during a day it is evident that a full strip cannot be completed, then only start part of a strip; this too must be completed.
- 4.15 At the end of each day, or during the day if interrupted by rain, make provisions to protect base of restored strip from ponding/runoff by sumps and grips, and also clean and level the basal layer. At the start of each day ensure there is no ponding in the current strip or operating areas, and the basal layer is to level with no ruts.

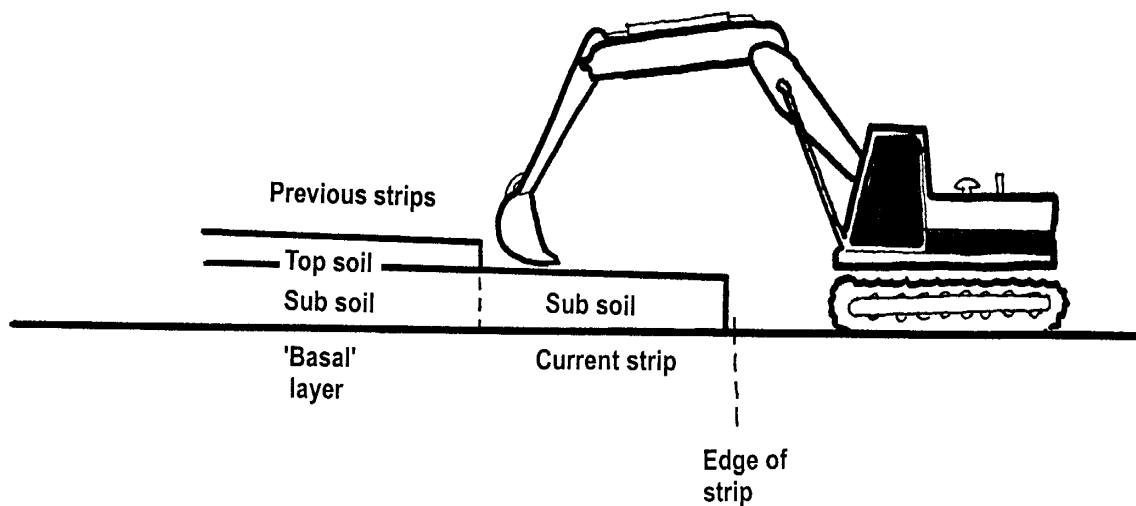
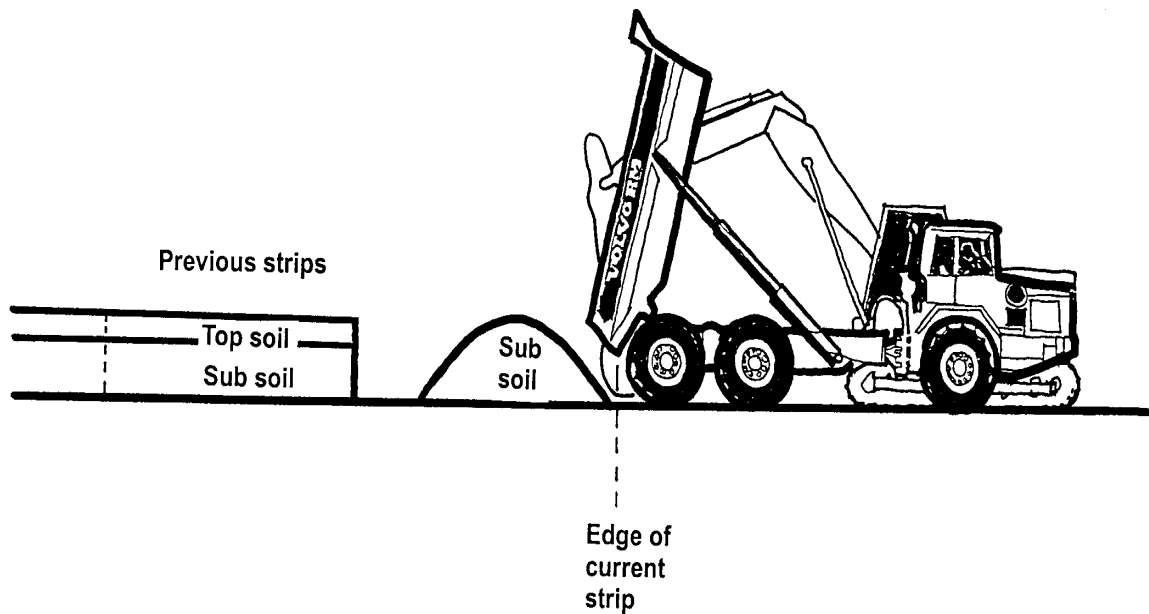
Operational Variations

- 4.16 When the replaced soil profiles reach about 0.6-1m in height it may not be possible to discharge the load from some dump trucks directly onto the previously placed layers because of the height of the dump truck body. The preferred solution is to tip the soil against the partially completed profile as heaps without the dump trucks rising onto or reversing into the placed material. The soil material is then lifted by the excavator onto the profile. It is considered preferable to accept some limited soil losses rather than to contaminate the topsoil with overburden. The loss of topsoil is minimised if the basal/ formation layer is kept to level and clean.
- 4.16 If the basal/formation layer is to be decompacted, before any soil material is placed, each strip is to be firstly decompacted before the subsoil layer is replaced using either methods described in Sheets 18 or 19. The basal layer must only be decompacted in the strip required for soil replacement, and must

only be prepared on the day of soil placement. During this process it may be necessary to use Sheets 16 or 17 for the removal of stones or damaging materials from the decompacted basal layer.



**Figure 4.1 Soil replacement with excavators and dump trucks:
Sub soil layer**



**Figure 4.2 Soil replacement with
excavators - dump trucks
Sub soil layer**

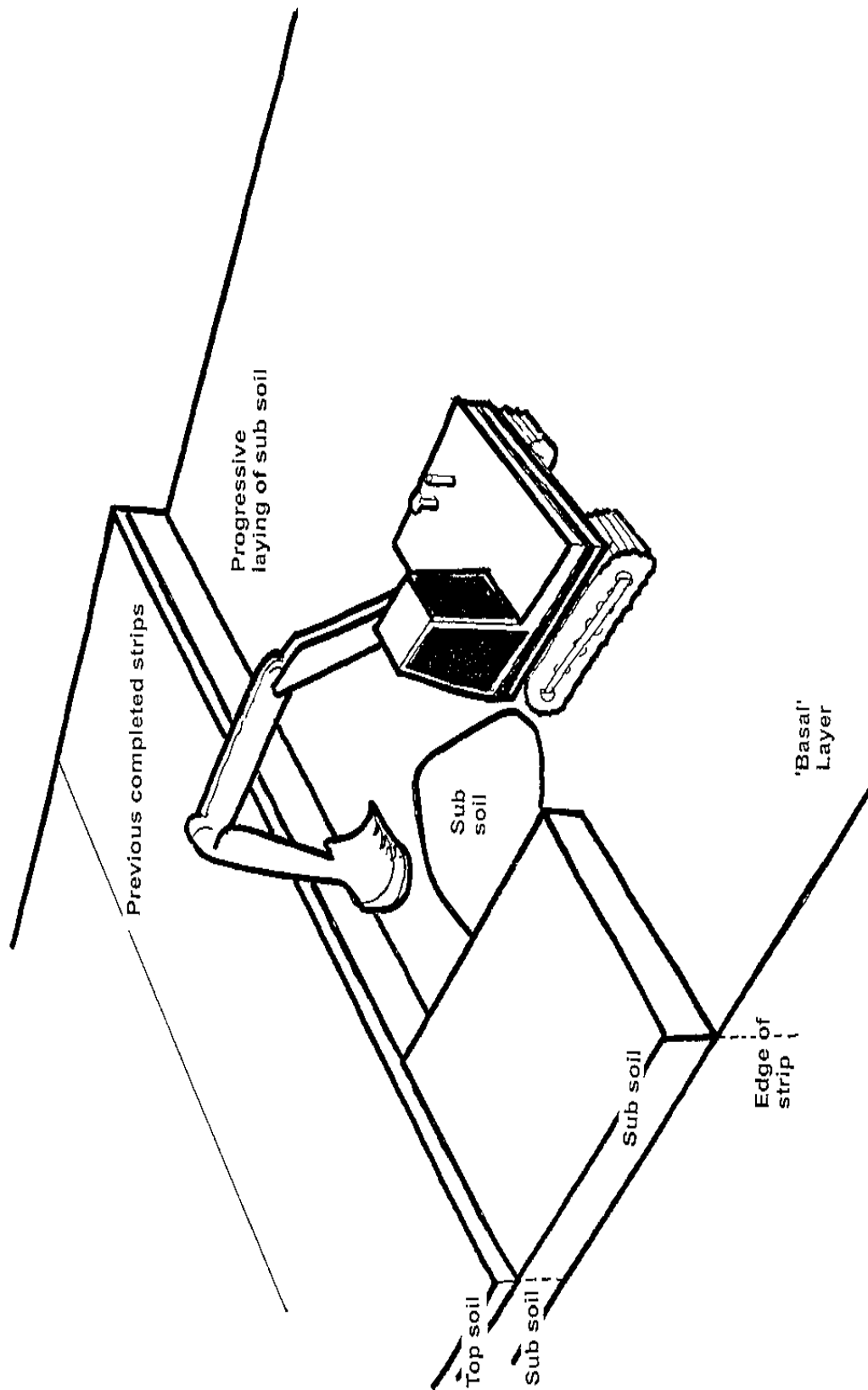


Figure 4.3 Soil replacement with excavators and dump trucks:
Sub soil progressively laid

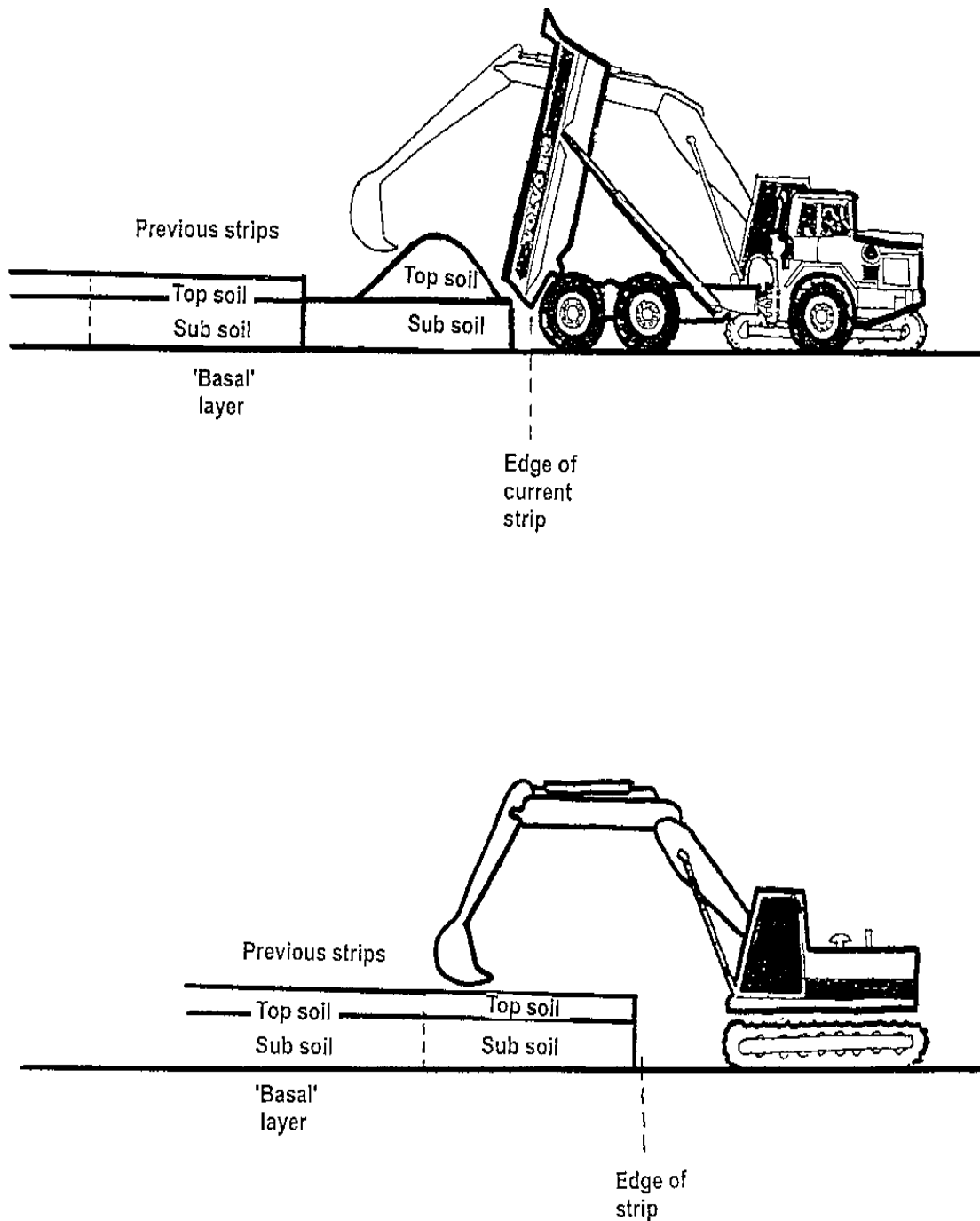


Figure 4.4 Soil replacement with excavators and dump trucks:
Top soil layer

SHEET 4

Version: 04/00

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GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 15:

Soil Replacement with Bulldozers and Dump Trucks

Issued by the Farming and Rural Conservation Agency, Cambridge

April 2000

MAFF FOREWORD

Standards of restoration of minerals and waste sites have steadily improved in recent years, with operators increasingly aware of their environmental responsibilities. The industry is putting forward more imaginative restoration concepts to a variety of afteruses, and is more aware than ever that it will be judged on the standard of that restoration, and the sustainability of the development.

Sustainable mineral development means balancing economic, environmental and social needs, whilst using resources wisely. The UK Strategy for Sustainable Development recognises the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development*.

Improved restoration standards have sometimes enabled planning permission to be given for best and most versatile agricultural land to be worked for minerals, on the basis that it can be restored in a way that safeguards its long-term agricultural potential**. Inherent in these high standards of restoration is the requirement to handle soils in such a way that damage to their structure is minimised. It is the aim of this Guide to provide comprehensive advice on soil handling “Good Practice” to operators, soil moving contractors, consultants and planning authorities.

The Guide is in the form of 15 Sheets giving advice on soil stripping, the forming and taking down of soil storage mounds, and soil replacement operations using excavators, earth scrapers or bulldozers. There are also four Guidance Sheets on remedial works involving the removal of stones and damaging materials, and decompaction during the replacement operations.

This document should be cited as MAFF (2000), Good Practice Guide for Handling Soils (version 04/00). FRCA, Cambridge.

Any views expressed in the guidance are those of the consultant and do not necessarily represent the view of the Ministry of Agriculture, Fisheries and Food.

*(DETR, A Better Quality of Life, May 1999, paragraphs 6.66 and 8.50)

**MPG7 (November 1996, paragraph 3).

Acknowledgements

The Guide was written and prepared by Dr R N Humphries of Humphries Rowell Associates, Charnwood House, Loughborough, LE11 3NP, UK. The art work was by R Shenton of H J Banks & Co.

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SHEET 15 SOIL REPLACEMENT WITH BULLDOZER & DUMP TRUCKS

The purpose of this Guidance Sheet is to provide a model method for best practice where the soils are replaced using bulldozers and dump trucks. This Guidance Sheet comprises 6 pages of text, 3 figures and a user response form.

The model may need to be modified according to site conditions or requirements of the Planning Authority. Where this is the case, deviation from the model should be recorded with reasons. The guidance does not specify the type, size or model of equipment, but this should have been agreed as part of the planning conditions or as a reserved matter. The machines should be of a kind which will cause the minimum compaction whilst being operationally efficient (eg wide tracked), and must be well maintained at all times.

Persons involved in the handling of soils, overburden etc., and in the construction or removal of mounds or tips, must comply with the Health and Safety at Work Etc. Act 1974 and its relevant statutory provisions, and in particular those aspects which relate to the construction and removal of tips, mounds and similar structures. This requirement takes preference over any suggested practice in the Sheets.

The user of these guidelines is solely responsible for all liabilities that might arise. No liabilities are accepted for any losses of any kind arising from the use of this guidance.

This soil handling method uses a bulldozer to replace the soils and dump trucks transport it to the replacement area. If the soil is from store an excavator will be required to load the trucks.

The bulldozer soil handling method can significantly affect the agricultural quality of the restoration through severe soil deformation (compression and smearing). This is primarily caused through unavoidable repeated trafficking over the soils during the lifting and the building and excavating mounds, and on replacement; the effects of

which increases with increasing soil wetness. Consequently, for satisfactory restoration there is a need for effective decompaction treatment during the replacement operation (see Sheet 19). Decompaction treatment is an obligate requirement when soils are handled by bulldozers and dump trucks.

The early installation of under drainage is strongly recommended. Where required this should either be undertaken sequentially during the replacement of the soils or in the early aftercare period. Until drains are installed it is recommended that the restored land is sown and managed as grassland.

There are a number of key operational points to minimise the degree and extent of severe soil deformation and for the effective treatment of the compaction:

- (i) To minimise compaction and optimise decompaction:
 - the dump trucks must only operate on the 'basal'/non-soil layer, and their wheels must not in any circumstances run on to the soil layer(s).
 - the adoption of a bed/strip system minimises the need for the trucks to travel on the soil layers.
 - the machines are to only work when ground conditions enable their maximum operating efficiency.
 - the soils are to be stripped by the bulldozer in as thick layer as possible whilst maintaining their operational efficiency.
 - effective decompaction on soil replacement is a requisite of the bulldozer handling method (see Sheet 19).
 - the soil layers should have a moisture content of 5% or greater below their lower plastic limit*. Moisture content should be assessed by oven

drying* of samples taken from representative locations and mid/lower points of each soil horizon. [*Or as required in the planning conditions.]

- (ii) To minimise the re-wetting of the soil and maximising decompaction effectiveness:
- the bed/strip system provides a basis to regulate the exposure of lower soil layers to periods of rain and a means of maintaining soil moisture contents. The soil profile within the active strip should be replaced to the topsoil layer before rainfall occurs and before replacement is suspended.
 - measures are required to protect the face of the soil layer from ponding of water and maintain the basal layer in a condition capable of supporting dump trucks.
 - the area to receive soil is to be protected from in-flow of water, ponding etc. Wet sites should be drained in advance.

The Replacement Operation

- 15.1 The area to be restored is to be protected from in-flow of water, ponding etc. Wet sites must be drained in advance. Before the operation starts the basal layer should be to level and clean.
- 15.2 Prior to commencing operations a Meteorological Office forecast should be obtained which gives reasonable confidence of soil replacement proceeding without interruptions from rainfall events. If significant rainfall is forecast or occurs during operations, the replacement must be suspended, and where the soil profile has been started it should be replaced to topsoil level.

Replacement must not restart unless the weather is expected to be dry for at least a full day.

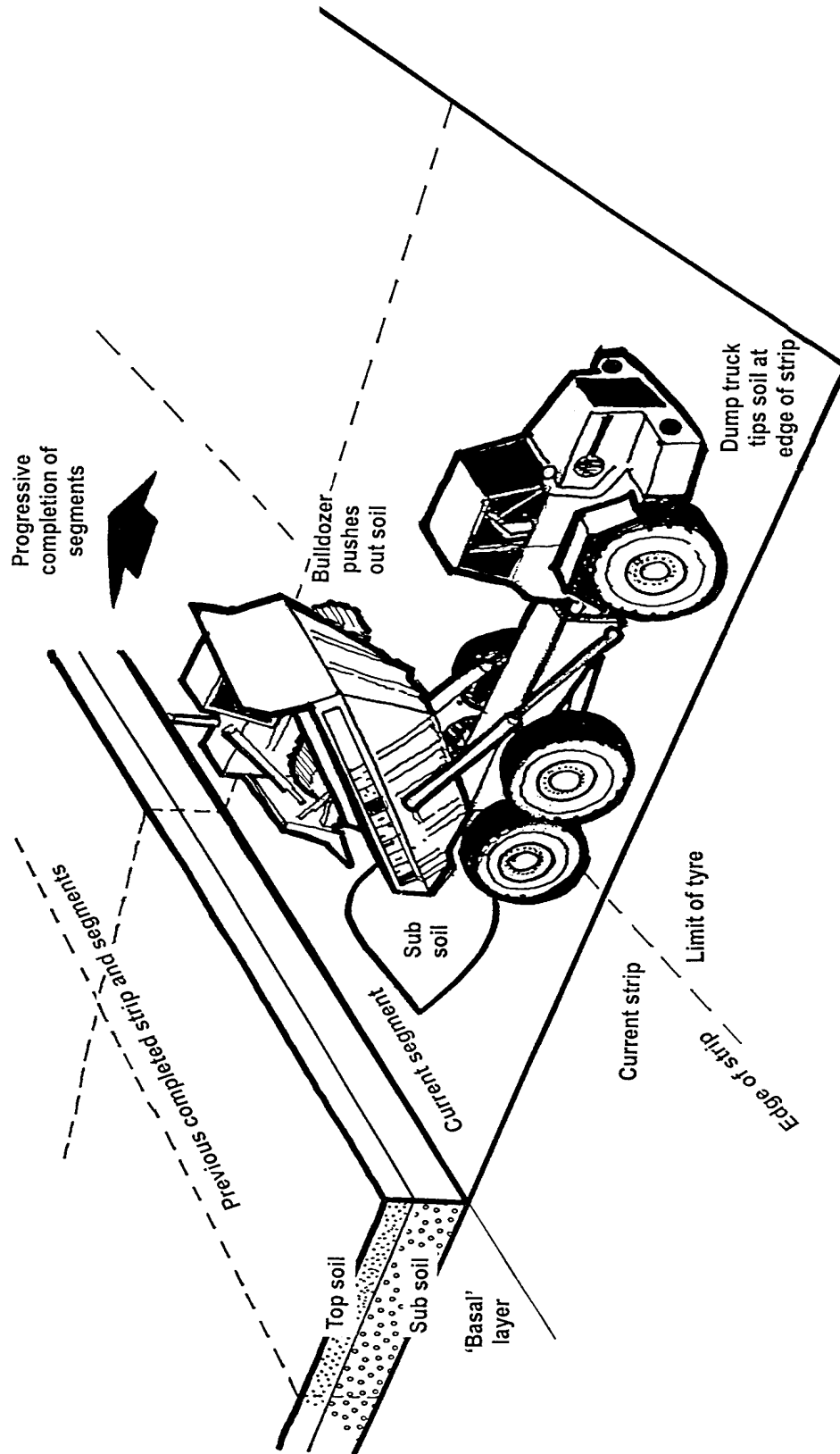
- 15.3 All machines must be in a safe and efficient working condition at all times. The machines are to only work when ground conditions enable their maximum operating efficiency. The operation should only be carried out when the basal layer supports the machinery without ruts or is capable of repair/maintenance. The operation is to be suspended before traction becomes a problem or the integrity of the basal layer and haul routes fails. All haul routes should be maintained.
- 15.4 The operation should follow a detailed replacement plan showing soil units to be replaced, haul routes and the phasing of vehicle movements. The soil units should be defined on the site with information to distinguish types and layers, and thickness. Detailed daily records should be kept of operations undertaken (including the removal of stones and damaging materials, and the results of any assessment of the need for additional decompaction and the effectiveness of decompaction work undertaken), and site and soil conditions.
- 15.5 The dump trucks are only to stand, work and travel on the basal/formation layer. Only the bulldozer is to operate on the soil layers to spread the soil.
- 15.6 The soil layers above the base/formation layer are to be replaced in sequential strips with the subsoil layer(s) to be replaced first, followed by the topsoil layer; each layer being replaced to the specified thickness. The next strip is not to be started until the current strip is completed. This is often referred to as the 'bed or strip system'. The system involves the progressive sequential laying of the materials in strips across the area to be restored (Figure 15.1).
- 15.7 Demarcate the initial strip width (15-20m) and axis, divide strip into 20m long segments. The haul routes should be clearly defined.

- 15.8 Reverse the dump truck to the edge of the current strip and tip the lowest layer (subsoil) soil at the edge of the strip. The bulldozer is used to spread the lower subsoil to full thickness, and in the thickest layers as possible from front to back of strip (Figure 15.2). This is undertaken progressively until the whole segment is complete, and then repeated in each segment until the strip is complete with the full depth of subsoil.
- 15.9 Level boards and soil pits should be used to verify soil thickness in each strip and overall levels. Allowance (ie. bulking factor) should be made for any 'heave' that may take place when the soil is decompacted.
- 15.10 The ripping strategy needs to be determined at the planning of operations and must take into account the thickness of soil layers, depth of recompaction and the effective depth of the ripping tool (Sheet 19), and the need for the removal of stones and other damaging materials (Sheet 17). These should be specified in the soil replacement plan. Decompaction and removal of materials should only take place when each specified soil layer is completed along the strip, and the work must be completed before the next layer of soil is placed.
- 15.11 On completion of the lowest layer (subsoil) across the whole strip, repeat the process sequentially spreading the next layers (subsoil/topsoil) (Figure 15.3). If the dump trucks have to rise on the already placed lower layers, this must be limited to the rear wheels only. The above decompaction operations must be arranged to treat the compacted strip margins.
- 15.12 On completion of the topsoil layer the above processes should be repeated for the next strips until the area to be restored is completed. Before the operation starts the basal layer should be to level and clean.
- 15.13 At the end of each day the current strip/segment must be completed if rain is forecast. If during a day it is evident that a full strip cannot be completed, then ensure the current segment is completed.

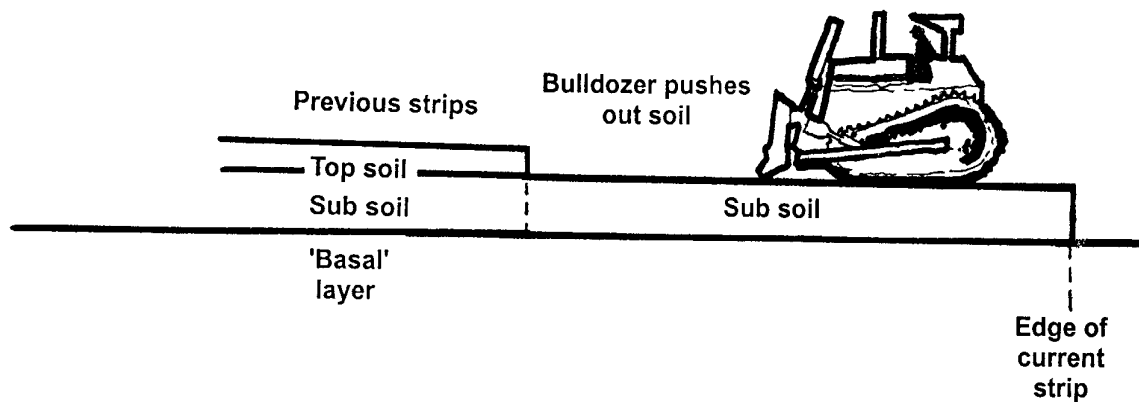
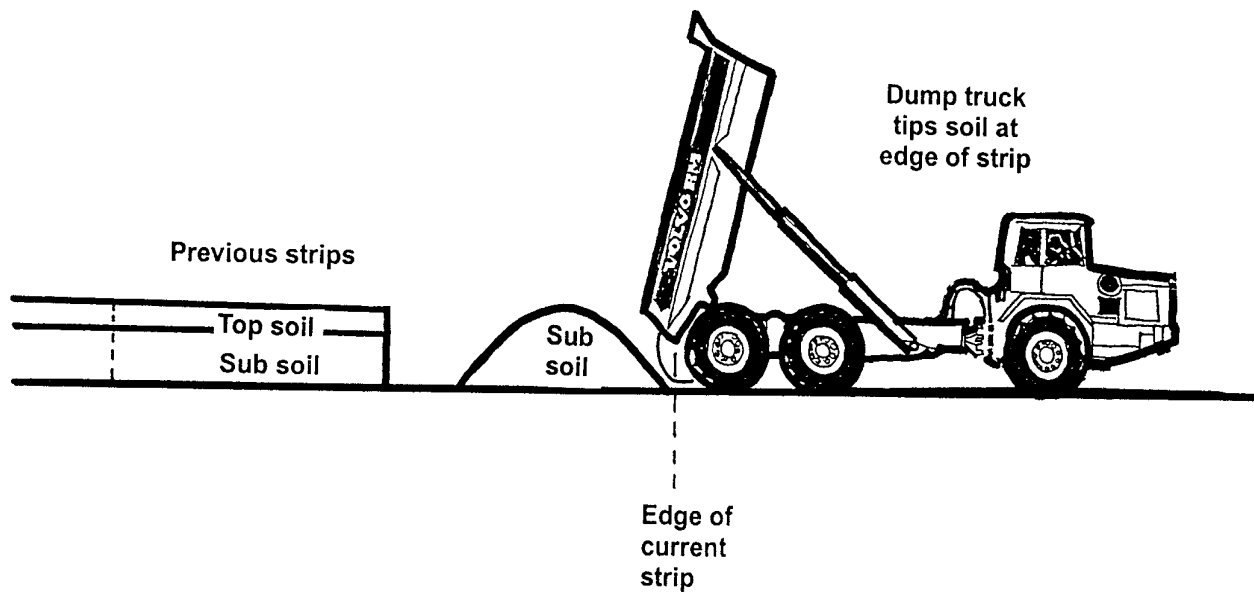
- 15.14 At the end of each day, or during the day if interrupted by rain, make provisions to protect the base of the restored strip from ponding/run-off by sumps and grips, and also clean and level the basal layer. At the start of each day ensure there is no ponding in the current strip or operating areas, and the basal layer is to level with no ruts.

Operational Variation

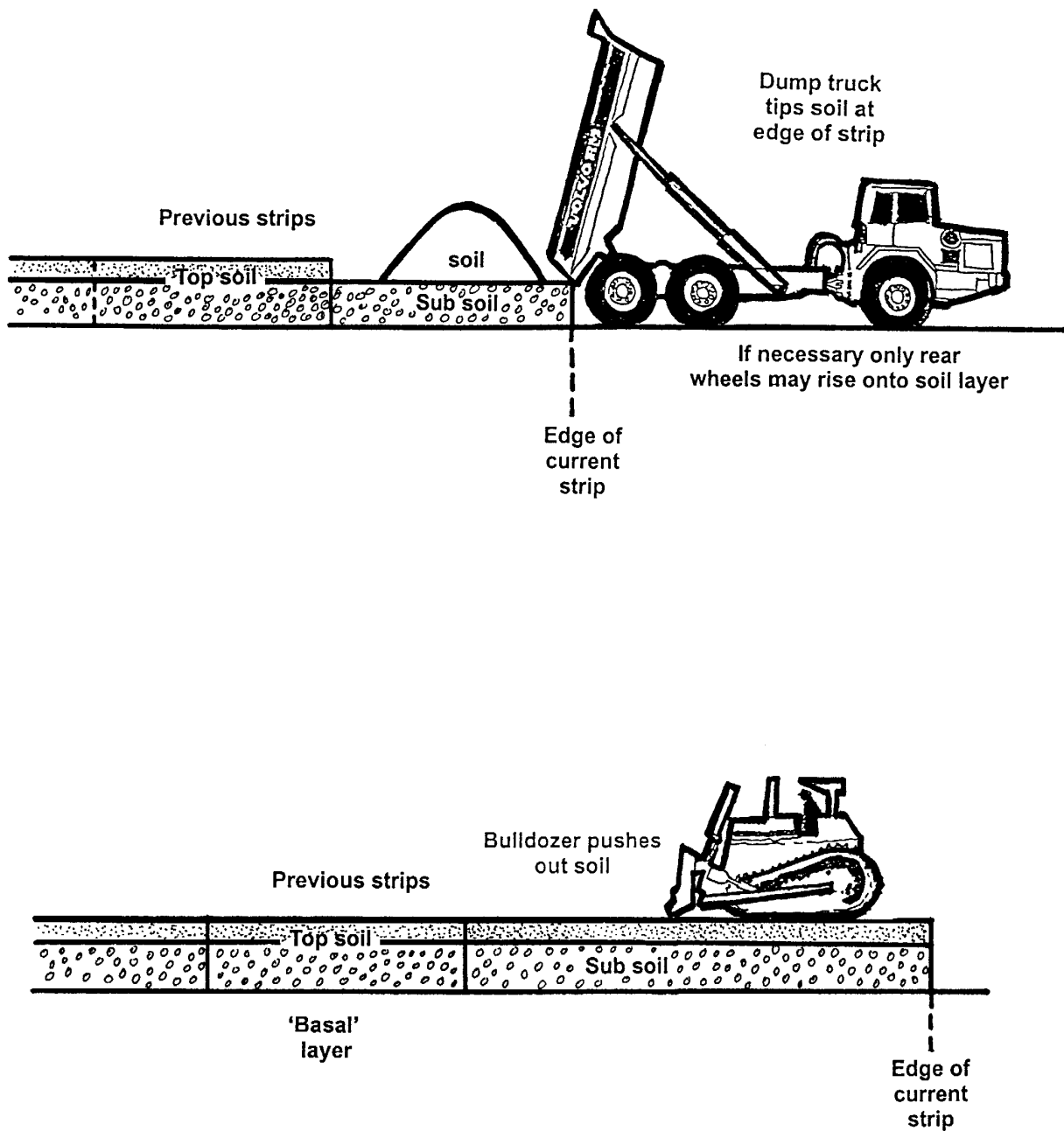
- 15.15 If the basal/formation layer is to be decompacted, before any soil material is placed, each strip is to be firstly decompacted before the subsoil layer is replaced. Decompaction is dealt with in Sheet 19, which covers strategies, equipment and methods of operation. The basal layer must only be decompacted in the strip required for soil replacement, and must be prepared on the day of soil placement. During this process it may be necessary to use Sheet 17 for the removal of stones or damaging materials from the basal layer.



**Figure 15.1 Soil replacement by bulldozers
and dump trucks:
Sub soil layer**



**Figure 15.2 Soil replacement by bulldozers
and dump trucks:
Sub soil layer**



**Figure 15.3 Soil replacement by bulldozers
and dump trucks:
Top soil layer**

SHEET 15

Version: 04/00

FEEDBACK

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Agency, Rural Development Team, Government Buildings, Block C, Brooklands Avenue, Cambridge CB2 2BL, UK



GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 16:

Release & Removal of Stones and Damaging Material from Excavator Replaced Soils

Issued by the Farming and Rural Conservation Agency, Cambridge

April 2000

MAFF FOREWORD

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Sustainable mineral development means balancing economic, environmental and social needs, whilst using resources wisely. The UK Strategy for Sustainable Development recognises the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development*.

Improved restoration standards have sometimes enabled planning permission to be given for best and most versatile agricultural land to be worked for minerals, on the basis that it can be restored in a way that safeguards its long-term agricultural potential**. Inherent in these high standards of restoration is the requirement to handle soils in such a way that damage to their structure is minimised. It is the aim of this Guide to provide comprehensive advice on soil handling “Good Practice” to operators, soil moving contractors, consultants and planning authorities.

The Guide is in the form of 15 Sheets giving advice on soil stripping, the forming and taking down of soil storage mounds, and soil replacement operations using excavators, earth scrapers or bulldozers. There are also four Guidance Sheets on remedial works involving the removal of stones and damaging materials, and decompaction during the replacement operations.

This document should be cited as MAFF (2000), Good Practice Guide for Handling Soils (version 04/00). FRCA, Cambridge.

Any views expressed in the guidance are those of the consultant and do not necessarily represent the view of the Ministry of Agriculture, Fisheries and Food.

*(DETR, A Better Quality of Life, May 1999, paragraphs 6.66 and 8.50)

**MPG7 (November 1996, paragraph 3).

Acknowledgements

The Guide was written and prepared by Dr R N Humphries of Humphries Rowell Associates, Charnwood House, Loughborough, LE11 3NP, UK.

SHEET 16 RELEASE & REMOVAL OF STONES AND DAMAGING MATERIAL FROM EXCAVATOR REPLACED SOILS

The purpose of this Guidance Sheet is to provide a model method for best practice where stones and/or potentially damaging materials are to be released from excavator replaced soils (see Sheet 4). This Guidance Sheet comprises 3 pages of text and a user response form.

The model may need to be modified according to site conditions or requirements of the Planning Authority. Where this is the case, deviation from the model should be recorded with reasons. The guidance does not specify the type, size or model of equipment, but this should have been agreed as part of the planning conditions or as a reserved matter. The machines should be of a kind which will cause the minimum compaction whilst being operationally efficient (eg wide tracked), and must be well maintained at all times.

Persons involved in the handling of soils, overburden etc., and in the construction or removal of mounds or tips, must comply with the Health and Safety at Work Etc. Act 1974 and its relevant statutory provisions, and in particular those aspects which relate to the construction and removal of tips, mounds and similar structures. This requirement takes preference over any suggested practice in the Sheets.

The user of these guidelines is solely responsible for all liabilities that might arise. No liabilities are accepted for any losses of any kind arising from the use of this guidance.

This soil handling method uses a back-acting excavator to remove stones and damaging materials (eg. wire rope, concrete blocks) from replaced layers of soil or treated basal layers.

The occurrence of stones and materials can affect the agricultural quality of the restoration, largely through interfering with cultivations.

The advantage of this method, if correctly carried out, is that it should avoid additional deformation of the soil (compaction) as trafficking is avoided.

The key operational points to ensure avoidance of severe soil deformation are as follows:

- (i) To minimise compaction:
 - the excavator must only operate on the basal layer.
 - the operation should only be carried out when the soils are below their plastic limit.
 - the excavator is only to work when ground conditions enable maximum operating efficiency.
 - if compaction is caused, then measures are required to treat it (see Sheet 18).
- (ii) To minimise soil wetness and re-wetting:
 - see Sheet 4.

The Release & Removal Operation

16.1 The removal of large stones (>150mm) from shallow depths of replaced soils (<300mm) is possible using an excavator fitted with a Geith Stone Rake Bucket (R) or similar. This is a slatted bucket with 'teeth' (150mm apart and about 300mm long). The same equipment can be used for the basal/formation layer provided it has been decompacted first, either by an excavator with a standard bucket (see Sheet 18) or ripping with tines (see Sheet 19). Where the stones to be removed are less than 150mm, but greater than 20mm, a specialist stone picking machine should be used. The use of such equipment is generally

only applicable to the topsoil layer. The removal of these smaller stones should be part of the cultivation phase for cropping, and is outside the scope of this document.

- 16.2 The effective removal of materials (wire rope, drums, tree roots, concrete lintels, etc) damaging to aftercare operations (eg. cultivation, under-drainage installation) is generally not effective with the above bucket method. This operation is best undertaken using ripping equipment and practices described in Sheets 17 and 19.
- 16.3 An excavator with a Geith type of bucket 'combs/rakes' the surface to a depth of up to about 200-250mm of each soil layer when it has been replaced to level along the strip, and before the next layer is placed. The combing action is used to release and windrow the stones, and the bucket is used to load them into a dump truck for disposal or utilisation elsewhere.
- 16.4 The combing action serves to level the soil surface and can also break up soil clods. Where the soil is of a very fine texture (clayey) and has a relatively high moisture content, it can be difficult to break down soil clods and release the stones. In these circumstances the stone rake bucket can be ineffective in releasing and removing stones.
- 16.5 Where required, in conjunction with the excavator-dump truck combination, the above is to be integrated into the procedures listed in Sheet 4.
- 16.6 Stone removal from the topsoil layer can be delayed until the whole area has been restored. If this option is adopted the use of the bucket method is not appropriate, and a tine cultivation method should be used followed by removal of the stones by hand or machine. In this situation, a final deep ripping of the soil profile is likely to be required on completion (see Sheet 19).

SHEET 16

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GOOD PRACTICE GUIDE FOR HANDLING SOILS

Sheet 19:

Soil Decompaction by Bulldozer Drawn Tines

Issued by the Farming and Rural Conservation Agency, Cambridge

April 2000

MAFF FOREWORD

Standards of restoration of minerals and waste sites have steadily improved in recent years, with operators increasingly aware of their environmental responsibilities. The industry is putting forward more imaginative restoration concepts to a variety of afteruses, and is more aware than ever that it will be judged on the standard of that restoration, and the sustainability of the development.

Sustainable mineral development means balancing economic, environmental and social needs, whilst using resources wisely. The UK Strategy for Sustainable Development recognises the importance of safeguarding agricultural land to meet the needs of future generations, and minimising the loss of soils to new development*.

Improved restoration standards have sometimes enabled planning permission to be given for best and most versatile agricultural land to be worked for minerals, on the basis that it can be restored in a way that safeguards its long-term agricultural potential**. Inherent in these high standards of restoration is the requirement to handle soils in such a way that damage to their structure is minimised. It is the aim of this Guide to provide comprehensive advice on soil handling “Good Practice” to operators, soil moving contractors, consultants and planning authorities.

The Guide is in the form of 15 Sheets giving advice on soil stripping, the forming and taking down of soil storage mounds, and soil replacement operations using excavators, earth scrapers or bulldozers. There are also four Guidance Sheets on remedial works involving the removal of stones and damaging materials, and decompaction during the replacement operations.

This document should be cited as MAFF (2000), Good Practice Guide for Handling Soils (version 04/00). FRCA, Cambridge.

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*(DETR, A Better Quality of Life, May 1999, paragraphs 6.66 and 8.50)

**MPG7 (November 1996, paragraph 3).

Acknowledgements

The Guide was written and prepared by Dr R N Humphries of Humphries Rowell Associates, Charnwood House, Loughborough, LE11 3NP, UK.

SHEET 19 SOIL DECOMPACTION BY BULLDOZER DRAWN TINES

The purpose of this Guidance Sheet is to provide a model method for best practice where tines are used to decompact soils and basal/formation layers. Tines are most likely to be used for this purpose where soils are replaced by either earth scrapers (towed and self-propelled types) or bulldozers and dump truck combinations. The tines should be drawn by tracked bulldozer and not by wheeled tractor or grader machines. This Guidance Sheet comprises 9 pages of text, 5 figures and a user response form.

The model may need to be modified according to site conditions or requirements of the Planning Authority. Where this is the case, deviation from the model should be recorded with reasons. The guidance does not specify the type, size or model of equipment, but this should have been agreed as part of the planning conditions or as a reserved matter. The machines should be of a kind which will cause the minimum compaction whilst being operationally efficient (eg wide tracked), and must be well maintained at all times.

Persons involved in the handling of soils, overburden etc., and in the construction or removal of mounds or tips, must comply with the Health and Safety at Work Etc. Act 1974 and its relevant statutory provisions, and in particular those aspects which relate to the construction and removal of tips, mounds and similar structures. This requirement takes preference over any suggested practice in the Sheets.

The user of these guidelines is solely responsible for all liabilities that might arise. No liabilities are accepted for any losses of any kind arising from the use of this guidance.

This decompaction method uses a tracked bulldozer to draw tines through the soil layers to relieve compaction and smearing. For this method of decompaction to be effective, there are a number of requirements to be met, in particular the

soil should be in a dry enough condition to be able to shatter and the use of effective equipment.

There are a number of key operational points to maximise the effectiveness of the decompaction treatment:

- (i) To maximise decompaction:
 - the moisture content of the soils should be at least 5% below their plastic limit, or greater than this if so advised.
 - the ripping pattern must be overlapping passes and recompaction at depth must be treated in the ripping strategy.
 - the tines should be sufficiently closely spaced to ensure that full lateral decompaction is achieved with overlapping passes.
 - the use of winged straight tines is recommended.
 - the tine length and width must be compatible with the proposed depth of decompaction, and allow for soil 'heave'.
 - tine and wings must have wear plates and be in good operating condition. Worn and deformed tools must not be used.
 - the towing unit must be capable of pulling the tine combination in an operationally efficient manner, without undue weaving and track slippage.
- (ii) To minimise rewetting:
 - ripping should not be undertaken if significant rainfall is forecast.
 - where the soil profile is partly raised to ground level, the uppermost soil layer should be left in an unripped state. Where the subsoil layer has been ripped, but the topsoil not placed, it should be sealed by blading with a bulldozer. On resumption of operations, the upper and lower layers will required decompacting.

Ripping Strategies

Ripping to decompact soils is an integral part of the soil replacement procedures using towed or self-propelled earth scrapers or bulldozer-dump truck combinations. The primary aim of the ripping strategy is to ensure that there is no significant compaction within the soil profile which might impede root growth or drainage. There are two basic ripping strategies that can be used. These are; when the soil profile is ripped sequentially as the soil layers are built up, or when it is ripped only after the profile is complete. Each have their own limitations and the selection should be matched to the soil profile in question and the specification of the equipment to be used. It may not be possible to treat deep compaction, or even compaction at moderate depth, once the profile has been completed, hence it is essential that the correct strategy is adopted. In some circumstances it may be necessary to adopt a combination of both strategies to achieve satisfactory results.

- (i) Sequential ripping of each layer before next is placed (Figure 19.1a):
 - appropriate when profile/horizon thickness exceeds the effective depth of the tine or capacity of the towing unit being used; a number of sequential rips are required, each layer ripped before the next is placed.
 - the depth of subsequent sequential ripping must relieve any recompaction of the lower layers following the placement of the new overlying layer or other surface operations.
 - appropriate where stones and/or damaging materials are to be released and removed from sub-surface horizons.
 - has to be carried out during the replacement operations.
 - the final surface layer ripping can be delayed (as with (ii) deep ripping approach) until all strips complete and works finished.

- (ii) Single deep ripping on completion of profile (Figure 19.1b):
- appropriate when profile thickness is equivalent to or less than the effective depth of tine and capabilities of towing unit.
 - appropriate where stones and/or damaging materials are absent or need not be removed from sub-surface horizons.
 - appropriate where artefacts or stones need only to be removed from surface topsoil layer, where a shallower surface cultivation would be carried out prior to final ripping.
 - appropriate where sequential ripping has been undertaken and there is still recompaction at depth.
 - final ripping can be delayed until all strips and final works complete, or later in aftercare period.

Equipment

- 19.1 Crawler-tracked tractor units of a minimum 300hp are required. [Expect 30hp/leg or shank on multiple tine beam cultivator to 750mm depth and 100hp/tine three leg or shank to 750mm depth.]
- 19.2 There are two types of ripping units: i) frame-mounted on tractor unit and usually hydraulic operated, and ii) mounted on towed trailers/tool carriers and either cable or hydraulic operated. Control mechanisms have to be matched between tractor unit and tool carriers.

- 19.3 There are two types of tines: straight leg and curved leg. The former is the most commonly used and is the principal tool for decompaction. Straight tines are to be used where there are obstructions or the soils/formation layer is excessively stony. Curved tines are typically used, in combination with straight tines, and set to operate at shallower depth for the purpose of reducing the ‘drag’ resistance of the following straight tines. Often the straight tine is operated in a raked mode (about 10 degrees backwards from the foot) rather than in an upright stance to promote decompaction by uplift and also to reduce drag.
- 19.4 Straight tines (leg) should have a wedge foot (Figure 19.2) at the base to reduce drag, aid penetration and assist with the upward displacement of the soil and shattering effect.
- 19.5 There are two forms of straight tines, those with and those without wings (Figure 19.2). Wings of 250-400mm total span (outer tip to outer tip) are welded either side of the tine leg or foot at angle 20-30 degrees. This is to promote upward displacement and lateral shatter, but also has the effect of significantly increasing drag. Straight tines without wings will require either more overlapping passes or closer spaced tines (the latter will increase drag).
- 19.6 There are two critical dimensions which determine the potential effectiveness of the tines, these are tine length (which determines the potential depth of decompaction) and tine thickness (which determines the potential amount of heave and therefore shatter and decompaction). The achievement of the potential of the ripping tools is dependent on the moisture content of the soil/formation material (it must be dry enough to shatter otherwise the soil material simply deform around the tool).
- 19.7 The length of the tine is the most common limiting dimension of the tool. The length of the tine from the heel of the foot to the base of the tool bar/carrier

less 200/250mm or 30%, whichever is the lesser, is the potential maximum effective ripping depth of the tine (Figure 19.3). The deduction allows for upward displacement of the soil as the tool is drawn through the profile. Without this allowance the soil heave will rise to or above the tool bar and increase drag and reduce the decompaction achieved (Figure 19.3). The most commonly used tines have maximum effective depths of about 500-700mm. Whilst longer tines can be provided these may cause problems with mobility of the tractor unit. One exception is the British Coal specification SIMBA MK IV Ripper with 1.2m carrier borne tines which has a potential effective depth of 900-1000mm.

- 19.8 The width of the tine (front to back) co-determines the potential effective ripping/ decompaction depth, with a ratio of 5 times the width of the tine (Figure 19.2). Typically the width of the tine is 300-400mm, giving a potential effective depth of 1500-2000mm and operationally is not usually a limiting factor. The thickness and width of the tine used is usually determined by other factors, the mechanical stresses imposed by the work undertaken (ie its strength) and the slot dimensions in the tool bar carrier.
- 19.9 The thickness of the tine (typically 40-80mm) contributes significantly to its strength but also to drag. The tine should have a welded wear plate on the leading edge to reduce wear, as should the leading edge of the attached wings (Figure 19.2).
- 19.10 The minimum number of tines must be two, each following the mid point of the tracks of the tractor unit (Figure 19.4). Generally, the most common configuration is three with a tine central to the tractor unit. The tines may be arranged in a straight line or as a triangle with the central tine leading to reduce drag. The tines may or may not have wings, often the central tine may be without wings to reduce drag. Three winged tines are the preferred

configuration. However, straight tines are more appropriate where there are significant artefacts/obstructions, and where soils are excessively stony.

- 19.11 Mixed combinations of curved tines leading straight tines (as a double beam configuration) are an alternative and can potentially achieve more effective lateral shatter.

Decompaction Operations

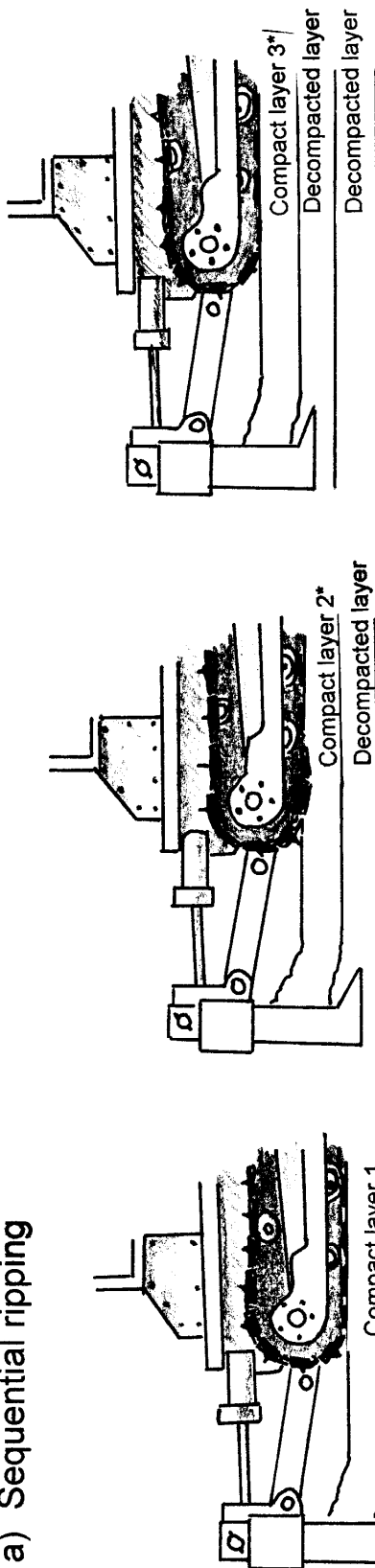
- 19.12 Ripping to decompact materials must only to be undertaken when the soils are dry enough to shatter and must be suspended before the soil become plastic. Ripping should only be undertaken in dry weather and is to be suspended when the tractor unit loses traction/weaves under normal operating conditions. If the soils are inherently wet consideration should be given to deep ripping later following the establishment of a crop to dry out the upper horizons; this may require several successive years of treatment to progressively decompact the profile.
- 19.13 The tines are to be drawn through the basal/formation or soil layer at the required depth according to the decompaction strategy and capability of the equipment and towing equipment. The tines are to be drawn at sufficient and constant speed, and at their optimum angle (rake) to achieve maximum heave with the least drag, and without track slippage or the tractor unit weaving.
- 19.14 The ripping is only to be undertaken both ways along one axis and at an orientation to promote down-slope drainage, but never cross-wise or across slope. Where ripping is in one direction, as down slope on steep gradients, the machinery is to travel back only on unripped ground.

- 19.15 The ripping must achieve the required depth in the first pass without the heave rising above the base of the tool bar (Figure 19.3), the tine is to enter to its full depth on the first pass and all subsequent passes. The area should not be ripped to a shallow depth first and then re-ripped to a greater depth. However, this may be unavoidable in the first pass in order to 'break' ground and reduce resistance to be able to achieve the required penetration. Headlands are to be ripped first to enable quick and full penetration; this is essential at the base of slopes. Ripping must extend into and out of sides of ditches.
- 19.16 Where the final profile thickness is equivalent to or less than the effective depth of the tine, the ripping operation can be undertaken after all the horizon(s) have been laid (Figure 19.1b), except where it is necessary for stones or artefacts to be removed.
- 19.17 Where the profile thickness exceeds the effective depth of the tine, the profile must be ripped in a sequence of successive layers. The ripping is to be undertaken sequentially following the placement of each layer and before the next layer can be laid. This usually takes place after the placement of each horizon (ie lower subsoil, upper subsoil and topsoil) (Figure 19.1a). If the proposed horizon thickness exceeds the effective depth of the ripper tine, then the soil horizon needs to be laid in sub-layers, with each of these being ripped before the next is laid.
- 19.18 In the ripping of successive replaced horizons/layers, allowance must be given to recompaction caused in the lower layers by the laying and spreading of the soil by scrapers or bulldozer. The allowance necessary depends on the soil type and moisture content. For scrapers, recompaction to 400mm should be allowed for in specifying the thickness of the next layer of soil to be placed and decompacted. A minimum of 300mm should be allowed for bulldozers with standard or narrow tracks. The recompacted soil layer must be

decompacted along with the thickness of the new layer laid. This requires the depth of decompaction of the next layer to include the thickness of the recompacted soil layers. The thickness of the new layer that can be laid over the recompacted layer(s) will be governed by the potential effective depth of the tine. Hence, after the laying and decompaction of the first soil layer, subsequent soil layers will have to be laid at shallower thickness (Figure 19.3).

- 19.19 The final decompaction of the topsoil layer should be to the full effective depth of the tine.
- 19.20 In carrying out the ripping operation, each successive pass is to overlap, with the tine on the ripped side bisecting the pass of the outer and central tine of the previous pass (Figure 19.4). Where full depth or lateral consistency of decompaction is not achieved, the overlap should be increased by further bisection.
- 19.21 The degree and consistency of loosened soil must be checked as the ripping is taking place, especially across the junctions between strips (the latter may require inspection by pits). Routine qualitative assessment can be made with a 15mm diameter steel probe with blunt convex end. The probe is pressed in soils at 150mm intervals along a number of transects across the line of ripping, and the depth to penetration and feel of resistance recorded (Figure 19.5). Alternatively soil penetrometers may be used. Both methods should only be used in conjunction with a method of on-site 'calibration' of compactness; this is essential as soil water content and stoniness have a major influence on interpretation.

a) Sequential ripping



*ripping depth to include recompaction in lower layers

b) Final deep rip

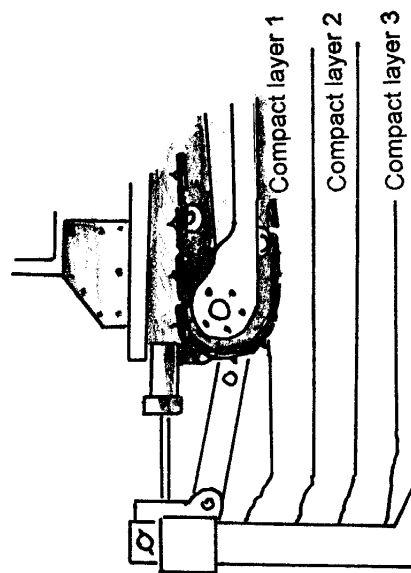


Figure 19.1 Decompaction by bulldozer drawn
tines

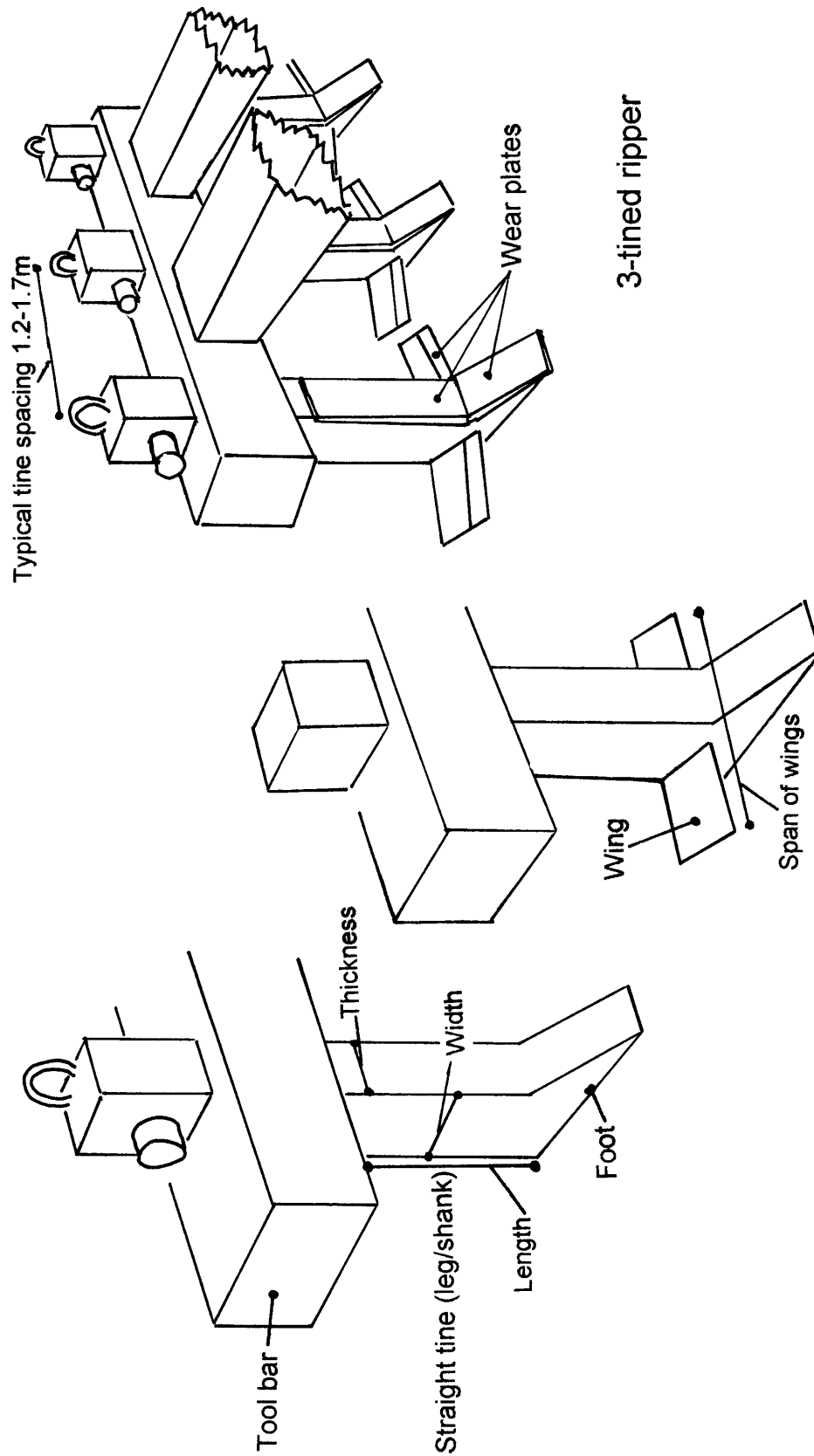
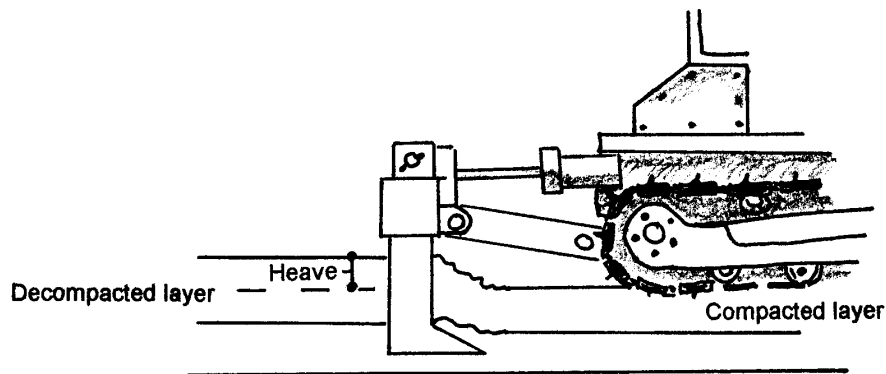
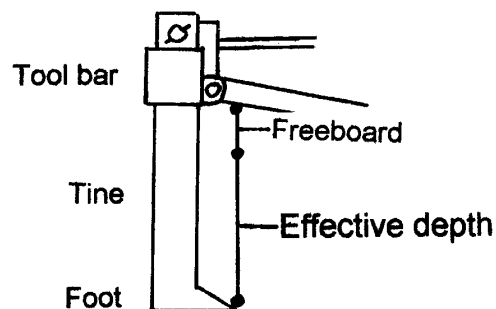


Figure 19.2 Features and critical dimensions of bulldozer drawn tines



Heave = freeboard required below tool bar



Calculation of effective depth of tine of 300mm width & 900mm in length below tool bar:

- i) potential maximum depth of decompaction is 1500mm with tine of 300mm width and 900mm with tine of 900mm length
- ii) potential effective operating depth for first soil layer is $900 - 200$ (freeboard) = 700mm
- iii) potential effective operating depth subsequent soil layer is $900 - (200 + 300$ [eg depth of recompacted lower material]) = 400mm

Figure 19.3 Effective decompaction depth by tines

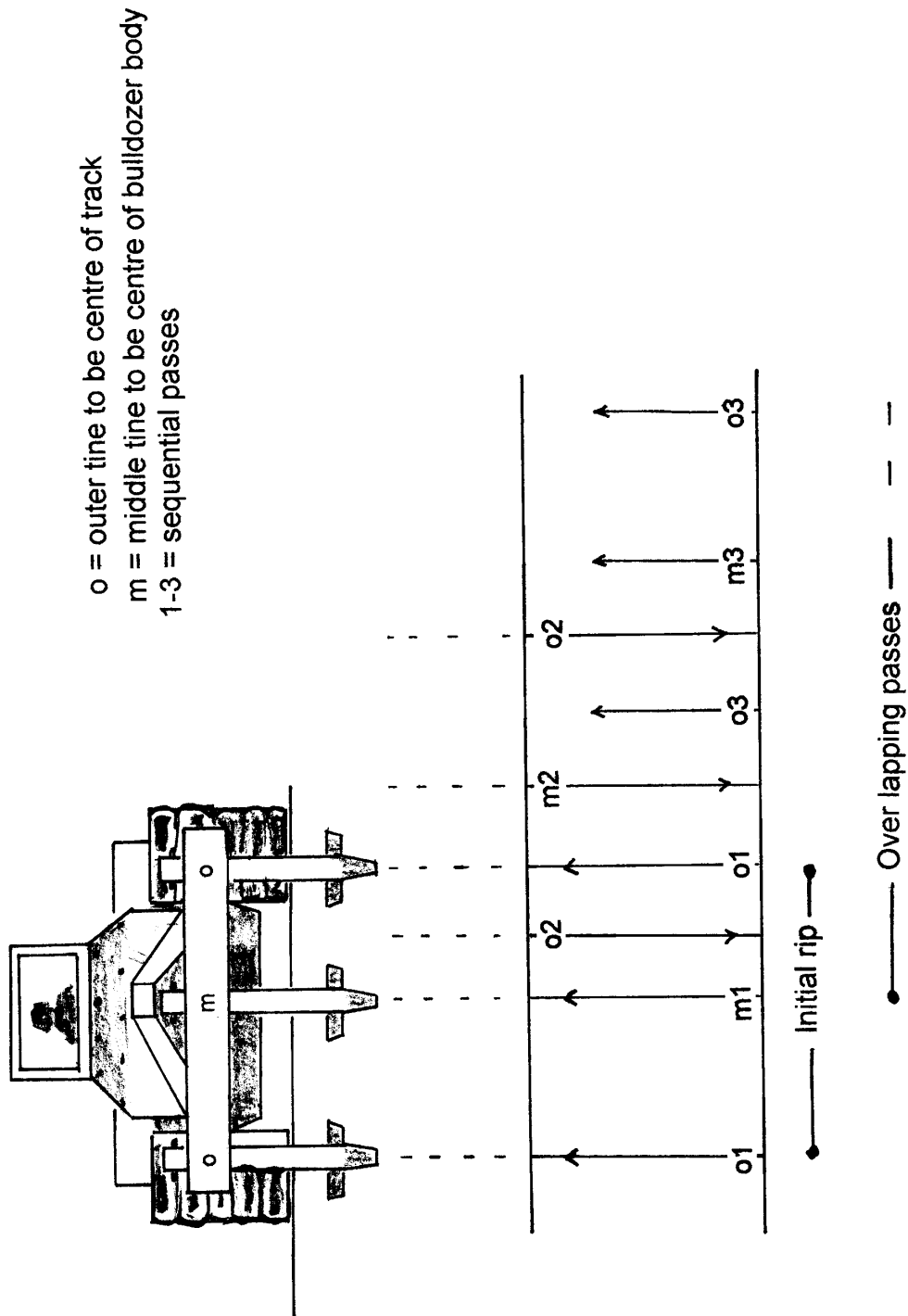


Figure 19.4 Decompaction by overlapping passes
 of bulldozer drawn tines

*target not consistently achieved between tines, ridges present

***target consistently achieved between tines, no ridges present

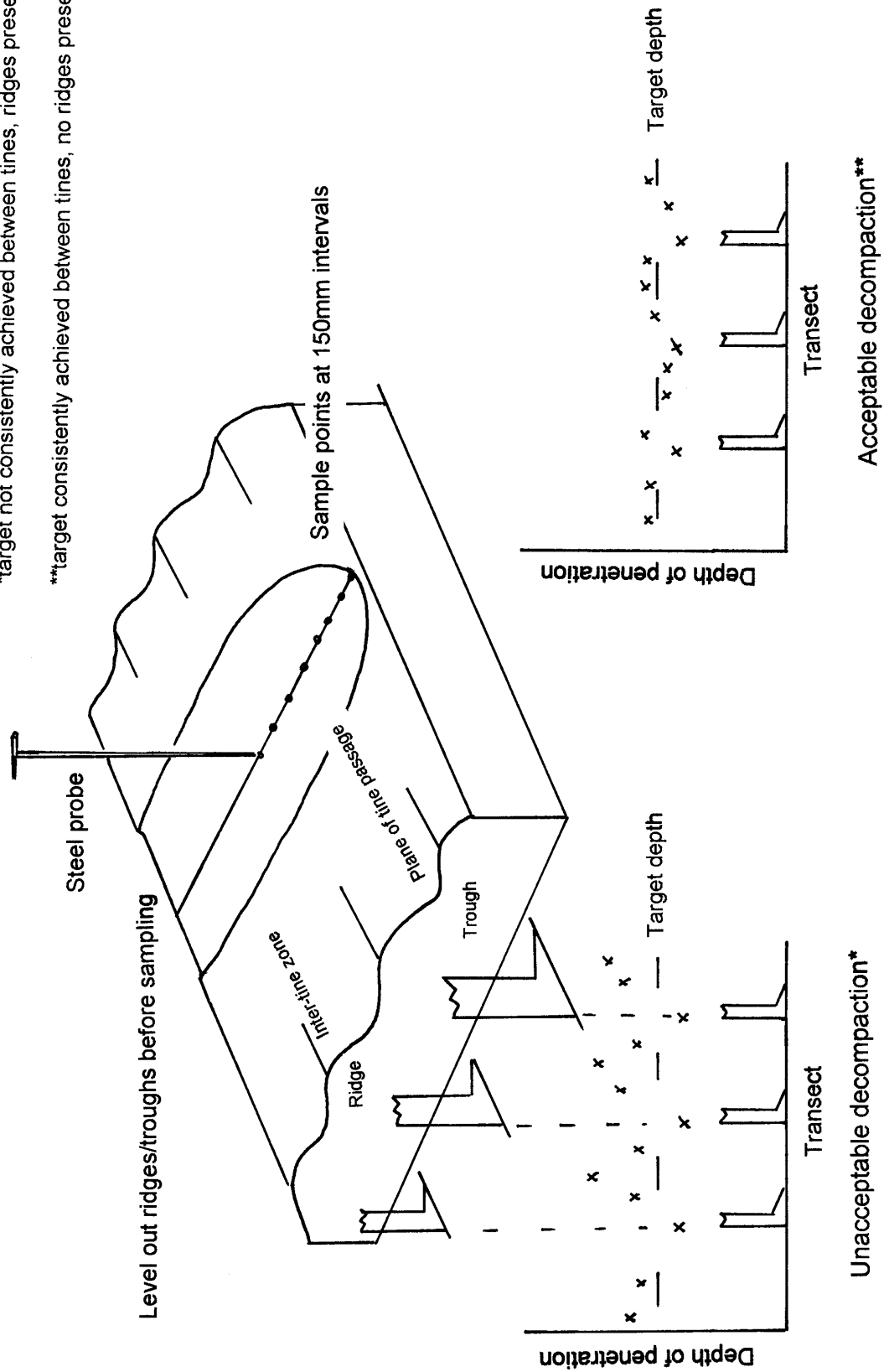


Figure 19.5 Assessment of decompaction achieved

SHEET 19

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Appendix 2

APPENDIX 2 – Details of Restoration Grassland Seeding & Tree Planting

The following sets out the specifications used or are to be used in the seeding of grassland and woodland planting of Phases 3A, 3B and 5 within the East Pit Mine Site; see Figure 2.1 for the locations of these works. The aftercare of these features is set out in Appendix 4.

Common LandAcid Grassland (Phase 5) -

Areas of upland acidic grassland along the north and west facing slopes of the Western Overburden Mound were established in 2015 and 2016 for landscape and nature conservation using the following seed mixture and seedbed fertiliser. (Table 2.1)

Table 2.1: Seed Mixture and Seedbed Fertiliser for Upland Acid Grassland used on Western Overburden Mound in 2015.

Species	% Composition	Total Mixture Seed rate kg/ha	Sowing Method	Seedbed Fertiliser
Perennial Ryegrass	40	100	Broadcast	240kg/ha 17:17:17 NPK 250kg/ha TSP#
Common bent	20			
Red fescue	20			
Sheep's fescue	20			

#TSP = Triple super phosphate

Semi-Improved Grassland (Phase 5) -

Within the reinstated Common Land a semi-improved type of grassland is to be established on the former coal stocking ground, the western access corridor, the regraded slopes and plateau of the Southern Overburden Mound for the purpose of livestock grazing. The following Table 2.2 gives the seed mixture and seed bed fertiliser to be used.

Table 2.2: Seed Mixture and Seedbed Fertiliser for New Semi-Natural Grassland Areas within Common Land.

Species	% Composition	Total Mixture Seed rate kg/ha	Sowing Method	Seedbed Fertiliser
Perennial Ryegrass	25	75	Broadcast	240kg/ha 17:17:17 NPK 250kg/ha TSP#
Smooth Stalked Meadow Grass	15			
Timothy	20			
Common bent	10			

Red fescue	10			
Sheep's fescue	10			
Wild White Clover (small leaved)	10			

#TSP = Triple super phosphate

Woodland (Phase 5) -

Three blocks of woodland trees and shrubs were planted in February 2017 with the following mixture for landscape and nature conservation purposes. (Table 2.3)

Table 2.3; Tree and Shrub Composition and Stock Sizes Planted on Western Overburden Mound in 2017.

Species	% Composition (number of trees/ha)	Spacing (total 2,500 trees/ha)	Stock Size	Planting Method
Goat willow	10 (250)	2x2m	30-60cm 1+2 feathered whips	Bare rooted – mattock planted
Rowan	10 (250)		“ “	“ “
Silver birch	20 (500)		“ “	“ “
Hawthorn	10 (250)		“ “	“ “
Hazel	5 (125)		“ “	“ “
Holly	5 (125)		“ “	Container grown/ pocket planted
Pedunculate oak	25 (625)		20-30cm 1+2 whips	“ “
Sessile oak	15 (375)		20-30cm 1+2 whips	Bare rooted – mattock planted “ “(with tree tubes)

Riparian Woodland (Phase 5) –

Three blocks of riparian woodland of 30m lengths are to be planted along the drainage channel to be formed to take drainage from the western slope of the Western Overburden Mound (WOM) alongside the former coal stocking yard to link to the retained woodland block to the south. Five blocks of 50m lengths are to be planted along the watercourse alongside the southern margin of the Southern Overburden Mound (SOM). The following table gives the species composition, stock sizes and planting method to be used. (Table 2.4)

Table 2.4; Tree and Shrub Composition and Stock Sizes for Riparian Plantings

Species	% Composition (number of trees/ha)	Spacing (total 2,500 trees/ha)	Stock Size	Planting Method
Common alder	60 (1500)	2x2m	30-60cm 1+2	Bare rooted – mattock planted
Grey willow	20 (500)		“ “	“ “
Downy birch	15 (375)		30cm 1+1	“ “
Sessile oak	5 (125)		20cm 1+1	Bare rooted – mattock planted with tree tubes

Country ParkUpland Acidic (Phases 3B & 5) -

Areas of upland acidic grassland for landscape and nature conservation are to be established on Celtic Energy owned land to the west and eastern sides of the proposed Lake. The following Table 2.5 gives the seed mixture and seedbed fertiliser to be used.

Table 2.5: Seed Mixture and Seedbed Fertiliser for Upland Acid Grassland within Celtic Energy Land.

Species	% Composition	Total Mixture Seed rate kg/ha	Sowing Method	Seedbed Fertiliser
Perennial Ryegrass	40	100	Broadcast	240kg/ha 17:17:17 NPK 250kg/ha TSP#
Common bent	20			
Red fescue	20			
Sheep's fescue	20			

#Triple super phosphate fertiliser

Woodland (Phase 5) –

Broadleaved woodland is to be planted around the south western and western sides of the Lake for landscape and nature conservation. The following Table 2.6 gives the species composition, stock sizes and planting method to be used above the maximum water line.

Table 2.6; Tree and Shrub Composition and Stock Sizes for Lakeside Planting Above the Water Line

Species	% Composition (number of trees/ha)	Spacing (total 2,500 trees/ha)	Stock Size	Planting Method
Goat willow	10 (250)	2x2m	30-60cm 1+2 feathered whips	Bare rooted – mattock planted
Rowan	10 (250)		“ “	“ “
Silver birch	20 (500)		“ “	“ “
Hawthorn	10 (250)		“ “	“ “
Hazel	5 (125)		“ “	“ “
Holly	5 (125)		“ “	Container grown/ pocket planted
Pedunculate oak	25 (625)		20-30cm 1+2 whips	“ “
Sessile oak	15 (375)		20-30cm 1+2 whips	Bare rooted – mattock planted with tree tubes

Thorny Bank (Phase 5) –

The eastern side of the Lake will have high steep cliffs/slopes down to the water line. Here, a bank will be formed at the top of the slope and planted with thorny species as deterrent to human and livestock access. The planted bank will be fenced along its entire length on the eastern side. The following Table 2.7 gives the species composition, stock size and planting method,

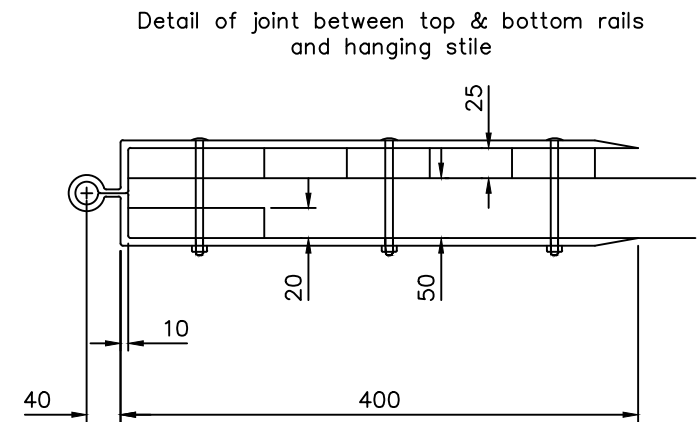
Table 2.7: Tree and Shrub Composition and Stock Sizes for Hedge Bank Planting

SPECIES & PERCENTAGE COMPOSITION	SPECIFICATION – 700m long x 6m wide strip planted as 9 rows of plants at 600mm spacing
Common alder – <i>Alnus glutinosa</i> – 10%	Bare-rooted notch planted, 1.5m whips
Hawthorn – <i>Crataegus monogyna</i> – 40%	Bare-rooted notch planted, 600mm multi-stemmed
Blackthorn – <i>Prunus spinosa</i> – 40%	Bare-rooted notch planted, 600mm multi-stemmed
Dog-rose – <i>Rosa canina</i> – 10%	Bare-rooted notch planted, 600mm multi-stemmed

Lichen-Bryophyte Heath (Phase 5) -

A small area of overburden shales on the southern rim of the Lake is to be left unsoiled for the purpose of establishing lichen-bryophyte heath. It is not to be seeded or fertilised. However, some of the windrowed surface soils from the plateau of the Southern Overburden Mound is to be recovered and placed to initiate the colonisation process. Placement of the soils will be by excavator following the principles of MAFF (2000, Sheet 4) guidance. The soils will be placed at unevenly varying depths (0 – 250 mm). The area of placed soils is to be fenced.

Appendix 3



DESCRIPTION OF TIMBER MATERIALS	SIZE
Wing posts	125x100x2100 long
Apex posts	150x150x2100 long
Fence rails cut to length and housed in the apex post	87x38x1600 long



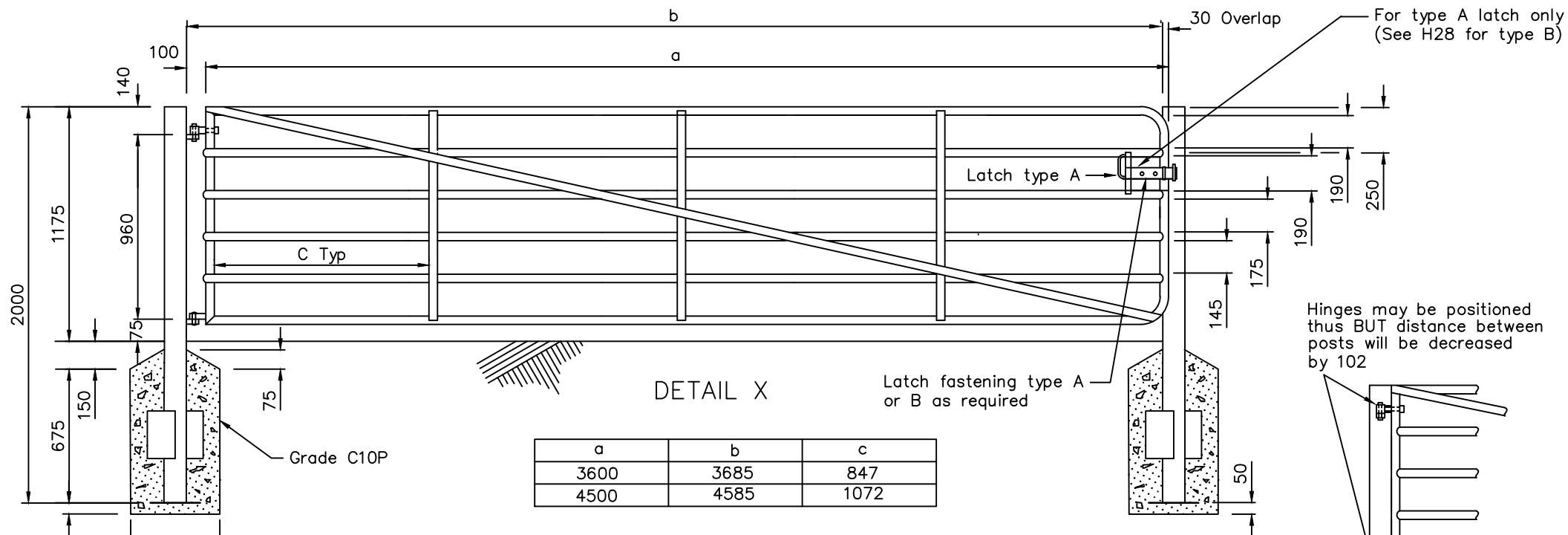
- 1 All dimensions are in millimetres unless otherwise stated.
- 2 Gates shall comply with the appropriate Clauses in the 300 series, any further requirements in Appendix 1/15 or 3/2 and the appropriate Clauses in BS 5709.
- 3 Gate itself shall be Wicket gate Type 2 (Drawing No. H24).
- 4 All nails shall be galvanised.
- 5 All tenons shall be pegged with 13 dia oak dowels.

CELTIC ENERGY LIMITED,
9, BEDDAU WAY,
CASTLEGATE BUSINESS PARK,
CAERPHILLY.
CF83 2AX.

Timber Kissing Gate

NOT TO SCALE

DRG No. 07A04708



NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. Gates shall comply with the appropriate Clauses in the 300 Series, any further requirements in Appendix 1/15 or 3/2, and with BS3470.(Cattle yard).
3. For details of latches and fittings see Drawing Nos.H26, H27 & H28.
4. Gate stops to be provided in accordance with Drawing No H33.
5. The gate shall open into the owners property.
6. The corners of the main frame may be rounded, rounded or mitred, (as drawn), mitred, saddled or crimped. Protective treatment as described in Appendix 1/15 or 3/32.

DESCRIPTION OF MATERIAL	SIZE	FIXINGS AND FIXTURES
Hanging post (Tubular steel)	114.3 outer dia x 3.6 thick	Top capping plate 4.8 thick Two 230x150x4.8 wing plates stitch welded to post
Shutting post (Tubular steel)	88.9 outer dia x 3.2 thick	Base plate 250x250x4.8 Cap and base plates to be continuously flush welded to tube
Outer frames	48.3 outer dia x 2.9 thick	Fillet welded to each gate member crossed by braces
Infilling horizontal rails (All tubular steel)	42.4 outer dia x 2.6 thick	
Vertical braces (Mild steel flat)	Three 38x4.8	
Diagonal braces (Mild steel flat)	Two 38x4.8	

DETAIL Y

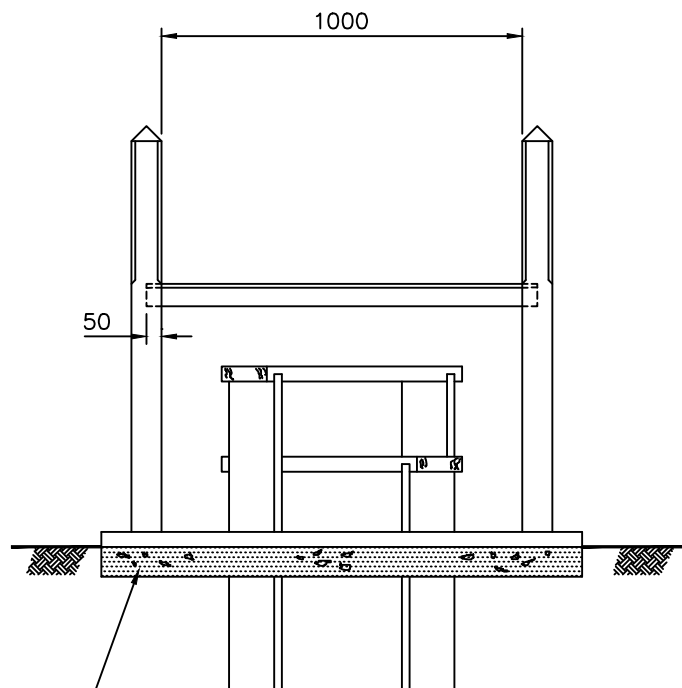
Alternative position of hinge to give a full 180° opening when required in Appendix 1/15 3/2

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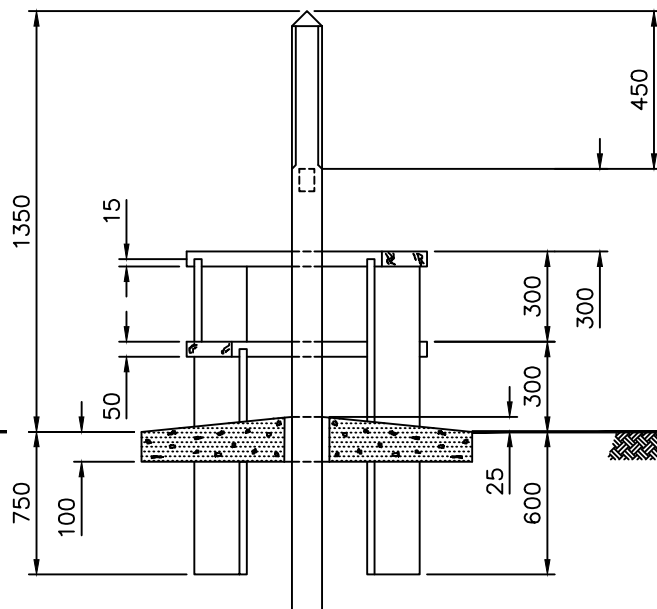
STEEL SINGLE
FIELD GATE

NOT TO SCALE

DRG No. 07A04709

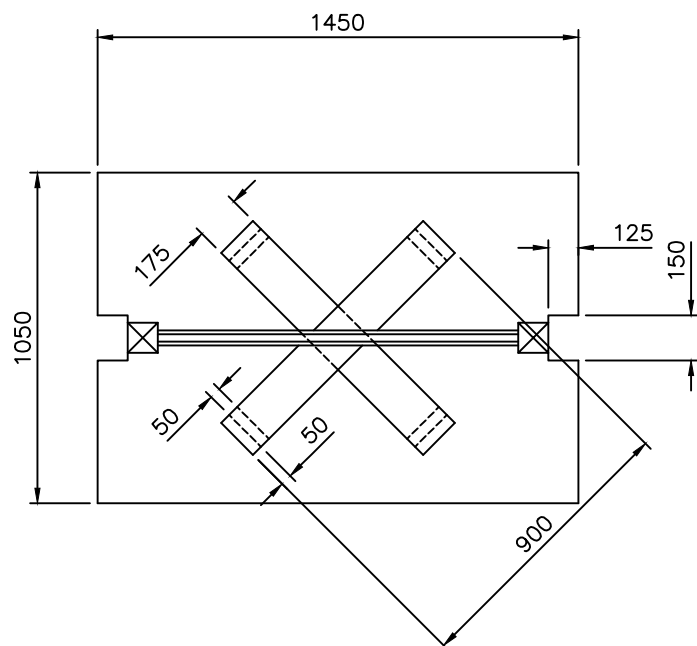


Concrete grade C10P



NOTES

- 1 All dimensions are in millimetres unless otherwise stated.
- 2 All timber shall be in accordance with the appropriate Clauses in the 300 Series and any other requirements in Appendix 1/15 and 3/2 and BS 5709.
- 3 All steelwork shall be galvanised to comply with BS 729.
- 4 Stile posts shall be set in line of fence.



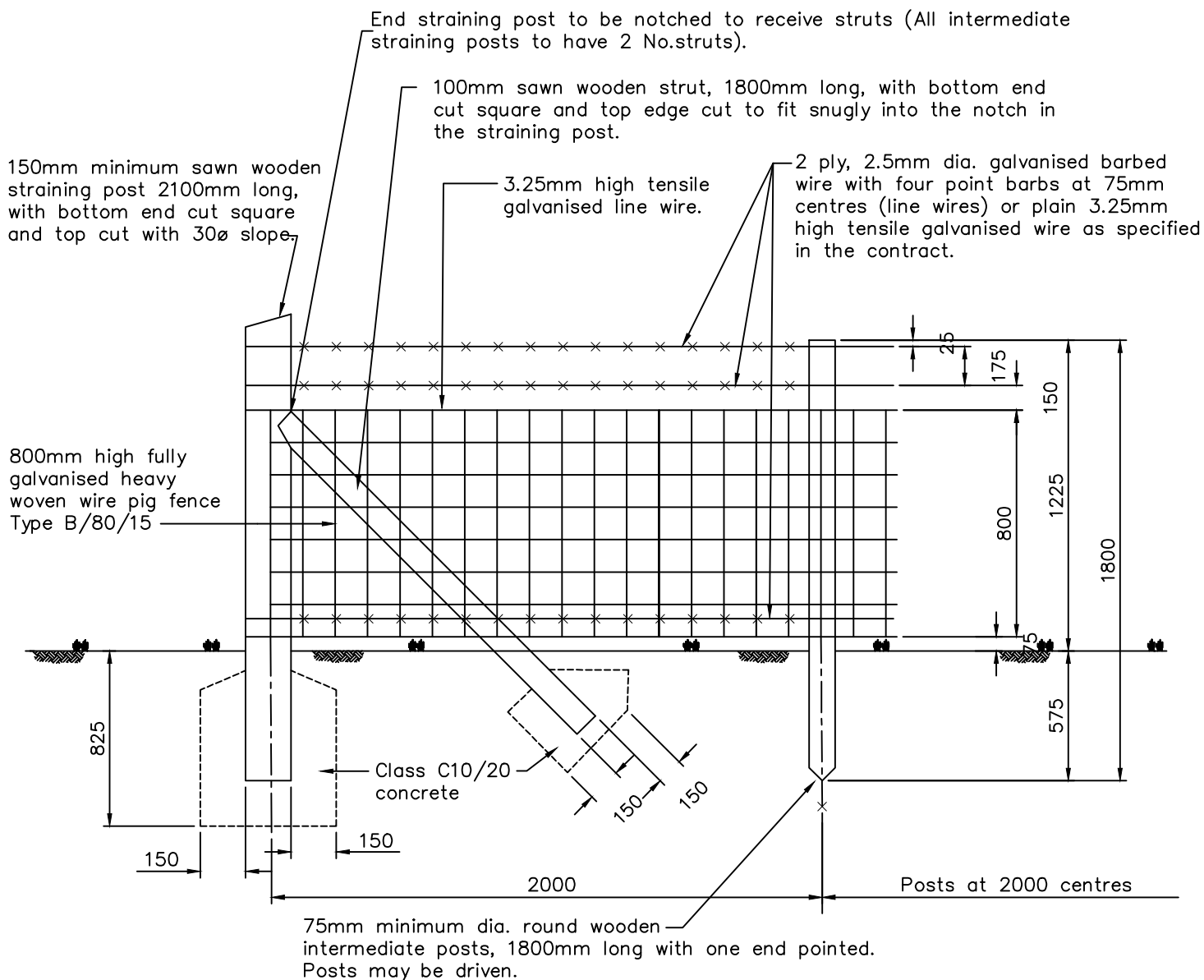
DESCRIPTION OF TIMBER MATERIALS	SECTION SIZE
Posts	100 x 100
Crosshead wrought. Top edge double chamfered.	87 x 38 minimum
Steps	175 x 50
Supports Secured by two 100 long x 4 galvanised round wire nails skew driven.	175 x 50

CELTIC ENERGY LIMITED,
9, BEDDAU WAY,
CASTLEGATE BUSINESS PARK,
CAERPHILLY.
CF83 2AX.

Timber Stile
(Type 1)

NOT TO SCALE

DRG No. 07A04711



1. The timber for the posts and struts shall be to BS 1722, Part 2 Appendix E.
2. The woven wire shall be to BS 1722, Part 2, and the galvanised staples 38mm x 4mm. The woven wire may only be joined at posts.
3. Straining posts shall be provided at all ends and corners of fences, at changes in direction, at acute variations in slope and at intervals not exceeding 50m in straight lengths of fence.
4. The ground in which the fence posts are to be erected may contain large stones. The method of erecting and rates for all fence posts should take these facts into account.
5. Where the existing surface consists of uneven ground this shall be leveled along the line of the fence to provide a gap between the fence and the ground of 75mm maximum and the rates should provide for this work.
6. The four line wires shall be tightly strained and fixed to straining posts before staples to intermediate posts are fastened. Barbed wire to be cross stapled at straining posts.
7. Woven wire netting shall be strained tightly both horizontally and vertically and secured to each post by at least 4 staples, one each securing the top and bottom wires and the remainder fixed at equal centres. The netting shall also be clipped to top and bottom line wires at 500mm centres with galvanised clips.
8. Straining posts shall not be used as gate posts.
9. All plain high tensile line wires to have winders for tensioning at straining posts.
10. Staples should not be driven against the wires so hard as to damage the galvanised surface.
11. The fence shown is the barbed wire type. If plain wire is specified, the three strands of barbed wire are replaced with 3.25mm galvanised high tensile wire.
12. The post shall be erected to a good vertical and horizontal line. Cutting of posts to achieve this is not permitted.

TYPE 'A'—
WOODEN POST & WIRE
FENCING

Appendix 4

APPENDIX 4 – Details of Aftercare Provisions for the Rehabilitation of Restored, Mitigation & Retained Land

Following the completion of restoration works (grading, soiling and seeding and planting, fencing etc) the EPER Site is subject to a statutory aftercare period of 5 years. This is extended by a Section 106 Agreement to total of 20 years for new woodland plantings, the management of the mitigation works for the development (Tairgwaith SINC and the EERAs) and the management of nature conservation habitat and species features within the retained land. It needs to be noted that the following aftercare provisions for the Common Land are recommendations as the work and programme may have to change to be compliant with future stewardship schemes like the current Glastir scheme for Welsh Commons. Similarly, those for the Country Park may also be varied according to the needs of Phase 2 of the Lakes at Rhosaman consented scheme.

Certain pre-restoration nature conservation features within the Site are protected and enhanced under the provisions of Conditions 68 and 69b. The sources of information used to define these are given in the Environmental Statement, Chapter 14, Volume 4 Appendix 14 and Appendix A of the SEI/03 submission, and subsequent Site monitoring reports. A summary of the distribution of these habitat and species features are shown on Figures 4.1 and 4.2 respectively. They are located on land that has been set aside from the mining operation and where specific mitigation enhancement work is to be undertaken within the Common Land and Country Park (Figure 4.3). Except for Tairgwaith SINC (Figure 4.4), all the past records of habitat and species features (Figures 4.1 & 4.2) occur within the operational area of the East Pit East Revised surface mine Site. The management and enhancement of these features are to be integrated into the extended aftercare programme for the Site (Phases 3A, 3B & 5) as detailed below.

The aim of the aftercare period is to ensure the features involved achieve functionality, resilience and sustainability for the intended land uses and nature conservation features. The following programme of works, monitoring and reporting are provisional as they will be dependent on the current baseline. From experience, once the required habitat conditions are achieved, significant changes are slow to happen. It is anticipated that once the target conditions have been achieved only the necessary periodic work to maintain them in a suitable condition will be required. Similarly, the monitoring and reporting would be tailored to appropriate intervals. Importantly, will be the regular 'integrity' monitoring to confirm the presence of the habitat and its extent.

In all cases, during the allotted aftercare periods, an annual report of the management works (if any implemented), the integrity of the features, the condition and proposed further programme of works in the following year(s) will be submitted to the Authority for its approval.

Restored Land**Common Land –****Acid Grassland**

Acid grassland was established on the regraded north west corner of the Western Overburden Mound (WOM) in 2015 and 2016 on the graded eastern slopes to ultimately provide for upland livestock grazing and ground nesting habitat for Skylark (Figure 4.5). These areas are subject to a 5-year statutory aftercare and will have completed the period in 2021.

i) **Baseline Condition**

Baseline surveys will be undertaken of the condition of the grassland (as a nature conservation habitat) after completion of the 5-year aftercare period, when its condition would be reviewed as to its contribution as a potential nature conservation feature and future as grazed upland grassland.

ii) **Management Actions 2021- 2042**

The main management action required for this feature is its integration into the wider WOM-SOM single grazing unit (Figure 4.6).

iii) **Provisional Programme****Table 4.1: Acid Grassland (WOM) Reporting and Review Process 2022/2026**

Actions	2021#	Notes
Stakeholder Consultation – Graziers	March	Commoner's Association
Baseline Condition of Acid Grassland Survey & Report	July 2021	Methodology – 1, 2, 3
Drafting of Annual Management Plans	N/A	Completed
Annual Review & Reporting	December 2021	Completed

#For future management plan and actions, see retained land - lichen-bryophyte heath and marsh grassland on the WOM

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf> <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

2. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

3. <https://www.ceh.ac.uk/our-science/projects/uk-butterfly-monitoring-scheme>

Table 4.2: Restored Acid Grassland Management Works 2021

Actions	2021#	Notes
Erect & Maintain fences and gates	N/A	Currently open land
Livestock	Grazing to be allowed on completion of 5-year aftercare. Stocking density to be based on Glastir/successor Welsh Commons scheme for semi-improved upland acid grassland (currently maximum 0.8 LSU/ha* May -September only) or as appropriate to maintain grassland. To be reviewed annually.	To be grazed with the rest of the WOM-SOM single unit of land
Soil Analyses	N/A	Aftercare completed
Annual Fertiliser Applications#	N/A	Aftercare completed

#For future management plan and actions, see retained land - lichen-bryophyte heath and marsh grassland on the WOM; *<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Semi-improved Neutral Grassland

The neutral grassland established within the Common Land on the Southern Overburden Mound, the former coal washing facility, the former Coal Stocking Yard and the linking access corridor will be subject to a 5-year statutory aftercare period (Figure 4.5). They are to be sown with a pasture grassland seed mixture to provide for livestock grazing and an occasional hay cut. This grassland will extend the range of feeding Barn owl.

i) Baseline Condition

Baseline surveys are not needed until 2026 as this is newly established grassland for agricultural use.

ii) Management Actions 2022-2026

The main management action required for the establishment of the grassland during the aftercare period is to protect its integrity from premature grazing and to supplement the developing plant nutrient cycling and accumulation of soil organic matter. The grassland should not be grazed during the 5-year aftercare period. Thereafter, the grassland can be integrated into the combined single WOM-SOM grazing unit (Figure 4.6). To support a neutral type of grassland assemblage, the soils in these areas will be maintained during the aftercare period at or above pH6.0.

iii) Provisional Programme

Table 4.3: Restored Semi-improved Neutral Grassland Reporting and Review Process 2022/2026

Actions	2022-2026*	Notes
Stakeholder Consultation – Graziers	March 2022	Commoner's Association
Drafting of Annual Management Plans	October 2022-26	
Annual Review & Reporting	December 2022-26	

* assumes restoration not completed until 2021

Table 4.4: Restored Semi-improved Neutral Grassland Management Works 2022-2026

Actions	2021	2022-2026	Notes
Livestock	No Grazing Allowed in 2021	No Grazing Allowed 2022-26	Grazing only to be allowed on completion of 5-year aftercare. Stocking density to be based on Glastir*/successor Welsh Commons scheme for upland marshy grassland# (currently maximum 0.6 LSU/ha May - September only) or as appropriate to maintain grassland. To be reviewed annually
Soil Analyses	N/A	2022, 2024, 2026	
Annual Fertiliser Applications	May# 2021	May 2022-26	If holding sown areas before start of aftercare

#Assumes sown grassland to become part of the combined single grazing unit within the Common Land, for improved grassland Glastir 2020-2021 has a LSU of 1.4/ha; *<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Woodland

Three small areas of new woodland were established on the western slopes of the Western Overburden Mound (WOM) in February 2017 (Figure 4.5). These are to have a 20-year aftercare programme. Currently, there have had four years of aftercare.

i) Baseline Condition

New baseline surveys will be undertaken to determine the condition of the woodland/scrub habitats at the end of the first 5-year aftercare period in 2021, and used to set aftercare objectives, targets and actions on the next 5-year rolling programme.

ii) Management Actions 2021-2042

The management action required for this feature is to protect the integrity of the three woodland clumps from grazing and encroachment.

iii) Provisional Programme

Table 4.5: Restored Woodland (WOM) Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2038	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline Extent & Condition of Woodland Survey & Report	July 2021	July 2026	July 2032, 2037, 2042	Methodology – 1, 2
Annual Integrity Monitoring	July 2021	July 2022-26	July 2027-38	
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037	

1. <http://data.incc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.incc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.6: Restored Woodland (WOM) Management Works 2021-2042

Actions	2022-2026	2027-2038	Notes
Maintain fences	Anytime	Anytime	Ongoing as required
Herbicide Treatment to control competition	N/A	N/A	Completed
Replacement of failed plant stock	N/A	N/A	Completed
Livestock excluded	Anytime	Anytime	

Riparian Woodland

The new riparian woodland blocks (Figure 4.5) to be planted along the watercourses on southern margin of the SOM and the watercourse from the WOB to the retained woodland to the south of the mine offices will have a 20-year aftercare programme.

i) Baseline Condition

New baseline surveys will be undertaken to determine the condition of the riparian woodland habitats at the end of the first 5-year aftercare period in 2026, and used to set aftercare objectives, targets and actions on the next 5-year rolling programme.

ii) Management Actions 2021-2042

The management action required for this feature is to protect the integrity of the developing riparian woodland from grazing.

iii) Provisional Programme

Table 4.7: Restored Riparian Woodland Blocks Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline Extent & Condition of Woodland Survey & Report	N/A	July 2026	July 2032, 2037, 2042	Methodology – 1, 2
Annual Integrity Monitoring	July 2021	July 2022-26	July 2027-42	
Drafting & Review of 5 Year & Annual Management Plans	N/A	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.incc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.incc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.8: Restored Riparian Woodland Blocks Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Maintain fences and gates	Anytime	Anytime	Ongoing as required
Herbicide Treatment to control competition	2022, 2023, 2024	N/A	First 3 years only
Replacement of failed plant stock	2022, 2023, 2024	N/A	First 5 years only & where gaps >20m ²
Livestock excluded	Anytime	Anytime	

Inland Rock & Scree

Rock outcrops and scree habitats are classed as nature conservation features and subject to the extended aftercare period of 20 years. Three small areas were created in 2016 on the eastern side of the restored section of the WOM (Figure 4.5).

i) Baseline Condition

New baseline surveys will be undertaken of the condition of this habitat, and to set objectives, targets and actions.

ii) Management Actions 2021-2038

The main management action required for this feature is to protect its integrity through the removal of scrub should it colonise. However, should grazing pressure at any time prove to be detrimental, the scree feature is to be fenced to exclude livestock.

iii) Provisional Programme

Table 4.9: Restored Inland Rock & Scree Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline habitat and integrity monitoring	July 2021	July 2022-2026	July 2032, 2037, 2042	Methodology – 1, 2, 3
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.incc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.incc.gov.uk/data/9e8ebc52-5062-4c67-a00c-24dbd3248c50/CSM-BryophytesLichens-2005.pdf>

3. <http://data.incc.gov.uk/data/a81bf2a7-b637-4497-a8be-03bd50d4290d/UKBAP-BAPHabitats-19-InlandRockOutcrop.pdf>

Table 4.10: Restored Inland Rock & Scree Management Works 2021-2042

Actions	2022-2026	2027-2038	Notes
Scrub reduction	N/A	November-January 2032	Extent and location to be advised by habitat and species condition report
Livestock excluded	Anytime	Anytime	

Wetlands/Ponds

Wetland/pond habitats are classed as nature conservation features and subject to the extended aftercare period of 20 years. A large pond is to be created at the base of the WOM where the coal processing operation was located and the two contiguous silt ponds in the former coal stocking yard are to be 'dug-out', linked and regraded to form another pond feature (Figure 4.7). From experience, they will be left to colonise naturally having created

shallow margins. The ponds will also provide an additional source of drinking water for livestock.

i) Baseline Condition

New baseline surveys will be undertaken of the condition of these pond habitats, and to set objectives, targets and actions.

ii) Management Actions 2022-2042

The main management action required for these features is to protect its integrity through the removal of scrub should it colonise the pond margins.

iii) Provisional Programme

Table 4.11: Restored Pond Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March	Commoner's Association
Baseline habitat and integrity monitoring	July 2021	July 2022-26	July 2032, 2037, 2042	Methodology – 1, 2, 3
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/1b15dd18-48e3-4479-a168-79789216bc3d/CSM-FreshwaterLakes-2015.pdf>

3. <http://data.jncc.gov.uk/data/2ca75082-4246-4ec3-9472-08fbc24165a3/CSM-LowlandWetlandHabitats-2004.pdf>

Table 4.12: Restored Pond Management Works 2021-2042

Actions	2022-2026	2027-2038	Notes
Scrub reduction	N/A	November-January 2032, 2037	Extent and location to be advised by habitat and species condition report
De-silting	N/A	November-January 2032, 2037	Extent and location to be advised by habitat and species condition report

Country Park -**Acid Grassland**

Acid grassland established within the Country Park on the lower slopes of the Western Overburden Mound and the eastern margins of the Lake will be subject to a 5-year statutory aftercare period (Figure 4.5). They are to be sown with an upland grassland seed mixture to provide for amenity purposes and occasional low intensity livestock grazing. The Fescue-Bent based seed mixture will facilitate natural colonisation by native acid grassland plant species and the short sward support ground nesting birds such as skylark.

i) Baseline Condition

Baseline surveys will be undertaken of the condition of the grassland (as a nature conservation habitat) after it has completed its aftercare period of 5 years, when its condition would be reviewed as to the potential nature conservation features it could support in the future as grazed upland grassland.

ii) Management Actions 2022-2026

The main management action required for this feature during the 5-year aftercare period is to protect its integrity through fencing and to supplement the establishment of natural plant nutrient cycles and build-up of soil organic matter. The grassland will not be grazed during the 5-year aftercare period.

iii) Provisional Programme**Table 4.13: Restored Acid Grassland Reporting and Review Process 2022/2026**

Actions	2021	2022-2026	Notes
Baseline Condition of Acid Grassland Survey & Report	N/A	July 2026	Methodology – 1, 2, 3, 4
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2022-26	Aftercare completed
Annual Review & Reporting	December 2021	December 2026	Aftercare completed

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

4. <https://www.ceh.ac.uk/our-science/projects/uk-butterfly-monitoring-scheme>

Table 4.14: Restored Acid Grassland Management Works 2022-2026

Actions	2022-2026	2027-2042*	Notes
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Erect & Maintain fences and gates	Anytime	Anytime	Ongoing as required
Livestock	No Grazing Allowed	May-September 2027-42	Grazing to be allowed on completion of 5-year aftercare. Stocking density to be based on Glastir/successor Welsh Commons scheme for lowland acid grassland (currently maximum 0.5 LSU/ha* May -September only) or as appropriate to maintain grassland. To be reviewed annually.
Soil Analyses	2023 & 2025 & 2026	If required	
Annual Fertiliser Applications#	May 2022-2026	If required	

*Voluntary as not a Statutory or S106 requirement for the restored acid grassland; #To be determined by soil analysis

Woodland and Hedge Barrier

The new woodland and wide hedgerow are only within Celtic Energy land is associated with the southern and western margins of the Lake (Figure 4.5). An extended aftercare period of 20 years in total applies to the woodland and the wide 'hedge' barrier on the east side of the Lake. The woodland planting will provide extended habitat for breeding birds such as Song thrush and Linnet, and commuting and feeding bats

i) Baseline Condition

New baseline surveys will be undertaken to determine the condition of the woodland/scrub habitats at the end of the first 5-year aftercare period, and used to set aftercare objectives, targets and actions on a 5-year rolling programme.

ii) Management Actions 2021-2042

The management action required for this feature is to protect the integrity of the three woodland clumps from grazing and encroachment.

iii) Provisional Programme

Table 4.15: Restored Woodland & Scrub Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Baseline Extent & Condition of Woodland Survey & Report	July 2021	July 2026	July 2032, 2037, 2042	Methodology – 1, 2, 3
Annual Integrity Monitoring	July 2021	July 2022-26	July 2032, 2037, 2042	

Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

2. <http://data.jncc.gov.uk/data/6df1057b-5357-400b-a363-c8748298180a/CSM-WoodlandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.16: Restored Woodland and Scrub Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Erect & Maintain fences and gates	Anytime	Anytime	Ongoing as required
Herbicide Treatment to control competition	2022, 2023, 2024	N/A	First 3 years only
Replacement of failed plant stock	2022, 2024, 2026	N/A	First 5 years only & where gaps of >4x4m
Livestock excluded	Anytime	Anytime	

Inland Rock & Scree

Rock outcrops and scree habitats (Figure 4.5) are classed as nature conservation features and subject to the extended aftercare period of 20 years. The areas within the Country Park are located at the southern end of the Lake and comprise rock outcrops and scree, and an area 'seeded' with lichen-bryophyte 'soil' scrapings to be recovered from the surface of the former communities on the Southern Overburden Mound.

i) Baseline Condition

Baseline surveys will be undertaken of the condition of this habitat, and to set objectives, targets and actions.

ii) Management Actions 2021-2042

The main management action required for this feature is to protect its integrity through the fencing to exclude livestock and the removal of scrub should it colonise.

iii) Provisional Programme

Table 4.17: Restored Inland Scree/Rock Face Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Baseline and annual Monitoring (Habitat types)	July 2021	July 2022-2026	July 2027-2042	Methodology – 1, 2, 3
Drafting & Review of 5 Year & Annual Management Plans	October	October 2022-2026	October 2032, 2037, 2042	
Annual Review & Reporting	December	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/a81bf2a7-b637-4497-a8be-03bd50d4290d/UKBAP-BAPHabitats-19-InlandRockOutcrop.pdf>

3. <http://data.jncc.gov.uk/data/9e8ebc52-5062-4c67-a00c-24dbd3248c50/CSM-BryophytesLichens-2005.pdf>

Table 4.18: Restored Inland Rock & Scree Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Erect & Maintain fences and gates	Anytime	Anytime	Ongoing as required
Scrub reduction	N/A	November-January 2032	Extent and location to be advised by habitat and species condition report
Livestock excluded	Anytime	Anytime	

Mitigation & Retained Land

Conservation Status and Targets

The conservation status and targets for the mitigation and retained habitats and species features to be protected and enhanced during the extended aftercare period within the restored operational part of the East Pit Surface Mine are to be as follows.

For the retained habitats, the conservation status and targets are:

- To maintain the extent of the habitats
- To achieve a favourable/recovering condition of the habitats

For the prioritised species, the conservation status and targets are:

- To maintain the range of the priority species supported
- To achieve a favourable/recovering condition of the habitats for the prioritised species
- To extend the range of the prioritised species

Some of the features are within Celtic Energy owned land and the Country Park, whilst others are within Commoner Land. The delivery of the proposed aftercare on the Common Land will require co-ordination with the Commoner's Association to ensure delivery. Hence, annual consultation with the Association is an integral part of the aftercare process.

Mitigation Works

The aim of the mitigation works is to compensate for the impact of the extended mine operation and provide nature conservation enhancements due to the scheme going ahead.

Common Land -

Tairgwaith SINC

Although outside of the mine Site development (Figure 4.4), Tairgwaith SINC it is within the boundary of the consented Lakes at Rhosaman scheme. It covers 11.4ha and is designated for its mosaic of habitats comprising rush pasture and neutral grassland as mosaics with willow scrub. Currently, the willow scrub is extensively encroaching on the grasslands within the core of the SINC with large bramble patches around the margins probably as a result of the current grazing with domestic ponies and apparent use as ad hoc pony-paddocks. The Council's Countryside and Wildlife Team recommended the reduction of scrub encroachment and restricted grazing to maintain and enhance the SINC (Neath Port Talbot, 2014).

To restore and enhance the SINC grasslands, an appropriate livestock grazing regime needs to be in place, along with a scrub control programme to be implemented during the aftercare period. The aim is to maintain and if possible extend the extent of the two grassland types within the SINC and to achieve a favourable/recovering condition with the objective of maintaining the value of the SINC and its contribution to the extent of Section 7 (Environment (Wales) Act, 2016) grasslands within the Borough.

i) Baseline Condition

Baseline information will be collected about the condition of the grasslands and on which management objectives, targets and programmes of actions are to be based. It is proposed that a condition survey of the entire SINC is carried out in 2021.

The scrub and bramble habitats are associated with other species features, which also need to be assessed prior to implementing management plans for the grassland habitat. From these assessments, a detailed management plan can be devised to be implemented for the duration of the aftercare period. The following is an outline of the initial actions that are to be implemented.

ii) Community Expectations

There are also a number of community expectations that need to be defined and better understood. These include: the juxtaposition of the SINC with an encircling urban

environment may limit what is achievable in terms of livestock grazing and conflict with residents use as pony paddocks, footpaths access for commuting to the school on New Road, educational opportunities, as well as the deregistered as Common Land and use by its lawful beneficiaries.

iii) Management Actions 2021-2042

Subject to liaison with the local residents, the following actions are proposed for 2021-2042:

- 2021 - Undertake an extent and condition survey of the grasslands within the SINC using the JNCC (2004b) criteria and supporting JNCC (2010) survey methodologies and extent and condition of supporting habitat for other target feature species.
- 2022 – 2042 - Repair/replace damaged/degraded and maintain boundary fences and access gates.
- 2022-2026 - Initiate a 5-year rotational programme of selective and progressive scrub removal (cut and chip (removing chippings from the Common)) and reduction of bramble cover (by repeated flail mowing) encroaching on to the core areas of the target grassland types.
- 2022-2042 – Initiate grazing by sheep/cattle. To comply with agri-environmental scheme recommendations (currently Glastir Welsh Commons scheme at maximum 0.6 LSU/ha April-September only) controlled through an annual grazing licence which would be reviewed annually. If eligible, the SINC is to be entered into a Stewardship Scheme.

iv) Reporting of Works 2021-2042

It is proposed an annual report of management work implemented, its achievements and proposed further works is made in October each year as part of the reporting of aftercare works (Condition 76) undertaken and the outcomes, along with the next 12 month intended programme

The 2021 reporting for the SINC will be the factual outcome of the baseline condition survey, the consultations, future arrangements for livestock grazing, and any initial bramble/willow scrub clearance undertaken, and the strategy for and expectations of taking the management of the SINC forward.

v) Provisional Programme

The following two tables give a summary of the above which are subject to annual reviews.

Table 4.19: Tairgwaith SINC Reporting and Review Process 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Consultation – Residents	March 2021	March 2022-2026	March 2027-2042	Resident's Group
Baseline Extent & Condition of Grassland and Other Targeted	July 2021	July 2022 & 2026	July 2032, 2037, 2042	Methodology – 1, 2, 3, 4

Species Survey & Report				
Annual Integrity Monitoring	July 2021	July 2022-26	July 2027-42	
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2032, 2037, 2042	
Annual assessment of SINC condition and management needs	N/A	October 2022, 2026	October 2032, 2037, 2042	Methodology – JNCC (2004b; 2010)
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

4. <https://www.ceh.ac.uk/our-science/projects/uk-butterfly-monitoring-scheme>

Table 4.20: Tairgwaith SINC Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Secure & Maintain fences and gates	Anytime	Anytime	Ongoing as required
Scrub & bramble reduction	November-January 2022-26	November-January 2032, 2037, 2042	Extent and location to be advised by habitat and species condition report
Livestock grazing - Cattle	May-September 2022-26	May-September 2027-42	Stocking density to be based on Glastir/successor Welsh Commons scheme for lowland unimproved grassland (currently maximum 0.75 LSU/ha* May -September only). To be reviewed annually

* <https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

EERA-A Marginal Wetland Habitats – Common Land

The original intention of EERA-A was to be a “trial” in diversifying marshy grassland flora on an area of Common Land. This was “... not directly required to offset any predicted impact as a result of the proposed (mine) extension.” (SLR, Supplementary Ecological Information Report, para 2.12.1 EERA A, 2013). Subsequent changes to the restored landform meant that it would have to be located on undisturbed Common Land where the grazing rights had not been suspended. The inability to secure agreement for the necessary changes in livestock management with the graziers meant that the trial had to be abandoned.

Instead, it was agreed that nature conservation enhancement of the site could be achieved through the promotion of marginal wetland habitats for flora and fauna. The decommissioning of the extensive water treatment facility on the south western boundary of the operational mine site provided an opportunity to achieve this on a significant scale. The facility was already notable as a regular breeding location for Lapwing.

On decommissioning of the water treatment facility, the eight ponds unlined ponds are to be remodelled by removing the artificial structures such as “T”-pies and replacing with spillways and local regrading of the pond sides for marginal vegetation to colonise (Figure 4.8). From experience elsewhere, the wetlands will quickly colonise with marginal and aquatic flora and fauna.

i) Baseline Condition

It is proposed a condition survey is carried out in 2021 to provide a baseline to set future aftercare management, targets and actions.

ii) Management Actions

The initial and anticipated subsequent prescriptions and programme are set out in the following Table 10. The following actions are proposed:

- Remove “T”-pipes connecting ponds/outfalls and replace with spillways
- Locally regrade pond sides to create shallows and remove parts of dividing banks to create islands whilst retaining vegetation features of nature conservation value
- Create one point of access to the north-eastern pond to provide for livestock drinking water
- Remove redundant fencing and replace with stock-proof fencing around the pond (excluding the access to drinking water)

iii) Provisional Programme

Table 4.21: Wetland Marginal Habitat Reporting and Review Process

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline - Extent & Condition of Pond Margins & Lapwing	May 2021	May 2022 & 2026	May 2032, 2037, 2042	Methodology – 1, 2, 3, 4
Annual Integrity Monitoring	July 2021	July 2022-26	July 2027-42	
Drafting of 5-Year Annual Management Plan	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/1b15dd18-48e3-4479-a168-79789216bc3d/CSM-FreshwaterLakes-2015.pdf>

3. <http://data.jncc.gov.uk/data/2ca75082-4246-4ec3-9472-08fbc24165a3/CSM-LowlandWetlandHabitats-2004.pdf>

4. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.22: Wetland Marginal Habitat Management Works 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Remove "T"-pipes connecting ponds/outfalls and replace with spillways	+	N/A	N/A	Work prohibited during bird breeding season
Locally regrade pond sides to create shallows and remove parts of dividing banks to create islands whilst retaining vegetation features of nature conservation value	+	N/A	N/A	Work prohibited during bird breeding season

Create drinking access for stock	+	N/A	N/A	Work prohibited during bird breeding season
Remove redundant fencing & erect and maintain stock proof fences and gates	+	N/A	N/A	Work prohibited during bird breeding season
Scrub control	N/A	November-December 2026	November-December 2032, 2037	5-year rolling programme

EERA– C – Translocated Grasslands

Two areas of translocated marshy grassland (and an area of peat) have been established within the Common Land on the eastern slopes of the Western Overburden Mound (Figure 4.4). Purple-moor grassland (PMG) was recovered in 2015 from the development area for the southern spillway and recovered peat from the advancing mine workings was placed in a small valley next to it. In 2017, a second area was created for marshy grassland from in front of the advancing mine.

i) Baseline Condition

Monthly integrity monitoring of both features has been carried out. It is proposed that a condition survey is carried out in 2021 to establish a new baseline to be used to set future aftercare management objectives, targets and actions.

ii) Management Actions 2021-2042

The main management actions required are to protect the translocated vegetation from grazing until sufficient resilience has developed and from fertiliser run off from the newly established grasslands. These will be achieved simply by erecting stock proof fencing that is set back sufficiently from the features to create a buffer zone of 5-30m (according to topography). The longer term need for the fencing would be reviewed after 5 years.

iii) Provisional Programme

Table 4.23: EERA-C Translocated Grassland Reporting and Review Process 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-2026	March 2027-42	Commoner's Association
Baseline Extent & Condition Surveys & Annual assessment of grassland condition and management needs	July 2021	July 2022-26	July 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2, 3

Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1. <http://data.incc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.incc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

3. <https://www.ceh.ac.uk/our-science/projects/uk-butterfly-monitoring-scheme>

Table 4.24: EERA-C Translocated Grassland Management Works 2021-2042

Actions	2021	2022-2042	Notes
Erect and maintain stock proof fences and gates	Anytime	Anytime	#Fencing to be reviewed after 2026
Exclusion of grazing	Anytime	Anytime#	#Grazing to be reviewed after 2026. Stocking density to be based on Glastir/successor Welsh Commons scheme for lowland marshy grassland (currently maximum 0.6 LSU/ha* May -September only). To be reviewed annually

*<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Common Land & Country Park -

EERA – B – Common Lizard

The aim of EERA-B is to maintain and if possible, extend the range of the common lizard within the Mine Site and maintain the habitat in these areas in a favourable/recovering condition. Areas to the north and south were assessed by Sylvan Ecology (2015) to be in a good and moderate condition as common lizard habitat with scope to enhance the Site's contribution by linking areas of good habitat through improving corridors of the habitat between them. The enhancement is by installing artificial refugia together with a programme of creating 'rides' for basking, mating and commuting reptiles so as to extend its range within the Site. This is to be implemented during the five-year aftercare period. The integrity of the refugia and mowing of the rides will be reviewed on an annual basis and maintained as necessary throughout the extended aftercare period. The land involved is both within Common Land and the Country Park along the undisturbed eastern margin of the Site (Figure 4.9).

i) Baseline Condition

Baseline surveys and assessments by Sylvan Ecology (2019) have been used to devise the following habitat management strategy and programme for the common lizard. Further

monitoring will enable the setting of targets. The scheme is to include creation of a managed corridor linking of the ‘good’ quality habitat and ‘hot-spot’ for the lizard in the east with the good habitat in the north and south (Figure 4.9).

ii) Management Actions 2021-2042

The following actions are proposed:

- 2021 – Instigate any necessary repairs to refugia constructed under Condition 68.
- 2022 – Mark out corridor for habitat enhancement to facilitate lizard migration and begin progressive mowing to extend corridor to be completed by 2026
- 2022 -2026 – Progressively construct lizard refugia/hibernacula/scrapes along corridors.
- 2027-2047 - Progressive mowing of corridor and renewing refugia/scrapes

iii) Provisional Programme

The following two tables give a summary of the above which are subject to annual reviews.

Table 4.25: EERA-B Reptile Reporting and Review Process 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner’s Association
Baseline reptile surveys along the corridor & Assessment of common lizard habitat condition and management needs	June – September 2021	Annual June-September	June-September 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2
Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1.<http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2.<http://data.jncc.gov.uk/data/43e8e8ed-5f05-4613-a277-f116b34829f4/CSM-ReptilesAmphibians-2004.pdf>

Table 4.26: EERA-B Reptile Management Works 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Identify route of connecting corridor	May 2021	N/A	N/A	
Progressive mowing of corridor and refugia/scrapes construction	May 2021	May 2022-26	May 2029, 2032, 2035, 2038, 2042	Completed by 2026, triannual thereafter

Retained Land

The aim of the aftercare for the features identified associated with the retained land (Figure 4.1) is to maintain and enhance the condition of the habitat (marshy grassland, lichen-bryophyte heath, acid grassland, exposed rock/scree habitat and scattered scrub and scrub-woodland), and their supporting function for the species features.

With the wide range of feature species occurring and their differing preference for habitat condition, to enable delivery of the objectives the pragmatic approach adopted is to prioritise habitat management actions in different parts of the retained land based on their historic distributions specified in Table 4.25 below.

Table 4.27: Retained Habitat Features and Prioritised Supported Species

Retained Feature	Habitat	Location of Habitat Feature	Prioritised Species Features#
Marshy Grassland/Purple Moorgrass		Eastern fringe of East Pit Mine Site	Barn owl, Bats
Flushes		Eastern fringe of Marshy Grassland	
Mosaic Bryophyte/Lichen Heath/Marshy Grassland		Plateau of Western Overburden Mound	Lapwing, Skylark, Linnet
Scrub/Woodland		Scattered around the operational areas	Barn owl, Song thrush, Linnet
Inland Rock & Scree		Northern Slopes of Southern Overburden Mound	Lichen, Bryophytes
Acid Grassland		Northern and Southern Ends of Marshy Grass Fringe	Common lizard, Small heath butterfly

#Provisions for the common lizard have been made in EERA-B mitigation works above and is not repeated here.

Common Land –

Seven types of habitat feature of nature conservation value are identified on the Common Land within the operational mine Site. The most extensive is the lichen-bryophyte

heath/marshy grassland mosaic covering the plateau and southern sides of the Western Overburden Mound (Figure 4.1, area A). Areas of marshy grassland (B) occur to the north and south of the eastern margin of the Site, acid grassland (D) to the east of the Southern Overburden Mound with rock/scree (E) on its northeast flank. Two areas of regenerating broadleaved woodland (F) are located on the northern margin of the Site and in the southwest. Potential wetland features (G), as water treatment facilities, are located on the northwest boundary with a complex of ponds in the southwest. Two mitigation areas (H) with marshy grassland and peatland are located on the eastern slopes of the Western Overburden Mound.

The notable nature conservation species feature of the habitat mosaic on the Western Overburden Mound is the number and density of breeding bird species of conservation concern supported, such as the Lapwing and Skylark, but several others too, including the Linnet (Figure 4.2). The marshy grassland habitat on the north eastern margin support bats, Common Lizard, breeding Skylark and other birds and the Small Heath Butterfly. The regenerating woodland along the northern boundary supports bat species, and the water treatment facilities in the north and north west, otter and bats.

Mosaic Lichen-Bryophyte-Heath & Marshy Grassland

This is the most extensive habitat feature within the Site and occurs only within the Common Land. Extensive mosaic of Lichen-Bryophyte-Heath with areas of Marshy Grassland occurs on the plateau of the Western Overburden Mound (Figure 4.1). This fragile habitat feature is of importance for nature conservation for its patchwork of lichen and bryophyte communities, the patches of neutral grassland and the more extensive swathes of rush dominated vegetation. The mosaic has established directly upon the overburden spoil following the regression of a reclamation sward over a 40-year period. The open habitat and short vegetation mosaic support numbers of birds of concern, including the skylark and lapwing. The marshy grassland is good habitat for short tailed vole and hunted by Barn owl and fox. Locally, scrub development provides habitat for the Linnet.

i) Baseline Condition

New baseline surveys will be undertaken of the mosaic's composition and its condition, and to update the surveys by Sylvan Ecology on the condition of the habitat mosaic for lapwing, skylark and linnet. These will be used to set management objectives, targets and actions.

ii) Management Actions 2021-2042

The management actions are multifarious in maintaining the openness of the plateau from excessive scrub invasion whilst retaining some for the Linnet, the very short vegetation for skylark, early successional stages for the lichens and bryophytes, and localised seasonal ponding for the lapwing. Whereas, the rush dominated and other matted areas provide for small mammals and hunting Barn owl.

The highly patterned habitat precludes sectioning out the various types for particular management recipes. On the other hand, the mosaic of habitats differs from other abutting retained and restored types. Hence, the whole plateau is to be treated as a single entity where controlled low intensity grazing is to be used to maintain short sward for skylark and lapwing, and excessive scrub encroachment, but sufficient for Linnet. Mechanically, a number of scrapes are to be created for lapwing, and when appropriate to create bare areas of

overburden to initiate new areas for lichen-bryophyte colonisation as the current patches become neutral grassland. No inorganic or organic fertilisers and herbicides are to be applied to agriculturally improve the vegetation, no supplementary feeding is to be allowed and no cutting is to be deployed.

The prescription for the lichen-bryophyte heath is to take preference over that for other components within the proposed single combined WOM-SOM grazing unit (Figure 4.6).

iii) Provisional Programme

Table 4.28: Retained Lichen-Bryophyte-Marshy Grassland Mosaic Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline Extent & Condition of Grassland and Targeted Species Survey & Report	July 2021	July 2022 & 2026	July 2032, 2037, 2042	Methodology – 1, 2, 3
Annual Integrity Monitoring	July 2021	July 2022-26	July 2027-2042	
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/9e8ebc52-5062-4c67-a00c-24dbd3248c50/CSM-BryophytesLichens-2005.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.29: Provisional Lichen-Bryophyte-Marshy Grassland Mosaic Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Erect & Maintain boundary fences and gates	Anytime	Anytime	Ongoing as required
Scrub reduction	N/A	November-January 2032, 2037	Extent and location to be advised by habitat and species condition report
Livestock grazing - Cattle	May - September 2022-26	May-September 2027-42	Stocking density to be based on Glastir/successor Welsh Commons scheme for upland unimproved grassland (currently maximum 0.6 LSU/ha* May -September only). To be reviewed annually
Scrapes for Lapwing	Autumn 2022	Autumn 2032, 2037	Provisionally create 10 scrapes of 5x5m – location to be advised from baseline survey. Maintain on 5-year cycle.
Scrapes to initiate lichen – bryophyte colonisation	Autumn 2026	Autumn 2032, 2037	Need, size and location to be advised from annual condition surveys.

*<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Marshy Grassland

The retained marshy grassland along the eastern fringe of the operational Site falls across Commoner's Association and the Country Park. Here, just that within the Common Land is considered as two blocks on the eastern margin of the Site (Figure 4.1), one in the north east and the other in the south east. That in the north is on undisturbed land or land that has been disturbed in the past and now recovered. In the south it comprises remnant field systems/margin of the Common with acid grassland. These rush dominant grasslands provide a tussocky habitat suitable for voles and shrews, the food source for the Barn owl, and damp grasslands with scrub providing feeding areas and commuting routes for bat species. For these reasons, the aim is for these marshy grasslands to managed to maintain its integrity and in a condition favourable for Barn owl and bat foraging.

The northern block abuts further Common Land to the east with provides a continuum of marshy grassland and drier grassland and scrub on land where the grazier's rights have not been suspended. Given their location and small size, the intention is that these areas are managed as a single grazing unit (North Eastern) and not divided by fences (Figure 4.6).

The retained marshy grassland in the south east is to be integrated into the combined single WOM-SOM grazing unit with the retained acid grassland and the sown semi-improved

grassland (Figure 4.6). The acid grassland in the south is too small to be a separate management entity. The acid grassland has been identified in the mitigation EERA-B as potential reptile habitat and forms the southernmost location of the mown corridor.

i) Baseline Condition

New baseline surveys will be collected about the condition of the marshy and acid grasslands and on which management objectives, targets and programmes of actions are to be based. This will include any remnant enclosure features (including scrub, hedges etc). Baseline surveys will be undertaken for bat species and Barn owl. Barn owl use of nest boxes erected as mitigation for the demolition of the unsafe dwelling at 43 Ochr Waun has been monitored by Sylvan Ecology (2019).

ii) Management Actions 2021-2042

The main action management actions required to protect the marshy grassland from agricultural improvement and intensive grazing whilst controlling excessive scrub invasion. These will be achieved by reinstating fenced enclosures to enable controlled grazing (if required) and access for scrub control.

iii) Provisional Programme

Table 4.30: Retained Marshy Grassland Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline Extent & Condition Surveys & Annual assessment of grassland condition and management needs	July 2021	July 2022-26	July 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2, 3, 4
Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

4. <http://data.jncc.gov.uk/data/485b119e-ccb9-479f-b181-0904e212b434/CSM-Mammals-2004.pdf>

Table 4.31: Retained Marshy Grassland Management Works 2021-2042

Actions	2021	2022-2042	Notes
Livestock grazing - Cattle	May - September 2021	May-September 2022-42	Stocking density to be based on Glastir/successor Welsh Commons scheme for lowland marshy grassland (currently maximum 0.6 LSU/ha* May - September only). To be reviewed annually

*<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Inland Rock & Scree

A small area of exposed scree/rock occurs on the steep north facing slopes of the SOM within the Common Land (Figure 4.1). This feature provides habitat for lichens and bryophytes.

i) Baseline Condition

New baseline surveys will be undertaken of the condition of this habitat, and to set objectives, targets and actions.

ii) Management Actions 2021-2042

The small area of scree with lichen-bryophyte heath on the north slope of the Southern Overburden Mound (Figure 4.1) is to be left unfenced provided that a stewardship like grazing regime is adopted for the combined single WOM-SOM grazing unit. The main management action required for this feature is to protect its integrity through the removal of scrub should it colonise.

iii) Provisional Summary Timetable

Table 4.32: Retained Inland Rock & Scree Management Plan and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline Extent & Condition of Grassland and Targeted Species Survey & Report	July 2021	July 2026	July 2032, 2037, 2042	Methodology – 1, 2, 3
Annual Integrity Monitoring	July 2021	July 2022-26	July 2032, 2037, 2042	
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/a81bf2a7-b637-4497-a8be-03bd50d4290d/UKBAP-BAPHabitats-19-InlandRockOutcrop.pdf>

3. <http://data.jncc.gov.uk/data/9e8ebc52-5062-4c67-a00c-24dbd3248c50/CSM-BryophytesLichens-2005.pdf>

Table 4.33: Retained Inland Rock & Scree Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Erect & Maintain boundary fences and gates	Anytime	Anytime	Ongoing as required
Scrub reduction	N/A	November-January 2032, 2037, 2042	Extent and location to be advised by habitat and species condition report
Livestock excluded	To be kept under review	To be kept under review	

Woodland and Scrub

Woodland, mainly as scrub-woodland, and scrub occur as isolated small clumps or widely scattered open areas within other habitats on retained land around the Site. There are two clumps within the Common Land, one located at the northern foot of the WOM near to the water treatment facility and along the northern boundary and the other on the Common Land is to the south west and on the access road between the offices and the mine working (Figure 4.1).

The woodland provides nesting sites for the Song thrush and the scrub foraging habitat for the Barn owl and bats. The approach to aftercare management is one of minimal intervention. Fencing is the primary management tool to maintain their integrity by encompassing a sufficient buffer area around the existing woodland/scrub to enable subsequent colonisation and succession. Whilst the two woodland clumps are readily definable entities within the Common Land, other areas are less so and can only be approached on an ad hoc basis.

i) Baseline Condition

New baseline surveys will be undertaken to determine the current condition of the woodland/scrub habitats, and to set aftercare objectives, targets and actions.

ii) Management Actions 2021-2042

The management action required for this feature is to protect the integrity of the three woodland clumps from grazing and encroachment.

iii) Provisional Programme

Table 4.34: Retained Woodland & Scrub Management Plan and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
Baseline Extent & Condition of Woodland Survey & Report	July 2021	July 2026	July 2032, 2037, 2042	Methodology – 1, 2, 3
Annual Integrity Monitoring	July 2021	July 2022-26	July 2032, 2037, 2042	
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/6df1057b-5357-400b-a363-c8748298180a/CSM-WoodlandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.35: Retained Woodland and Scrub Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Erect & Maintain fences and gates	Anytime 2022-26	Anytime 2027-42	Ongoing as required
Livestock excluded	Anytime 2022-26	Anytime 2027-42	

Wetland

The two existing water treatment facilities on the northern site boundary are within the Common Land. On decommissioning, ponds are to be retained primarily as habitat for Otter (Figure 4.10 & 4.11).

i) Baseline Condition

New baseline surveys will be collected about the condition of the two water treatment facilities for Otter, and on which management objectives, targets and programmes of actions are to be based.

ii) Management Actions

Subject to Licensing by the NRW, the concrete structures would be removed/capped with the pond at their eastern ends retained and enhanced for Otter as to be agreed with the NRW. In both cases the current chain link fencing would be removed and replaced with stock-proof fencing.

iii) Provisional Programme

Table 4.36: Former Water Treatment Facility Reporting and Review Process for Otter

Actions	2021	2022-2026	2027-2042	Notes
Stakeholder Consultation – Graziers	March 2021	March 2022-26	March 2027-42	Commoner's Association
NRW Otter Licence	January 2021			
Baseline Extent & Condition Surveys & Annual assessment of Otter use / Licence monitoring	May 2021	May 2022-26	May 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2
Drafting of 5-Year Annual Management Plan	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032,	

			2035, 2038, 2042	
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1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/485b119e-ccb9-479f-b181-0904e212b434/CSM-Mammals-2004.pdf>

Table 4.37: Former Water Treatment Facility Management Works for Otter 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Removal/infill of concrete structures	+	+	N/A	
Removal of fencing	+	+	N/A	
Implement licensed enhancement works	+	+	N/A	

Country Park –

Six types of habitat are identified within the Country Park. The most extensive is the retained marshy grassland (Figure 4.1, B) along the eastern margin of the Site, which contains a small flush (C). To the north west there is acid grassland (D). To the south there are two small areas of regenerating broadleaved woodland and two parcels of scrub woodland (recorded as a semi-natural ancient woodland site) (Figure 4.2). The small water treatment facility in the south east is a potential wetland feature. The cliff feature and slopes at the southern end of the Lake are potential lichen-bryophyte heaths. The marshy grassland supports bats, the Barn owl, and the Common lizard (Figure 4.2). The water treatment facility supports the otter and the reed bunting.

Marshy Grassland/Purple Moorgrass

The retained marshy grassland along the eastern fringe of the operational East Pit mine site falls across Common Land and the Country Park. That in the Country Park sits between the two blocks within the Common. Here, it comprises remnant field systems, with boundary hedgerows, which have not been in agricultural use for some decades. These rush dominant severed enclosures provide a tussocky habitat suitable for voles and shrews, the food source for the Barn owl, and damp grasslands with hedges, scrub and trees providing feeding areas and commuting routes for bat species. For these reasons, the aim is for these marshy grasslands to be managed to maintain its integrity and in a condition favourable for Barn owl and bat foraging. A further species feature of conservation importance is the supposed colony of Small Heath Butterfly; the larval food plant being fescues and bent short grassland species usually associated with dry neutral/acid soil conditions.

i) Baseline Condition

New baseline surveys will be collected about the condition of the marshy grasslands and on which management objectives, targets and programmes of actions are to be based. This will include any remnant enclosure features (including scrub, hedges etc). Baseline surveys will be undertaken for bat species and Barn owl. Barn owl use of nest boxes erected as mitigation for the demolition of the unsafe dwelling at 43 Ochr Waun has been monitored by Sylvan Ecology

(2019). Baseline surveys for the reported small heath butterfly colony and suitable habitat will also be undertaken to set management objectives, targets and actions.

ii) Management Actions 2021-2042

The main action management actions required to protect the marshy grassland from agricultural improvement with the control of grazing, whilst controlling excessive scrub invasion. To achieve this, it is proposed the grasslands are fenced to create the Eastern grazing units (Figure 4.12).

The actions for the Small Heath Butterfly need to be based upon confirmation of its presence and suitable habitat. This requires a systematic survey of the retained land to locate suitable habitat and colonies. Some grazing action is likely to be required to maintain short grassland. A detailed programme for the butterfly is not possible without the baseline data.

iii) Provisional Programme

Table 4.38: Retained Marshy Grassland Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Baseline Extent & Condition Surveys & Annual assessment of grassland condition and management needs	July 2021	July 2022-26	July 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2, 3, 4, 5
Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/485b119e-ccb9-479f-b181-0904e212b434/CSM-Mammals-2004.pdf>

4. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

5. <https://www.ceh.ac.uk/our-science/projects/uk-butterfly-monitoring-scheme>

Table 4.39: Retained Small Heath Butterfly Management Plan and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Baseline Population Extent & Habitat Condition Surveys & Annual assessment of butterfly habitat condition and management needs	July & September 2021	July & September 2022-26	July 2029, 2032, 2035, 2038, 2042	To cover the all retained land. Methodology - 1
Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	2029, 2032, 2035, 2038, 2042	

1. <https://www.ceh.ac.uk/our-science/projects/uk-butterfly-monitoring-scheme>

Table 4.40: Retained Marshy Grassland Management Works 2021-2042

Actions	2021	2022-2042	Notes
Reinstate enclosures - erect and maintain stock proof fences and gates	Anytime	Anytime	Ongoing
Livestock grazing - Cattle	May - September 2021	May-September 2022-42	Stocking density to be based on Glastir/successor Welsh Commons scheme (currently maximum 0.6 LSU/ha* May - September only). To be reviewed annually
Scrub control/Hedge cutting (Autumn)	N/A	Autumn 2026, 2031, 2036, 2042	Rolling 5-year programme

*<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Flush

A flush/seepage was identified mid-way along the retained eastern marshy grassland fringe, and within Country Park (Figure 4.1). It is not known the extent and anything of the associated conservation features.

i) Baseline Conditions

New baseline surveys for the condition of the flush(es) will be undertaken to set management objectives, targets and actions.

ii) Management Actions 2021-2042

The main action management actions required to protect the flush(es) from agricultural improvement and stock poaching, and scrub invasion. These will be achieved by fencing the marshy grassland as enclosures (the Eastern grazing unit) to enable the control of grazing.

iii) Provisional Summary Timetable

Table 4.41: Retained Flush Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Flush - Baseline Extent & Condition Surveys & Annual assessment of flush condition and management needs	July 2021	July	July 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2
Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/6fe22f18-fff7-4974-b333-03b0ad819b88/UKBAP-BAPHabitats-59-UplandFlushesFensSwamps.pdf>

Table 4.42: Retained Flush Management Works 2021-2042

Actions	2021	2022-2042	Notes
Erect and maintain stock proof fences and gates	Anytime	Anytime	Ongoing
Exclusion of grazing	Anytime	October-May 2022-42	Grazing to be reviewed after 2026
Scrub control	N/A	Autumn 2026, 2031, 2036, 2042	Rolling 5-year programme

Woodland and Scrub

Woodland, mainly as scrub-woodland, and scrub occur as isolated small clumps or widely scattered open areas within other habitats on retained land around the Site. There are two clumps within the Country Park. One is a linear woodland alongside the southern outfall from the Lake is recorded as an 'ancient woodland' site and the other comprises two small adjacent clumps at the northern foot of the Southern Overburden Mound (Figure 4.1).

The woodland provides nesting sites for the Song thrush and the scrub foraging habitat for the Barn owl and bats. The approach to aftercare management is one of minimal intervention. Fencing is the primary management tool to maintain their integrity by ensuring there is sufficient area around the existing woodland/scrub to enable subsequent colonisation and succession. Whilst these woodland clumps are readily definable entities, other scrub areas are less so and can only be approached on an ad hoc basis.

i) Baseline Condition

New baseline surveys will be undertaken to determine the current condition of the woodland/scrub habitats, and to set aftercare objectives, targets and actions.

ii) Management Actions 2021-2042

The management action required for this feature is to protect the integrity of the three woodland clumps from grazing and encroachment.

iii) Provisional Programme

Table 4.43: Retained Woodland & Scrub Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Baseline Extent & Condition of Woodland Survey & Report	July 2021	July 2026	July 2032, 2037, 2042	Methodology – 1, 2, 3
Annual Integrity Monitoring	July 2021	July 2022-26	July 2032, 2037, 2042	
Drafting & Review of 5 Year & Annual Management Plans	October 2021	October 2026	October 2032, 2037, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2032, 2037, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/6df1057b-5357-400b-a363-c8748298180a/CSM-WoodlandHabitats-2004.pdf>

3. <http://data.jncc.gov.uk/data/dc33b514-d571-44b3-8936-08d2d7a1e1b1/CSM-Birds-2004.pdf>

Table 4.44: Retained Woodland and Scrub Management Works 2021-2042

Actions	2022-2026	2027-2042	Notes
Erect & Maintain fences and gates	Anytime	Anytime	Ongoing as required
Livestock excluded	Anytime	Anytime	

Acid Grassland

The small area of retained acid grassland occurs in the north west of the Park is to be integrated into the newly established acid grassland management programme in that part of the parkland as it is too small to be a separate management entity (Figure 4.1). The area of acid grassland has been identified in the mitigation EERA-B as potential reptile habitat and forms the northern most location of the mown corridor.

i) Baseline Condition

New baseline surveys will be collected about the condition of the acid grassland on which management objectives, targets and programmes of actions are to be based and integrated with those for the new acid grassland.

ii) Management Actions 2021-2042

The main action management actions required to protect the acid grassland from agricultural improvement and intensive grazing, and any scrub control measures.

iii) Provisional Programme

Table 4.45: Retained Acid Grassland Reporting and Review Process 2021/2042

Actions	2021	2022-2026	2027-2042	Notes
Baseline Extent & Condition Surveys & Annual assessment of grassland condition and management needs	July 2021	July 2022-26	July 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2
Drafting of 5 Year & Annual Management Plans	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/15a03fed-f306-4f01-9139-4933e814b9ec/CSM-LowlandGrasslandHabitats-2004.pdf>

Table 4.46: Retained Acid Grassland Management Works 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Erect and maintain stock proof fences and gates	Anytime	Anytime	Anytime	To be part of the newly sown acid grassland
Livestock grazing - Cattle	None#	None#	May-September 2027-42	Stocking density to be based on Glastir/successor Welsh Commons scheme for upland unimproved grassland (currently maximum 0.6 LSU/ha* May - September only). To be reviewed annually

#to align with sown grassland management plan; *<https://gov.wales/glastir-commons-general-rules-booklet-2020-2021>

Wetland

The existing water treatment facility on the south eastern site boundary is within the Country Park. On decommissioning, the three ponds within the facility are to be retained and enhanced primarily as habitat for Otter.

i) Baseline

An updated baseline survey will be collected about the condition of the water treatment facility for Otter, and on which management objectives, targets and programmes of actions are to be based.

ii) Management Actions

Subject to Licensing by the NRW, the “T”-pipes and the plastic-liner along the outfall are to be removed with the pond to be agreed with the NRW (Figure 4.13). The current stock-proof fencing would be retained.

iii) Provisional Programme

Table 4.47: Former Water Treatment Facility Reporting and Review Process for Otter

Actions	2021	2022-2026	2027-2042	Notes
NRW Otter Licence	January 2021			
Baseline Extent & Condition Surveys & Annual assessment of Otter use / Licence monitoring	May 2021	May 2022-26	May 2029, 2032, 2035, 2038, 2042	Methodology – 1, 2
Drafting of 5-Year Annual Management Plan	October 2021	October 2022-26	October 2029, 2032, 2035, 2038, 2042	
Annual Review & Reporting	December 2021	December 2022-26	December 2029, 2032, 2035, 2038, 2042	

1. <http://data.jncc.gov.uk/data/9578d07b-e018-4c66-9c1b-47110f14df2a/Handbook-Phase1-HabitatSurvey-Revised-2016.pdf>

2. <http://data.jncc.gov.uk/data/485b119e-ccb9-479f-b181-0904e212b434/CSM-Mammals-2004.pdf>

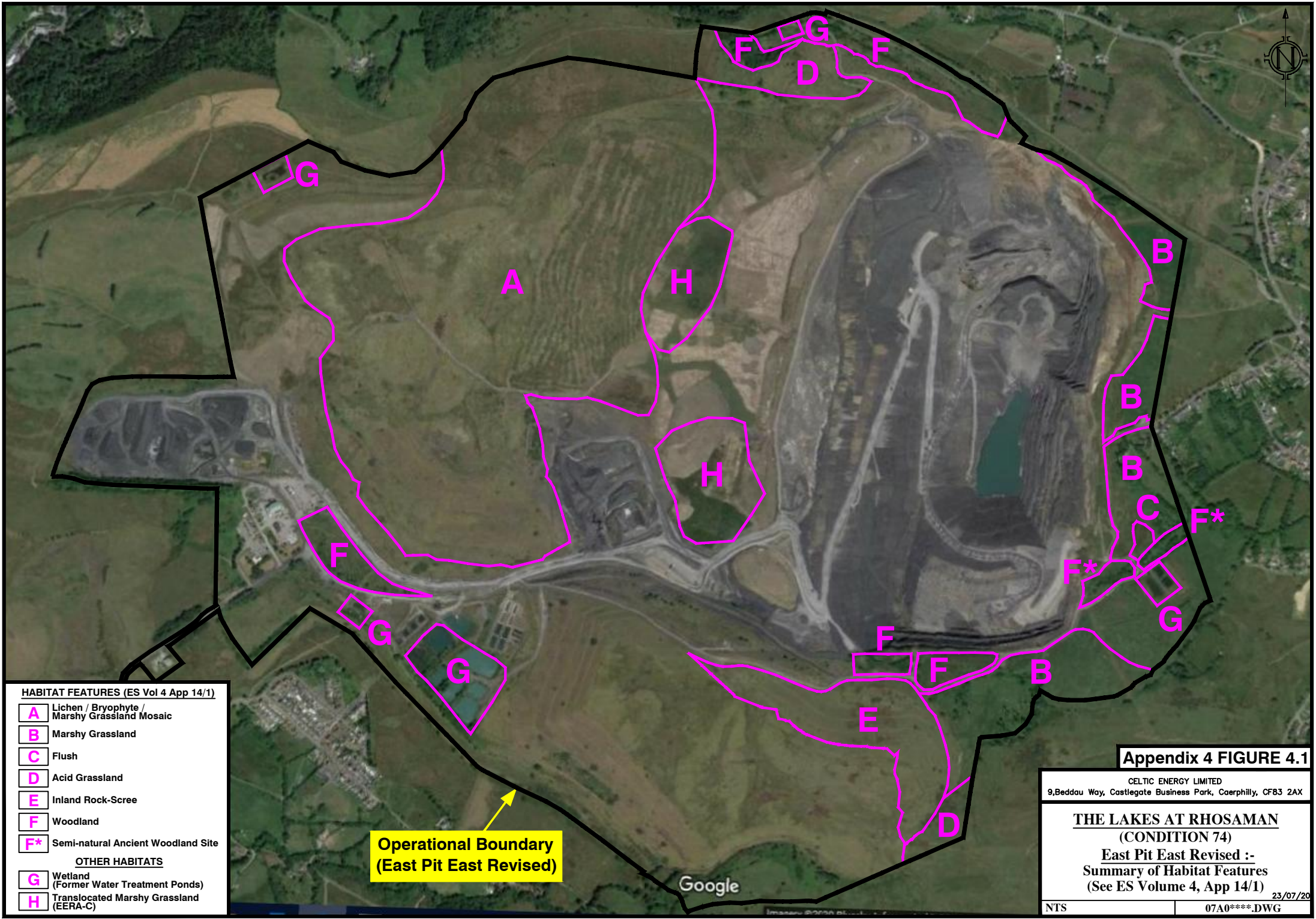
Table 4.48: Former Water Treatment Facility Management Works for Otter 2021-2042

Actions	2021	2022-2026	2027-2042	Notes
Removal of “T”-pipes & plastic liner	+	+	N/A	
Removal of fencing	+	+	N/A	
Implement licensed enhancement works	+	+	N/A	

References

Sylvan Ecology, 2019. East Pit Surface Mine: Ecological Surveys for Otter, Reptile, Badger and Barn Owl. A Report to Celtic Energy, Caerphilly.

Figures



HABITAT FEATURES (ES Vol 4 App 14/1)

- A** Lichen / Bryophyte / Marshy Grassland Mosaic
- B** Marshy Grassland
- C** Flush
- D** Acid Grassland
- E** Inland Rock-Scree
- F** Woodland
- F*** Semi-natural Ancient Woodland Site

OTHER HABITATS

- G** Wetland (Former Water Treatment Ponds)
- H** Translocated Marshy Grassland (EERA-C)

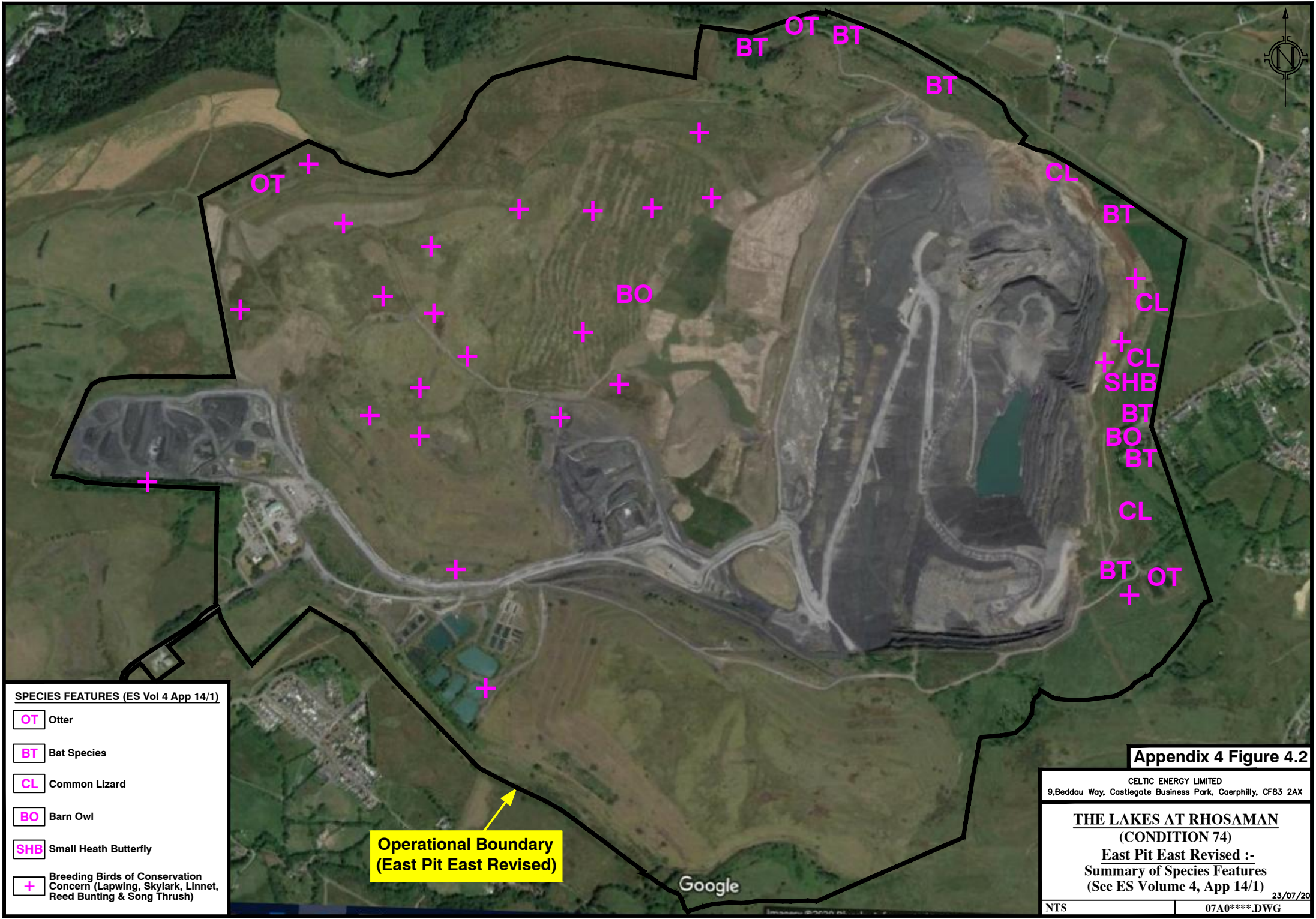
Operational Boundary
(East Pit East Revised)

Appendix 4 FIGURE 4.1

CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

THE LAKES AT RHOSAMAN
(CONDITION 74)
East Pit East Revised :-
Summary of Habitat Features
(See ES Volume 4, App 14/1)

23/07/20



SPECIES FEATURES (ES Vol 4 App 14/1)

- OT** Otter
- BT** Bat Species
- CL** Common Lizard
- BO** Barn Owl
- SHB** Small Heath Butterfly
- +** Breeding Birds of Conservation Concern (Lapwing, Skylark, Linnet, Reed Bunting & Song Thrush)

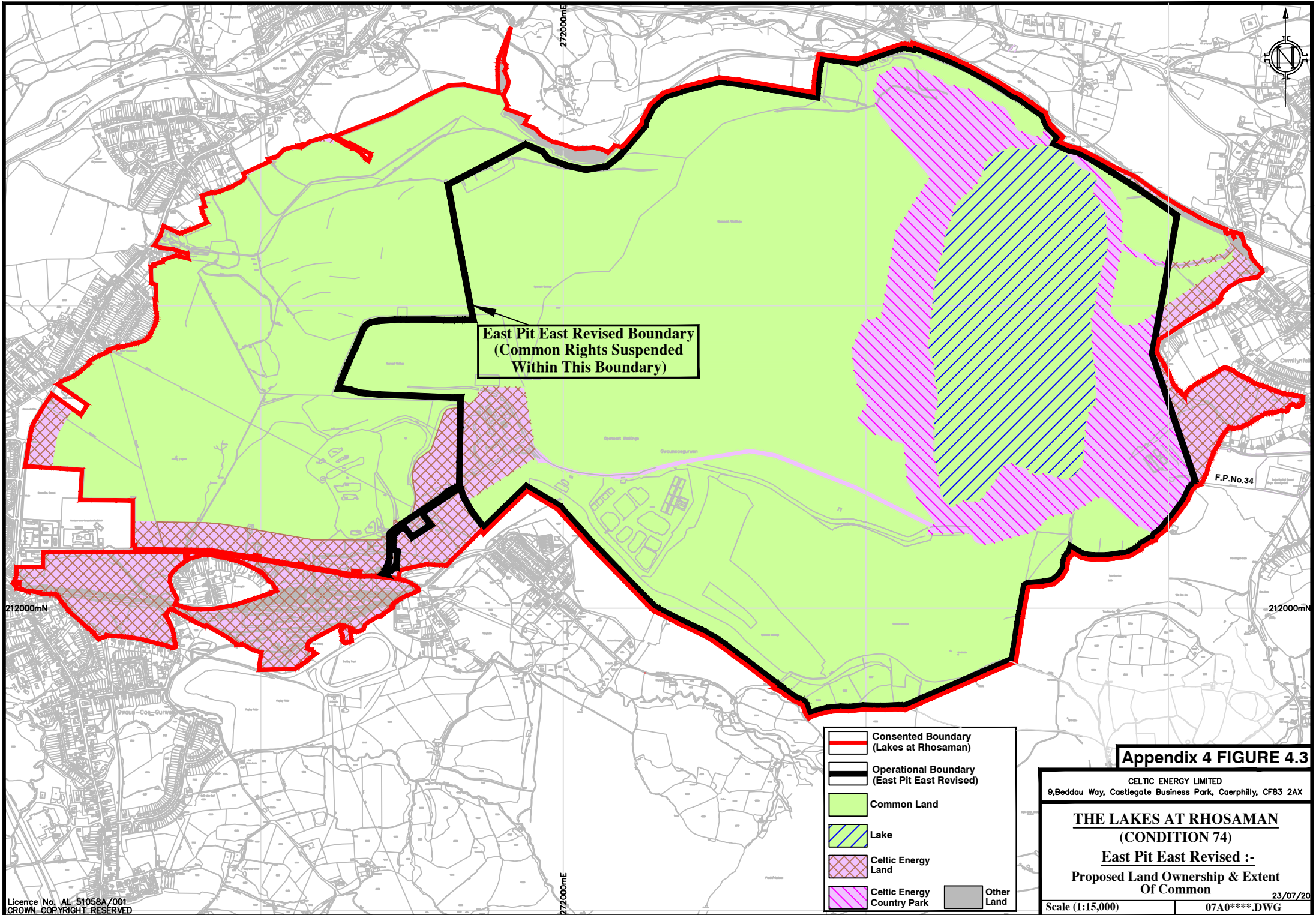
Appendix 4 Figure 4.2

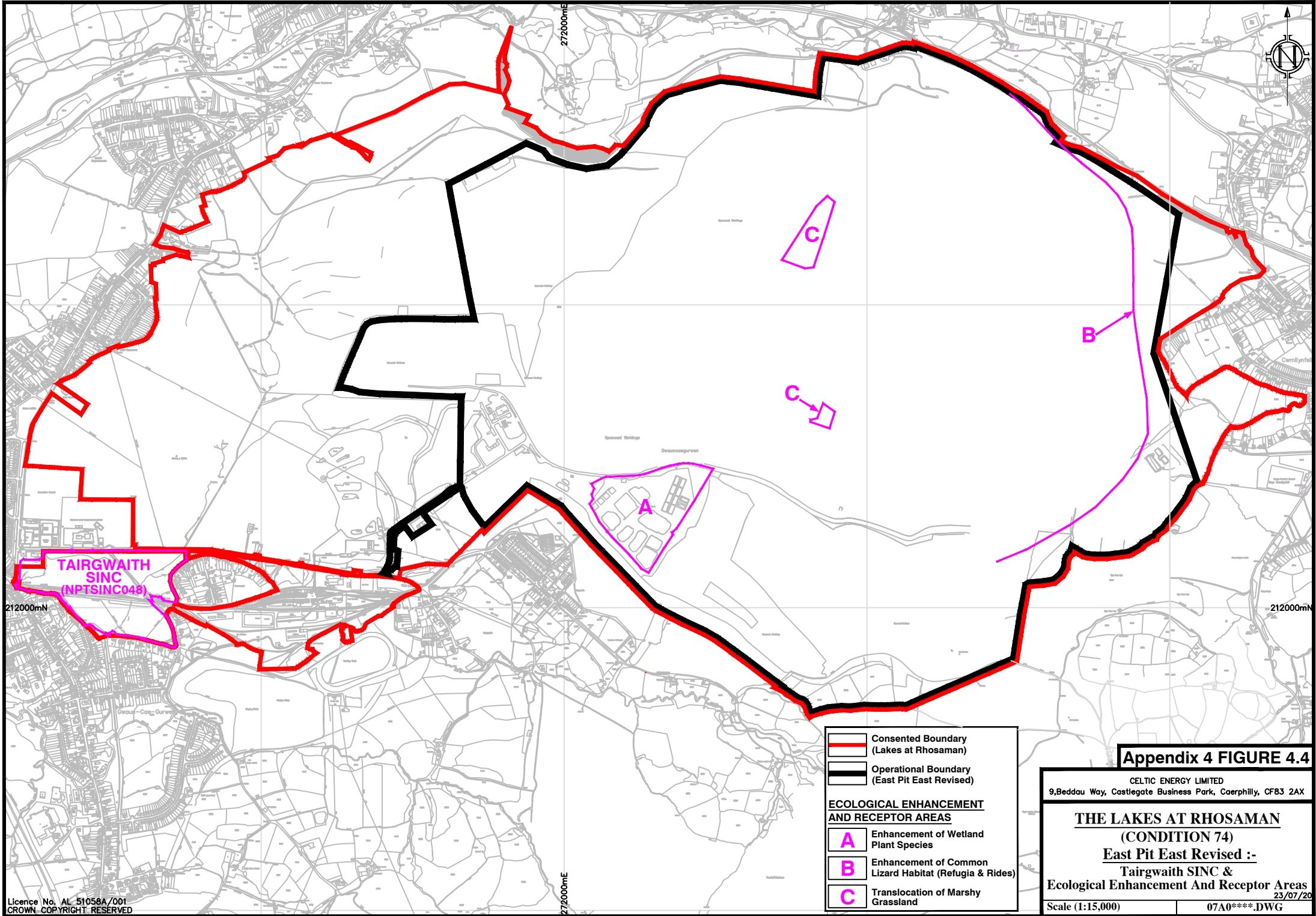
CELTIC ENERGY LIMITED
9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

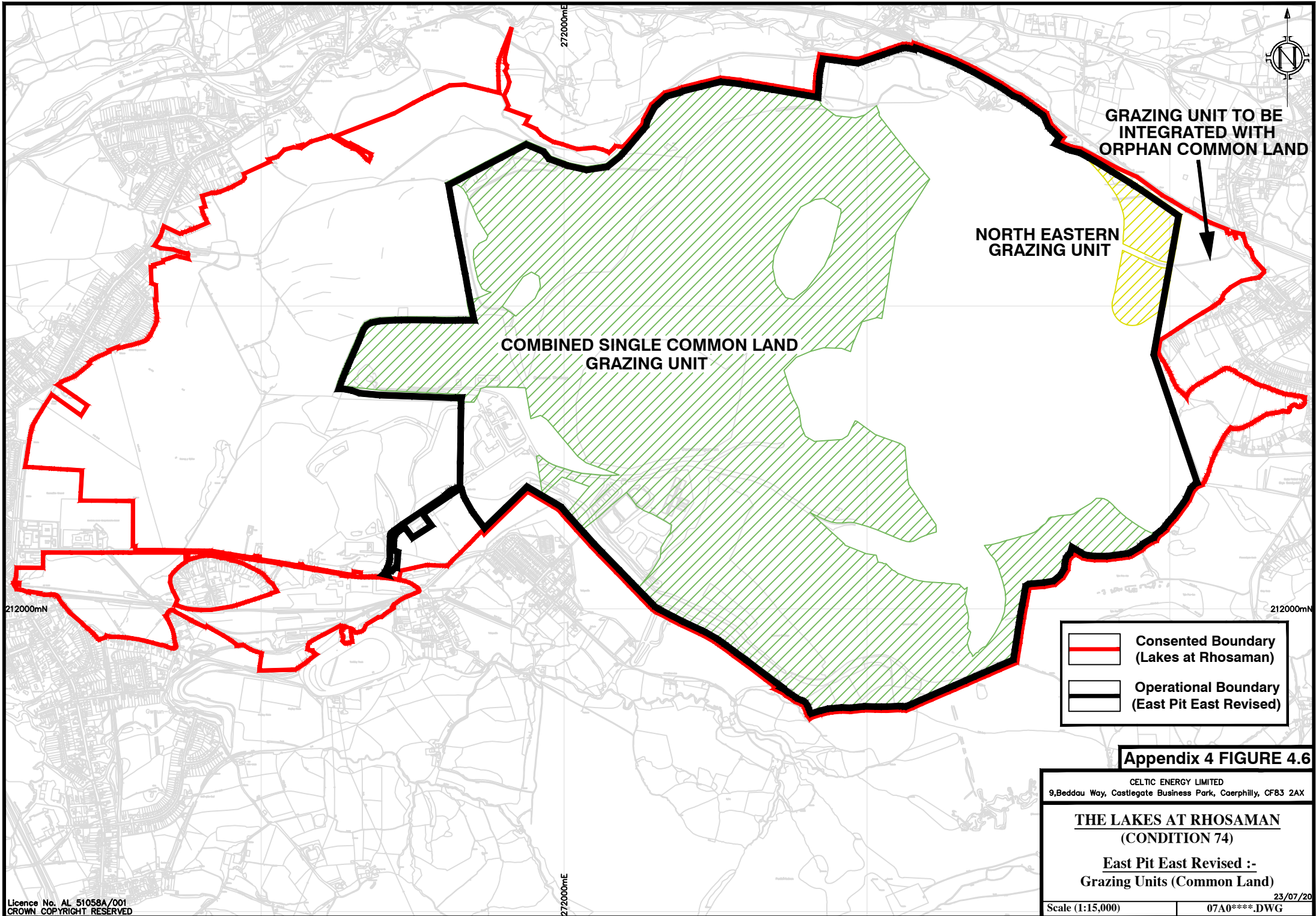
**THE LAKES AT RHOSAMAN
(CONDITION 74)**

**East Pit East Revised :-
Summary of Species Features
(See ES Volume 4, App 14/1)**

23/07/20





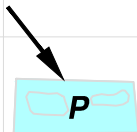


Appendix 4 FIGURE 4.6

CELTIC ENERGY LIMITED 9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
<u>THE LAKES AT RHOSAMAN</u> (CONDITION 74)	
East Pit East Revised :- Grazing Units (Common Land)	
Scale (1:15,000)	23/07/20 07A0****.DWG



**TWO PONDS TO BE COMBINED TO FORM
ONE POND, DE-SILTED & REGRADED
TO CREATE WETLAND HABITAT**



**NEW POND TO BE CREATED AT
SOUTHERN BASE OF WESTERN
OVERBURDEN MOUND**



212500mN

272000mE

	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

Appendix 4 FIGURE 4.7

CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

**THE LAKES AT RHOSAMAN
(CONDITION 74)**

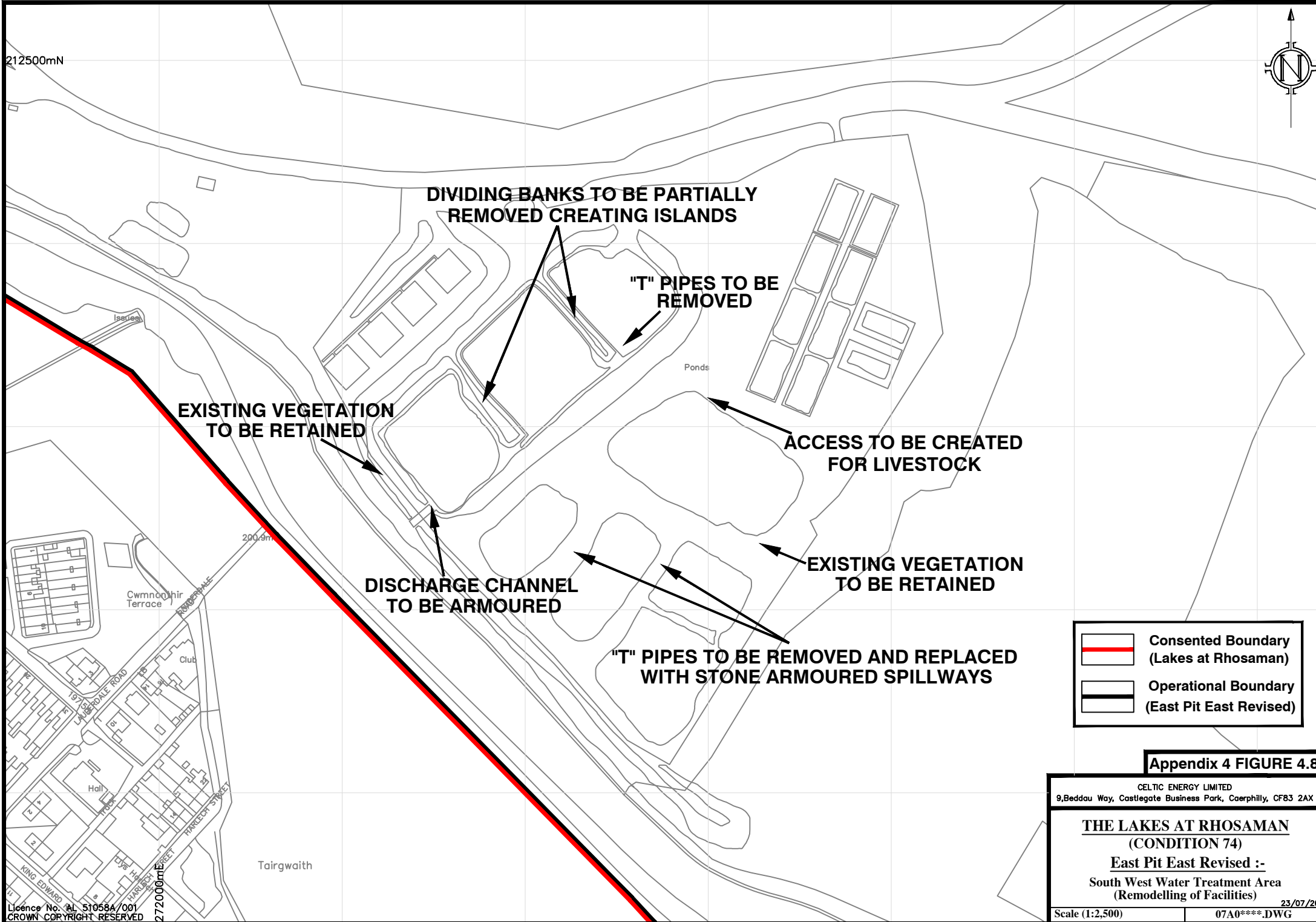
**East Pit East Revised :-
Creation of Wetland & Drinking Ponds**

Scale (1:5,000)

07A0****.DWG

23/07/20

212500mN



272000mE

Tairgwaith

	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

Appendix 4 FIGURE 4.8

CELTIC ENERGY LIMITED
9,Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

THE LAKES AT RHOSAMAN (CONDITION 74)

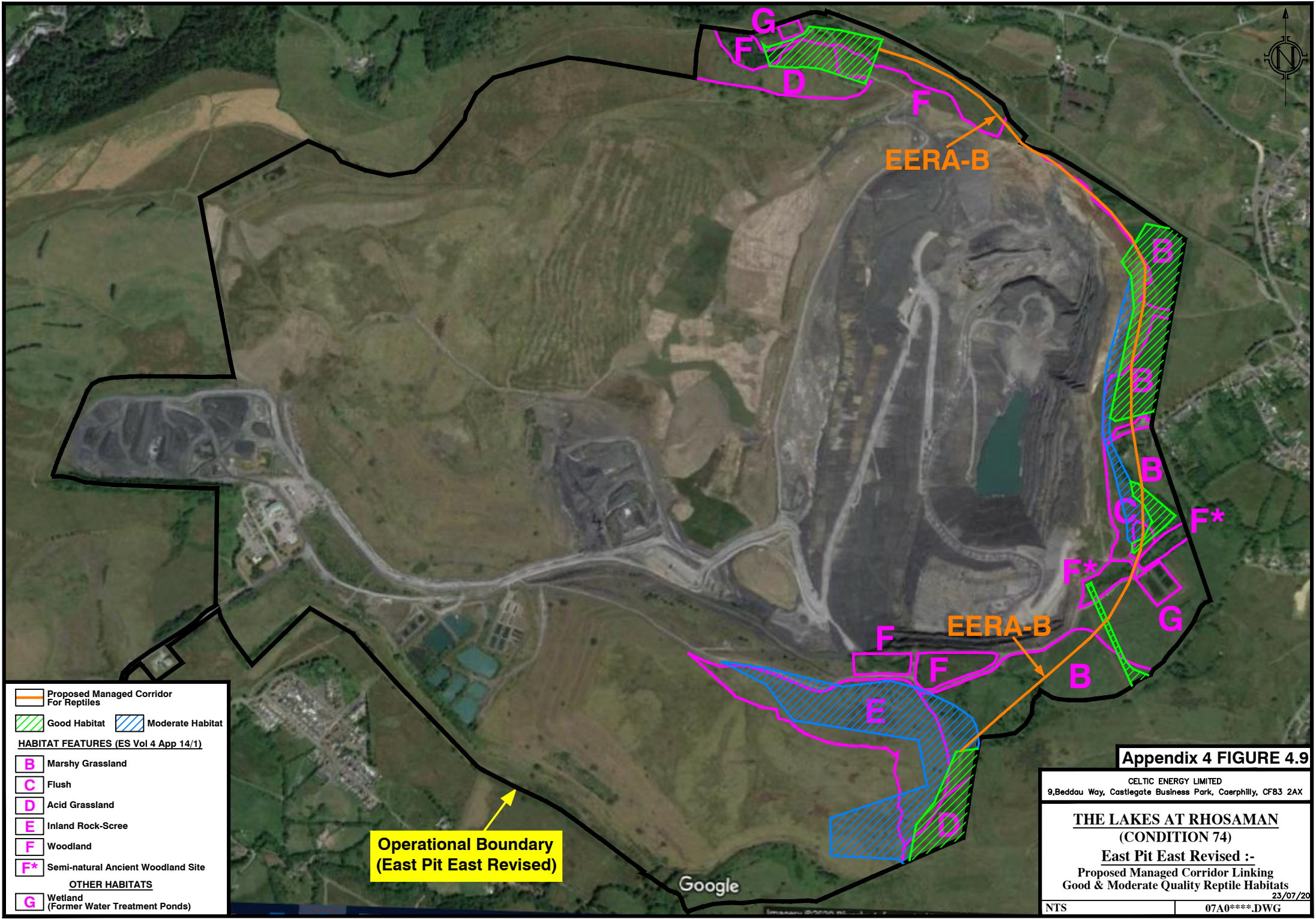
East Pit East Revised :-

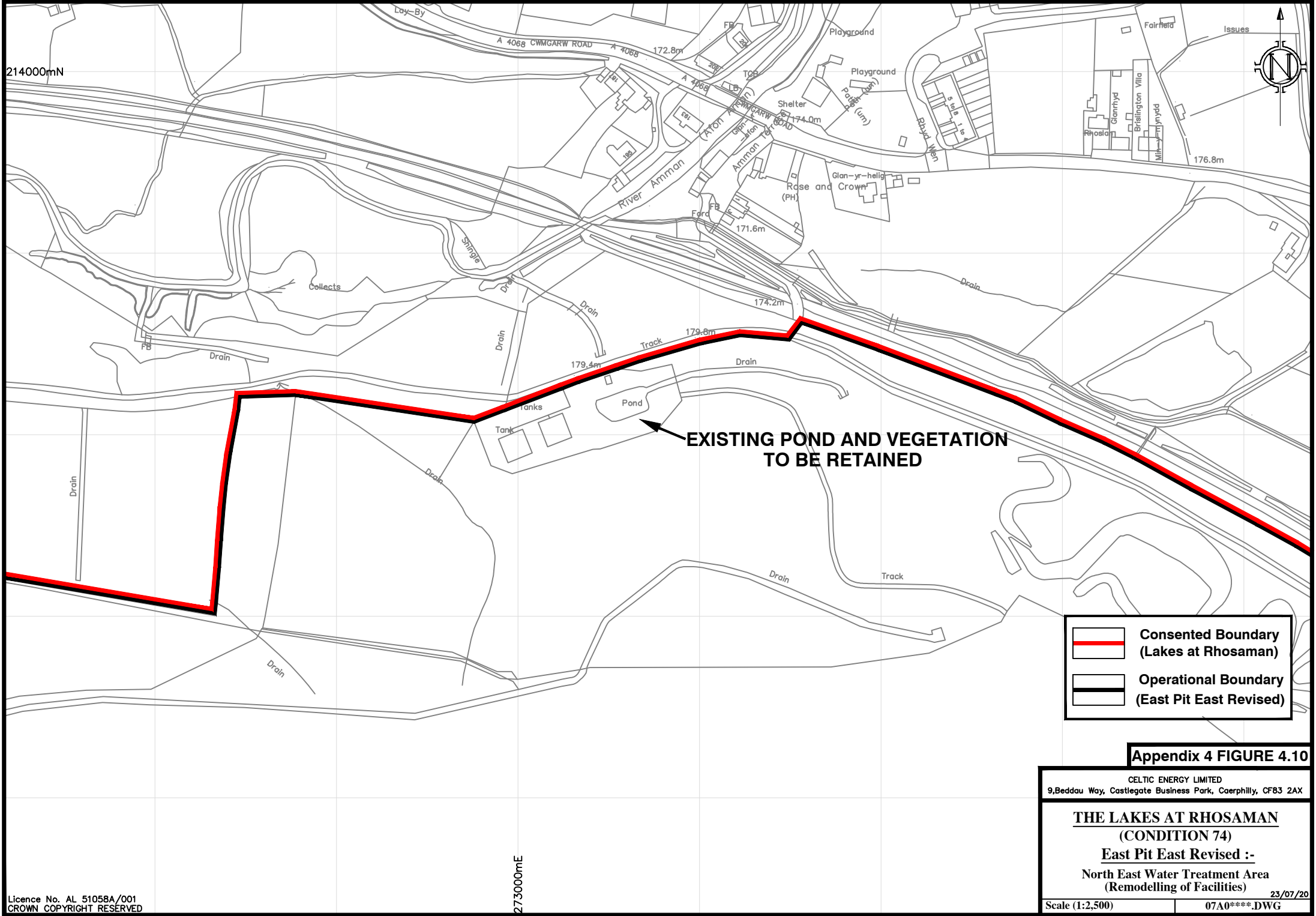
South West Water Treatment Area
(Remodelling of Facilities)

Scale (1:2,500)

07A0****.DWG

23/07/20





	Consented Boundary (Lakes at Rhosaman)
	Operational Boundary (East Pit East Revised)

Appendix 4 FIGURE 4.10

CELTIC ENERGY LIMITED 9, Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX	
THE LAKES AT RHOSAMAN (CONDITION 74)	
East Pit East Revised :-	
North East Water Treatment Area (Remodelling of Facilities)	
Scale (1:2,500)	23/07/20 07A0****.DWG



