

# COG MOORS WWTW – PROPOSED ADVANCED ANAEROBIC DIGESTION (AAD) PLANT

## Habitat Management Plan

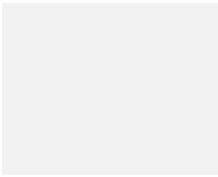
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# Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant

## Habitat Management Plan

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## VERSION CONTROL

Version	Date	Author	Changes
001	November 2017	Siân Carr	Issue of final document
002	March 2018	Siân Carr	Addition of new woodland planting in field north of Green Lane

This report dated 29 March 2018 has been prepared for Welsh Water (the “Client”) in accordance with the terms and conditions of appointment dated 01 July 2014(the “Appointment”) between the Client and **Arcadis Consulting (UK) Limited** (“Arcadis”) for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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4798-S-202-HYD-XX-XX-DR-XX-06120 (P03) – Proposed Site Development
4798-S-202-HYD-XX-XX-DR-NX-06127 (P06) - Landscape Mitigation Plan

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# 1 Introduction

Arcadis Consulting (UK) Ltd (Arcadis) have produced this Habitat Management Plan (HMP) on behalf of Welsh Water to be submitted to the Vale of Glamorgan Council as part of the supporting information for the proposed extension of Cog Moors Waste Water Treatment Works (WwTW) planning application.

The proposed Development comprises an extension to the sludge treatment process at Cog Moors WwTW, including the incorporation of new Advanced Anaerobic Digestion (AAD) plant. The development also requires the connection of a new electrical supply.

This report has been prepared to inform the client and landscape contractors of the management actions to be undertaken post-development. It includes management of habitats within the WwTW and adjacent habitats within Welsh Water land ownership including part of the Cog Moors Site of Importance for Nature Conservation (SINC) and a field to the north of Green Lane; and monitoring and a review of the HMP in Years 5 and 10 post-development.

## 1.1 Site Location

The site is located in the Vale of Glamorgan south of Dinas Powys at National Grid Reference ST 16327 69571 (see Drawing 4798-S-202-HYD-XX-XX-DR-NX-06120 (P03) for the location and survey boundary).

Cog Moors WwTW is situated to the east of the A4055 Cardiff Road, approximately 2 km east of Barry and 1km south of Dinas Powys.

The site contains both concrete and steel process tanks, together with a series of process and control buildings and associated items of plant and equipment.

Vehicular and pedestrian access to the site is gained via a private road (Green Lane), which runs in a south easterly direction from its junction with the A4055.

The WwTW site is located within a low-lying landscape, characterised by flat fields separated by ditches. The land rises steeply to the north of the WwTW site (Pop Hill) and is intermittently wooded.

The nearest residential properties to the WwTW site are located at Downs Farm and Brook Cottage, approximately 230m and 290m to the east, respectively. Other residential properties are located, at distances of more than 0.5 km, on Ashby Road to the south, along Cross Common Road to the north east and along Sully Road and Cog Road to the east and south, respectively.

The WwTW is well screened in the surrounding landscape, and from most of the surrounding roads and properties, by the localised topography and by existing hedgerows and trees. The only significant views of the WwTW are from nearby public footpaths.

The land use within the immediate surrounding area is predominately agricultural with a residential estate to the north-east.

## 1.2 Proposals

The proposed AAD plant comprises a number of new process and storage tanks and buildings, together with the demolition and modifications to some existing items of plant and equipment. The AAD plant will operate in conjunction with the existing treatment facilities and is located to the east of the existing sewage sludge treatment infrastructure.

Part of the new development will be sited within the existing operational area of the WwTW whilst the remainder will be sited to the east within part of the Cog Moors SINC. Temporary construction compounds will also be sited on an area of mown grassland, within the Cog Moors SINC and an upgrade to the electricity connection will also be required through part of the SINC.

During the construction period, appropriate ecological mitigation measures will be implemented to protect wildlife in accordance with a Project Environment Management Plan (PEMP, Ref 1) and mitigation planting will be undertaken including new woodland planting in a field north of Green Lane. The site layout including proposed habitats are shown on Drawing 4798-S-202-HYD-XX-XX-DR-NX-06127 (P06). This HMP details the long-term management of both existing and new habitats within the planning application boundary.

### 1.3 Baseline Conditions

A Phase 1 Habitat survey was undertaken in 2016 by Mott MacDonald Bentley (MMB) of the WwTW and Arcadis have undertaken a range of ecological surveys in 2016 and 2017 surveying the area adjacent to the WwTW that forms part of the SINC and in 2018 the field north of Green Lane. The results of these are summarised below:

- The MMB desk study identified that the western part of the site is within the Cog Moors Site of Special Scientific Interest (SSSI) and that the eastern edge is part of the Cog Moors SINC. The Phase 1 survey identified areas of hardstanding (including buildings), woodland, hedgerows, dry ditches, tall ruderals and amenity grassland within the WwTW footprint (Ref 2). MMB identified the presence of Indian (Himalayan) Balsam *Impatiens glandulifera* within the site boundary and a small area of Japanese Knotweed *Fallopia japonica* located just outside the WwTW entrance.
- The Arcadis extended Phase 1 habitat survey identified tall ruderals, dense scrub, marshy grassland, broad-leaved plantation, neutral grassland and species-poor semi-improved grassland within the part of the site that is within the SINC (Ref 3). Indian (Himalayan) Balsam was also found within the woodland area.
- The Arcadis 2017 botanical survey identified that although the SINC was designated for Purple Moor-grass and rush pasture this habitat was not present within the planning application boundary. The botanical survey did identify that there was grassland of SINC quality which was “neutral grassland/lowland meadow” (Ref 4)
- The 2017 protected species surveys identified that a range of commuting and foraging bat species (mainly common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus* but also a few noctule *Nyctalus noctule*, *Myotis* sp. and a potential long eared bat) were present (Ref 5).
- There were no signs of badger *Meles meles* or reptile (Ref 11 and Ref 12).
- Of the trees to be removed to facilitate the development, only one was considered to have low potential for roosting bats and surveys found no evidence of bats (Ref 6).
- Evidence of nesting dormouse was found in Cog Moors SINC in October and November 2017 (Ref 7).
- Surveys were undertaken on three ponds within 250m of the Proposed development for great crested newt *Triturus cristatus*. These surveys were negative but due to access constraints several other ponds were not surveyed. There are a number of records for great crested newts in the locality and it is considered reasonable to assume that great crested newts are present in nearby ponds and therefore may be present in terrestrial habitats within the proposed Development (Ref 8).
- The field north of Green Lane comprises poor semi-improved grassland with an area of scrub half way up the field linking to the eastern boundary and a strip of semi-natural broadleaved woodland along the southern boundary bordering Green Lane (Ref 3).

The previous reports identified that the development impacts included loss of broad-leaved woodland (which supports dormouse), the tree described above with low potential to support roosting bats, and species-rich neutral semi-improved grassland within the SINC boundary (Ref 3).

The Biodiversity Strategy (Ref 9) and HMP have been devised with the assumption that great crested newt (in terrestrial habitats) are present on site although to date no evidence has been found; that these species will need protection during construction; and that the habitats on site should be managed such that they continue to support these (and other) species in the future.

A Project Environmental Plan (PEMP, Ref 1) has been produced with reference to the HMP and Biodiversity Strategy (Ref 9) and details protection measures during construction accordingly.

### 1.4 Scope of Habitat Management Plan

The HMP has been designed in collaboration with Welsh Water such that it can be incorporated into and undertaken in conjunction with existing management regimes.

This HMP sets out suitable prescriptions for the long-term management of existing and newly created habitats post-development as detailed in the Landscape Management Plan (Ref 10) whilst enabling ongoing operation of the WwTW. The HMP will be reviewed in Years 5 and 10 post-development but will likely form the management proposals for the life of the site. The overall aim is enhancement of existing habitats and/or creation of new habitats of value to nature conservation, leading to increased biodiversity and opportunities for wildlife.

In addition, a monitoring programme will be implemented to identify early changes in habitat quality and to determine any remedial measures that may be required.

## 1.5 Structure of Document

The HMP has been prepared in accordance with the specifications outlined in the British Standard BS42020:2013 (Ref 13); clause 11.1 and includes the following:

- Management aims and objectives;
- Management prescriptions including ecological constraints on site that might influence management;
- Monitoring actions (including baseline/thresholds and reporting); and
- Remedial measures.

This document should be read in conjunction with the PEMP (Ref 1) and the Biodiversity Strategy (Ref 9).

## 2 Management Aims and Objectives

The overarching aim of the HMP is enhancement of existing habitats and/or creation of new habitats of value to nature conservation, leading to increased opportunities for wildlife and overall securing a net gain in biodiversity. This will be achieved through the following:

- Re-instatement of SINC grassland areas disturbed during construction (i.e. the temporary compound area within the SINC boundary);
- Creating species-rich grassland along the route of the upgraded electricity supply;
- Creating a species-rich woodland in the field north of Green Lane to be managed specifically for dormouse (to compensate for the loss of woodland);
- Initiate and continue management of existing woodland within the WwTW and SINC;
- Improve long-term management of amenity grassland within the WwTW site;
- Continued protection of the Cog Moors SINC;
- Maintain ecological connectivity across the site, with the SINC and with the wider area;
- Encourage a diverse fauna assemblage through the provision of a range of nest boxes, log piles from wood felled on site and hibernacula; and
- Eradication of Indian (Himalayan) Balsam and prevent the spread of Japanese Knotweed.

Aims and objectives have been set for each main habitat type on site. The habitat may be sub-divided into compartments at a later stage for monitoring purposes.

### 2.1 Site Wide

Existing management of the WwTW is regular grass cutting of the amenity areas. No habitat management occurs within the woodland or SINC grassland areas. New ditches will be created as part of these proposals and will form part of the existing ephemeral ditch network on site. There are several measures to be undertaken across the site to ensure there are increased opportunities for wildlife:

- Provision of nest boxes for bats, birds and dormice (if dormice are found);
- Provision of log piles and hibernacula for reptiles, amphibians, invertebrates and hedgehog *Erinaceus europaeus*;
- Maintain ditches to ensure seasonal availability of ephemeral water for aquatic species;
- Keep site clear of non-native invasive species (i.e. Japanese Knotweed and Indian (Himalayan) Balsam which are listed on Schedule 9 of the Wildlife and Countryside act 1981, as amended) and /or ensure they do not spread;
- Maintain boundary fence to reduce the likelihood of habitat damage caused by trespassing, littering and vandalism; and
- Avoid the use of herbicides and pesticides through the use of mulch to encourage healthy growth and the removal of weedy and injurious species by mechanical measures where practical.



## 2.2 Amenity Grassland

Approximately 0.01ha of amenity grassland will be planted on site around new structures and plant. These habitats will be managed in a manner that is compatible with operation of WwTW with the following aims:

- Ensure new planting establishes;
- Maintain a short attractive grassland sward through regular management;
- No use of fertiliser and minimal use of non-persistent herbicide.

## 2.3 Species-rich Grassland

Approximately 0.63ha of existing amenity grassland within the WwTW footprint will be managed such that it forms a species-rich grassland. These areas will be managed with the following aims:

- Ensure new planting establishes in the first year;
- Maintain balance between grasses and wild flowers in newly planted areas through regular management in the first year;
- Removal of injurious weeds;
- Maintain flower-rich grasslands with up to three cuts a year;
- Encourage diverse structure including tussocks;
- No chemical input unless necessary and then only spot use of non-persistent herbicide.

## 2.4 SINC Grassland

Within the planning application area is approximately 0.63ha of grassland that is neutral semi-improved/lowland meadow that qualifies as SINC quality habitat. This grassland will not be impacted by the proposed Development but will be managed to maintain the habitat at SINC quality through no input of fertiliser and appropriate management techniques.

As part of the development a temporary compound area (0.23ha) will be created on some of the SINC grassland habitat; post-development this area will be re-instated using the retained original top soil and its corresponding seed bank as described in the Landscape Management Plan (Ref 10). The retained top soil will also be used to seed the wayleave above the new electricity supply (0.16ha).

The aims of the habitat management for the SINC grassland are to:

- Re-establish grassland on the temporary compound and the wayleave;
- Maintain flower-rich grasslands with “hay” cuts in mid-summer;
- Remove injurious weeds;
- Encourage a range of wildlife with provision of log and compost piles on the edge of the valuable grassland habitat in locations that will not interfere with grass cuts;
- Encourage diverse structure including tussocks; and
- No chemical (i.e. no herbicide, pesticide or fertiliser) input.

## 2.5 Hedgerows

There is a hedgerow along the north-east boundary of the site which is covered by a Tree Preservation Order. The aims of the long-term management of the hedgerow network is to increase its function as a wildlife corridor through the following:

- Ensure new native species planting is successful;
- Maintain a wide and dense structure;
- Maintain any standard trees with good structure and form to bear flowers, fruits and seeds.

## 2.6 Woodland, Tree and Shrubs

Within the planning application area approximately 1.66ha of existing woodland, comprising both semi-natural and plantation woodland, and 0.52ha scrub will be retained. 0.05ha broadleaved plantation woodland will be created post-construction within the Cog Moors SINC and a further 1.17ha in the field north of Green Lane. Sixteen individual tree specimens will also be planted across the site.

As described in the Landscape Management Plan (Ref 10) where possible coppiced tree stools will be translocated from areas to be developed into areas of woodland creation. Any supplementary woodland planting will comprise of the mix shown on Drawing 4798-S-202-HYD-XX-XX-DR-NX-06127 (P06). Any replacement woodland and shrub planting that is required during long-term management should adhere to the planting schedule provided in Appendix A.

The aims of the woodland management are:

- Remove grazing pressures within the field north Green Lane;
- Ensure new and translocated planting is successful;
- Encourage a range of wildlife with provision of nest boxes, log piles and a hibernaculum at the woodland edge;
- Encourage development of woodland structure with main canopy, shrub layer and ground flora;
- Encourage development of trees and shrubs with good structure and form to bear flowers, fruits and seeds;
- Establish and maintain a graded profile along the peripheral edges to create a varied structure and habitat diversity;
- Establish a long rotation coppice (15-20 years); and
- Retain dead standing wood for invertebrates and roosting bats where safety allows.

## 2.7 Wildlife Area

An area (0.05ha) has been set aside for wildlife/biodiversity within the existing treatment works. This area is a capped off storm tank currently covered by Butterfly-bush *Buddleia davidii*. Although Butterfly-bush will support a range of butterflies and other invertebrates during summer months particularly when it is flowering, and may be used by birds for nesting, it is not a UK native species. Therefore, post-development this area will be subject to clearance and the Butterfly-bush will be replaced by native shrub planting (e.g. Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa* and Dog-rose *Rosa canina* agg.). The habitat management aims are:

- Create a more diverse flora;
- Create a varied structure to the vegetation height;
- Encourage a range of wildlife with provision of log piles.

## 3 Management Prescriptions

Management prescriptions for the above habitat features are set out in detail for each habitat in Appendix B. The prescriptions detail the management operations to be carried out and appropriate timing for the works. This includes details for existing, retained and newly created habitats.

A detailed work schedule is provided in Appendix C detailing the minimum measures required to maintain and enhance biodiversity, it should be noted that this is live document and prescriptions may require amendment dependent on the results from monitoring undertaken in the summer months of Years 5 and 10.

### 3.1 Ecological Constraints

Surveys to date have identified several ecological constraints that require consideration during the management of habitats. The key seasonal constraints that influence long-term management practices / prescriptions within this document are outlined in Table 1, below.

These define the seasonal constraints associated with species or species groups and action that are affected. Red denotes no activity to be undertaken; yellow: activity to proceed with additional precautions; green: activity to continue without constraint.

Further information is provided in the Biodiversity Strategy (Ref 8).

**Table 1: Key seasonal management constraints**

Constraint	J	F	M	A	M	J	J	A	S	O	N	D	Management Implications
<b>Bat activity period.</b>	Green	Green	Green	Red	Red	Red	Red	Red	Red	Red	Green	Green	Where tree / tree limb removal is considered necessary for reasons of Health and Safety, a licensed bat ecologist shall assess the tree for roosting bats in advance. Their advice shall be followed with respect to timings for limb removal and whether a Natural Resources Wales (NRW) licence is required.
<b>Bird nesting period (covering any vegetation which could be used by nesting birds e.g. scrub, trees, bushes)</b>	Green	Green	Red	Red	Red	Red	Red	Red	Green	Green	Green	Green	Vegetation clearance shall be undertaken over winter to avoid direct impacts on nesting birds.
<b>Reptile activity period.</b>	Green	Green	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Green	Green	If cuts of grassland within 2m of hedgerows and woodland edges are necessary in September and October, the flail shall be set to 150 mm to prevent harm to reptiles potentially present in this habitat.
<b>Reptile hibernation/amphibian dormancy period.</b>	Red	Red	Yellow	Green	Green	Green	Green	Green	Green	Yellow	Red	Red	Removal of bases of trees / shrubs and subterranean roots, where reptiles might be hibernating, shall not take place over winter.
<b>Newt breeding season</b>	Green	Green	Red	Red	Red	Red	Red	Red	Yellow	Yellow	Green	Green	Maintenance works on the ditches shall only be undertaken during the winter months to minimise impacts on breeding newts (if they are present).
<b>Dormouse hibernation period</b>	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green	Red	Red	Where necessary or appropriate, vegetation shall be cut to 500mm over winter (i.e. outside the bird breeding season). Stump/root extraction shall take place April to avoid impacts on hibernating dormice (if present).

## 4 Monitoring

### 4.1 Overview

The site shall be assessed annually to identify whether remedial actions need to be taken, in particular to review the success, or otherwise, of the new planting. During Years 5 and 10 a botanical survey of the SINC grassland shall be undertaken during the summer months.

To assess that the management aims are being met the management prescriptions shall be subject to review at the end of Year 5 and Year 10. This walkover shall assess the condition of habitats and allow for changes to be made to the HMP management actions. The reviewed and updated HMP shall be provided to the Vale of Glamorgan Council before it is finalised and works in Year 6 to 11 (and beyond) are undertaken.

A five-year review period is considered to be appropriate for the scale of development.

## 4.2 Monitoring

A monitoring programme to assess the condition of the new and existing habitats is summarised below and shall be implemented to assess the effectiveness of the management approaches in delivering the ecological objectives detailed above and to ensure remedial actions are implemented as required where the objectives are (or may not) be met.

Annual monitoring shall occur and inform the ongoing management of the site, but a more formal process including a botanical survey of the SINC grassland, shall be undertaken Years 5 and 10. The monitoring in years 5 and 10 shall be carried out by a suitably qualified ecologist who shall undertake an assessment of the condition of the habitats and the current potential to support a diverse assemblage of fauna species. Table 2 below details the minimum monitoring measures.

**Table 2 – Monitoring Requirements**

Monitoring Measures	Monitoring Requirement
<b>Site Wide</b>	
Assess damage to habitats such as grazing, presence of litter and /or vandalism	Identify need for further fencing and/or security requirements
Establish extent of use of nest boxes	Identify need for additional and/or re-positioning of boxes, a licenced person shall be required to assess bat boxes (and dormice nest boxes if required)
Assess damage to nest boxes, hibernacula and log piles	Identify need for replacements
Assess damage to fencing	Identify need for repairs
Establish presence of Schedule 9 species	Identify need for additional eradication measures
Assess level of vegetation in ditches and blockages of culverts	Identify need for de-silting/clearance works
<b>Woodland, trees and hedgerows</b>	
Assess dead/damaged specimens	Identify need for replacements
Assess stakes, guards and ties	Identify need for adjustments and replacement
Assess structure of woodland (i.e. ground flora, shrub layer and main canopy)	Identify need for additional clearance/felling
Assess if hedgerows are intact with no gaps	Identify need for additional planting
Assess if hedgerows are dense and bearing fruit, seeds and flowers	Identify need for change in management
Quantify level of bare ground in field north of Green Lane	Identify need for additional shrub and ground flora planting
<b>Grasslands</b>	
Quantify sward height and grass to herb ratio	Identify need for change in management frequency
Quantify bare ground	Identify need for additional sowing
Identify and quantify the presence of scrub and any weedy (e.g. docks and thistles) and/or injurious species (e.g. common ragwort)	Identify need for spot treatment and change in management frequency
Species list; specifically identify if newly planted grassland supports the species sown, if there are any species present that may compromise the value of the grassland; and if SINC qualifying habitat is present (i.e. quantify number of neutral	Identify need for additional sewing, spot treatment of weedy species and any changes in in mowing frequency

Monitoring Measures	Monitoring Requirement
semi-improved / lowland meadow indicator species present). To be undertaken in Years 5 and 10 only.	

### 4.3 Remedial Measures

The monitoring measures shall be compared against the pre-works baseline and targets/thresholds. This shall establish if mitigation has been successful and whether any remedial measures are required. Some potential adverse outcomes have been identified along with thresholds and the remedial measure are detailed in Table 3 below.

**Table 3: Potential adverse monitoring outcomes and proposed remedial measures**

Monitoring Outcome Identified	Remedial Measure
<b>Evidence of fly tipping/vandalism</b>	Remove any fly-tipping immediately, and repair fencing as necessary
<b>Evidence of livestock entering the site and grazing</b>	Undertake checks for any fencing breaches and repair accordingly
<b>Unused nest boxes</b>	If nest boxes are not used in the first 2 years then, in consultation with an ecologist, re-site in time for the next breeding season
<b>Damaged nest boxes</b>	Replace any damaged nest boxes
<b>Damaged fencing</b>	Immediately repair damaged fencing
<b>Presence of Schedule 9 species (Indian (Himalayan) Balsam)</b>	Implement measures for the removal of any invasive plants in the following June and September by cutting or hand pulling individual stems.
<b>Presence of Schedule 9 species (Japanese Knotweed)</b>	Implement measures for the removal of any invasive plants in following June and September by the use of spot herbicide treatments/stem injection to avoid damage to surrounding habitats.
<b>Blocked ditches and culverts</b>	If the extent of vegetation in the ditches is more than 50% and/or the culvert is blocked then undertake vegetation clearance, litter removal and de-silting.
<b>Dead and/or damaged new planting</b>	Replace any dead/damaged specimens with live specimens of the same species in the next planting season (in accordance with the planting schedules in Appendix A)
<b>Missing stakes and guards and/or ties constricting tree growth</b>	Replace any missing stakes and guards, and loosen ties to allow tree growth.
<b>Woodland ground flora not establishing in existing woodland</b>	If ground flora cover is less than 10% of the woodland floor then undertake further understorey scrub clearance and tree felling to create openings in canopy.
<b>Woodland ground flora not establishing in new woodland north of Green Lane</b>	If ground flora cover is less than 10% of the woodland floor then undertake additional seeding

Monitoring Outcome Identified	Remedial Measure
<b>Gaps identified in hedgerow</b>	If any gaps exceed 1m in length then re-plant with new specimens in the next planting season (in accordance with Appendix A)
<b>No flowering, fruit or nut bearing specimens in hedgerows</b>	Increase the interval between cuts of hedgerows to limit the quantity of new growth removed.
<b>No flowering, fruit or nut bearing specimens in new woodland north of Green Lane</b>	Increase the interval between the coppice rotation
<b>Dense grass growth/drop in species diversity in species rich grassland</b>	Increase mowing frequency to include additional cuts in September and/or March if species rich grassland areas are identified as supporting less than 12% wild flowers (the starting mix is 25%)
<b>Patches of bare ground within grassland area</b>	Patch re-seeding if the extent of bare ground reaches 10% of the grassland area
<b>Scrub growth in grassland areas</b>	Scrub clearance during winter months if the extent of scrub reaches 10% of the grassland area
<b>Weedy and/or injurious species present</b>	Additional spot treatment if weedy and/or injurious species are found to cover more than 10% of grassland areas

Table 3 is not an exhaustive list and the ecological consultant may recommend further remedial measures depending on the condition of the habitats on site. Any additional measures should be discussed with the Vale of Glamorgan Ecologist.

A monitoring report shall be produced by the personnel undertaking the monitoring surveys, which shall detail survey results, data analysis and determine whether the mitigation provided has been successful. A more detailed report shall be produced at the end of Years 5 and 10 post-development. This shall identify any actions required to maintain or enhance the nature conservation value of the site. Any significant damage noted due to vandalism/severe weather shall be reported to Welsh Water to enable them to undertake immediate reparations.

## 5 Responsibilities

Welsh Water shall be responsible for ensuring the HMP is implemented.

Welsh Water shall be responsible for the appointment of suitable landscape contractors to carry out the management and monitoring actions detailed in the HMP.

Welsh Water shall ensure that an appropriately experienced skilled and licenced bat ecologist is appointed to assess trees to be removed for their potential to support roosting bats. If a roost is identified, then Welsh Water shall ensure a licence is granted by the statutory licencing body (currently NRW) before the tree is felled.

Welsh Water shall ensure that the Local Planning Authority (currently Vale of Glamorgan Council) are issued with copies of the monitoring reports.

Welsh Water shall be responsible for ensuring an appropriately, skilled ecological consultant is appointed to undertake monitoring of the bat boxes in years 5 and 10 and dormouse boxes in years 1, 2 and 3 (or as detailed in the approved disturbance licence from Natural Resources Wales).

The management and monitoring measures detailed in this document shall be funded by Welsh Water.

## 6 References

1. Skanska (2018) Cog Moor WwTW Upgrade AAD Plant – Project Environmental Management Plan
2. Mott MacDonald Bentley (2016) Cog Moors WwTW South Sludge Strategy - Preliminary Ecological Appraisal.
3. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Addendum Preliminary Ecological Appraisal
4. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Cog Coors SINC Botanical Survey Report
5. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Bat Activity Survey Report
6. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant Bat tree Roost Assessment Report
7. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Dormouse Survey Report
8. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Great Crested Newt Survey Report
9. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Biodiversity Strategy
10. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Landscape Management Plan
11. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Badger Survey Report
12. Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant – Reptile Survey Report
13. British Standards (2013) BS 42020:2013 Biodiversity – Code of Practice for Planning and Development

## **Drawings**

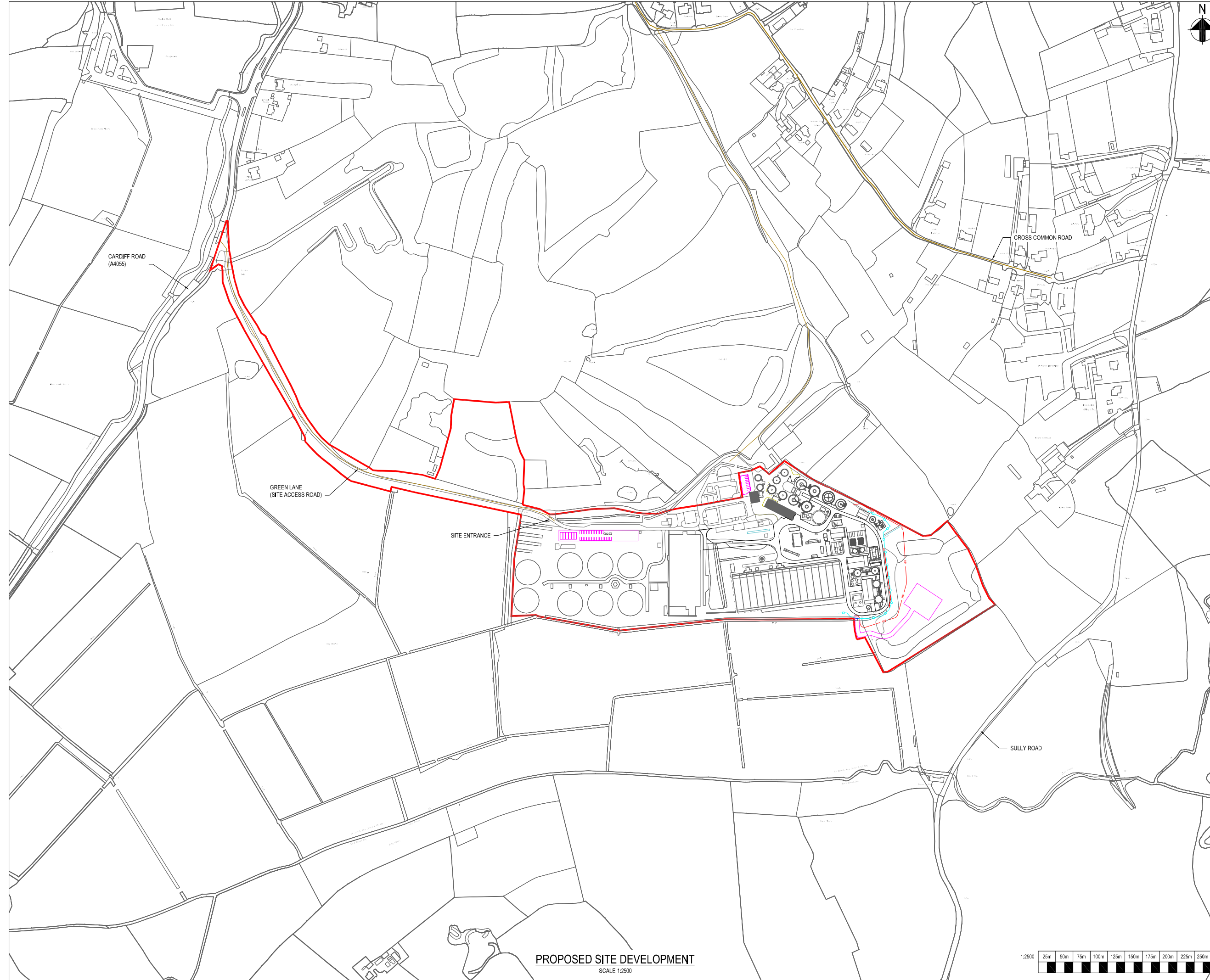
**4798-S-202-HYD-XX-XX-DR-NX-06120 (P03) - Proposed Site Development**





- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
  2. ALL LEVELS ARE IN METERS ABOVE GROUND LEVEL.
  3. DO NOT SCALE FROM THIS DRAWING.

- LEGEND:**
- PLANNING APPLICATION BOUNDARY
  - EXISTING
  - PROPOSED
  - TEMPORARY CONTRACTORS COMPOUND
  - PROPOSED SECURITY FENCE TO TIE INTO EXISTING FENCE LINE



P03	14/03/18	DM	UPDATED BOUNDARY	LW	MN	14/03/18
P02	17/10/17	DP	FOR INFORMATION	YF	MN	17/10/17
P01	21/08/17	DP	FOR INFORMATION	YF	MN	21/08/17
Rev.	Date	Drawn	Description	Chkd.	Appt.	Date

**Capital Delivery Alliance**  
**Cynghrair Cyflawni Cyfalaf**  
 Ty Awen, Spooner Close, Coed Kernaw, Newport, NP108FZ

Project Name:  
 COG MOORS WwTW AAD

Drawing Title:  
 PROPOSED SITE DEVELOPMENT

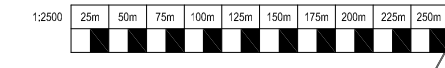
Subsidiary Code:  
 ISSUED FOR INFORMATION S2

Originator: DP Designer: RN Date: 17/10/17

Internal Project Number: UA007902 Scale: 1:2500 Rev: P03

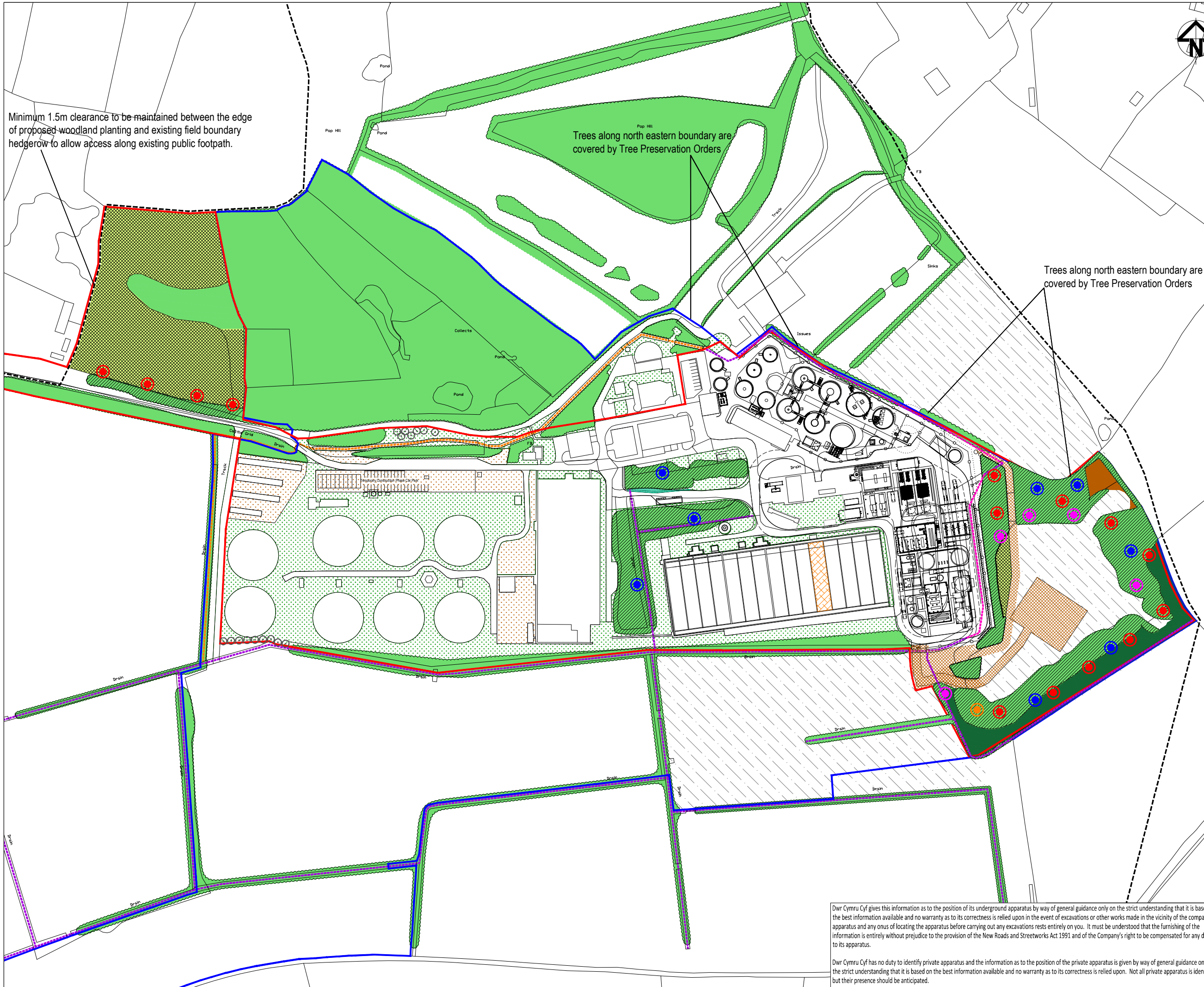
Drawing Number:  
 4798-S-202-HYD-XX-XX-DR-XX-06120

**PROPOSED SITE DEVELOPMENT**  
 SCALE 1:2500



**Drawing 4798-S-202-HYD-XX-XX-DR-NX-06127 (P06) – Landscape Mitigation Plan**





Minimum 1.5m clearance to be maintained between the edge of proposed woodland planting and existing field boundary hedgerow to allow access along existing public footpath.

Trees along north eastern boundary are covered by Tree Preservation Orders

Trees along north eastern boundary are covered by Tree Preservation Orders

- LEGEND:**
- Planning Application Boundary
  - DCWW Land Ownership Boundary
  - Public Rights of Way
  - Site of Importance for Nature Conservation (SINC)
  - Existing Amenity Grass
  - Existing Tree and shrub planting
  - Existing Tree planting to be managed for biodiversity
  - Existing Grassland to be managed as Species Rich Grassland
  - SINC Grassland Management Area
  - Proposed Amenity Grassland
  - Proposed Species Rich Grassland
  - Proposed Woodland Belt Planting
  - Tall Ruderal
  - Dense Scrub
  - Proposed Individual Tree Planting
  - Area to be Managed for Wildlife
  - Bird Nest Box
  - Bat Box
  - Hibernaculum to be created
  - Dormouse Nest Boxes
  - Existing Ephemeral Ditch
  - Existing Dry Ditch
  - Proposed Drainage Ditch

Latin Name	Common Name	Outline Specification	% in Mix
<b>Proposed Woodland Belt Forestry Transplant Mix</b>			
<i>Corylus avellana</i>	Hazel	1+1 Forestry transplant; Bare root; 1.5m spacing.	24%
<i>Quercus robur</i>	Pedunculate Oak	As above.	24%
<i>Carpinus betulus</i>	Hornbeam	As above.	6%
<i>Crataegus monogyna</i>	Hawthorn	As above.	6%
<i>Prunus avium</i>	Wild Cherry	As above.	5%
<i>Ligustrum vulgare</i>	Wild Privet	As above.	4%
<i>Malus sylvestris</i>	Crab Apple	As above.	4%
<i>Acer campestre</i>	Field Maple	As above.	4%
<i>Viburnum lantana</i>	Wayfaring-Tree	As above.	4%
<i>Sorbus aucuparia</i>	Rowan	As above.	3%
<i>Cornus sanguinea</i>	Dogwood	As above.	3%
<i>Lonicera periclymenum</i>	Honeysuckle	2L Pot; 1.5m spacing.	2%
<i>Frangula alnus</i>	Alder Buckthorn	1+1 Forestry transplant; Bare root; 1.5m spacing.	2%
<i>Rhamnus cathartica</i>	Buckthorn	As above.	2%
<i>Euonymus europaea</i>	Spindle	As above.	2%
<i>Prunus padus</i>	Bird Cherry	As above.	2%
<i>Sambucus nigra</i>	Elder	As above.	2%
<i>Ilex aquifolium</i>	Holly	2L Pot; 1.5m spacing.	1%
<i>Hedera helix</i>	Ivy	2L Pot; 1.5m spacing.	1%
<b>Individual Trees</b>			
<i>Quercus robur</i>	Pedunculate Oak	2x, 3 Breaks, Fthd, BR, 1.5-1.75m, 10m spacing.	40%
<i>Alnus glutinosa</i>	Alder	As above.	30%
<i>Prunus avium</i>	Wild Cherry	2x, 5 Breaks, Fthd, BR, 1.5-1.75m, 10m spacing.	30%

P06	13.03.18	DM	UPDATED BOUNDARY	LF	LW	13.03.18
P05	12.02.18	DM	SOLAR PANELS MOVED	LF	LW	12.02.18
P04	31.01.11	DM	THIRD ISSUE	LF	LW	31.01.11
P03	19.12.17	RG	SECOND ISSUE	SF	LW	19.12.17
P02	25.10.17	RG	SECOND ISSUE	SF	LW	25.10.17
P01	27.07.17	RG	FIRST ISSUE	SF	LW	21.06.17
Rev.	Date	Drawn	Description	Chkd	Appd	Date

**Capital Delivery Alliance**  
**Cynghair Cyflawni Cyfalaf**  
 Ty Awon, Spooner Close, Coed Kernes, Newport, NP108FZ

Project Name: **COG MOORS WwtW AAD**

Drawing Title: **FIGURE 10 LANDSCAPE MITIGATION PLAN**

Suitability: **INFORMATION** Suitability Code: **S2**

Originator: **R.G.** Designer: **S.F.** Date: **21.06.17**

Internal Project Number: **UA007902** Scale: **1:1250@A1** Rev: **P06**

Drawing Number: **4798-S-202-HYD-XX-DR-NX-06127**

Dwr Cymru Cyf gives this information as to the position of its underground apparatus by way of general guidance only on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. It must be understood that the furnishing of the information is entirely without prejudice to the provision of the New Roads and Streetworks Act 1991 and of the Company's right to be compensated for any damage to its apparatus.

Dwr Cymru Cyf has no duty to identify private apparatus and the information as to the position of the private apparatus is given by way of general guidance only on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon. Not all private apparatus is identified but their presence should be anticipated.

## APPENDIX A

### Planting Schedule

This is the planting to be used post-development as described in the Landscape Management Plan<sup>1</sup>. Any further remedial planting shall be like for like.

#### Woodland Areas

<i>Viburnum lantana</i>	Wayfaring-Tree
<i>Quercus robur</i>	Pedunculate Oak
<i>Carpinus betulus</i>	Hornbeam
<i>Crataegus monogyna</i>	Hawthorn
<i>Corylus avellana</i>	Hazel
<i>Ilex aquifolium</i>	Holly
<i>Alnus glutinosa</i>	Alder
<i>Prunus avium</i>	Wild Cherry
<i>Betula pendula</i>	Silver Birch
<i>Ligustrum vulgare</i>	Wild Privet
<i>Malus sylvestris</i>	Crab Apple
<i>Acer campestre</i>	Field Maple
<i>Sorbus aucuparia</i>	Rowan
<i>Cornus sanguinea</i>	Dogwood
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Frangula alnus</i>	Alder buckthorn
<i>Rhamnus cathartica</i>	Buckthorn
<i>Euonymus europaea</i>	Spindle
<i>Prunus padus</i>	Bird Cherry
<i>Sambucus nigra</i>	Elder
<i>Hedera helix</i>	Ivy

#### Individual trees

<i>Quercus robur</i>	Pedunculate Oak
<i>Alnus glutinosa</i>	Alder
<i>Prunus avium</i>	Wild Cherry

#### Hedgerow

<i>Crataegus monogyna</i>	Hawthorn
<i>Corylus avellana</i>	Hazel
<i>Prunus spinosa</i>	Blackthorn
<i>Acer campestre</i>	Field Maple

<sup>1</sup> Arcadis Consultancy (UK) Ltd (2018) Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant - Landscape Management Plan

Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant

*Rosa canina* agg. Dog-rose

*Ilex aquifolium* Holly

*Lonicera periclymenum* Honeysuckle

## APPENDIX B

### Prescriptions for Management Actions

The table below sets out the timeframe for operations.

Habitat/Feature Type Management Prescription	Party responsible	Timing	Description
<b>Bird and dormouse boxes - maintenance</b>	Welsh Water	Annually over winter	Boxes cleaned out in the winter to remove the previous year's nesting material. Any lost or damaged boxes replaced.
<b>Bat boxes - maintenance</b>	Welsh Water	Years 5 and 10 over winter	Bat boxes of self-cleaning design. Any lost or damaged boxes replaced once they have been checked by a licenced bat worker to ensure that no bats are present.
<b>Hibernacula and log pile</b>	Welsh Water	Years 5 and 10 over summer	No maintenance is required but if the structure is no longer suitable for wildlife (i.e. collapsed such that there are no longer cavities) then replace like for like.
<b>Fencing - maintenance</b>	Welsh Water	Annually	Annual inspection followed by necessary repairs and replacement
<b>Indian (Himalayan) Balsam - eradication</b>	Welsh Water	Years 0, 5 and 10 (June) maybe required more often	Larger areas cut in early June and again in September/October. Strim/cut the plant below the first node to avoid re-growth. Small areas/individual plants hand-pulled Arisings left exposed to dry or piled and covered with a tarpaulin to compost.
<b>Litter - removal</b>	Welsh Water	Annually	Annual inspection followed by removal of litter/fly-tipping
<b>Ditch - maintenance</b>	Welsh Water	Year 0, 5 and 10 (winter)	Vegetation clearance and dredging undertaken from the bank, arisings to be left on the bank side for 24 to 48hrs to allow wildlife to return to the ditch Banks left with an incline no steeper than 45° Culverts kept clear of vegetation and litter.
<b>Hedgerows - management</b>	Welsh Water	Year 0, 5 and 10 (January and February)	Cutting undertaken in January or February to maintain hedgerows in bushy conditional at a height of 3-6m. All cutting undertaken using a flail cut (blades shall be kept sharp to create clean cuts). Sharp tools used if the hedgerows are traditionally laid. Only recent growth and not old wood cut All arisings to be removed offsite, chipped, composted or used to form habitat piles on site.
<b>Hedgerows - infilling</b>	Welsh Water	Year 0, 5 and 10	In-fill gaps within hedges, that are evident and or may arise from disturbance/damaged i.e. from overgrazing etc. Planting to comprise a mix of native tree and shrub species, which are of local provenance (see Appendix A for planting schedule).



Habitat/Feature Type Management Prescription	Party responsible	Timing	Description
<b>Woodland – translocated and new planting</b>	Welsh Water	Year 0 to 5	<p>Translocated coppice stools and new saplings watered and weeded as necessary to promote strong and healthy growth.</p> <p>Dead or diseased plants replaced.</p> <p>Any stakes, guards and ties monitored, replaced and adjusted to ensure tree growth is not adversely affected</p> <p>After five years, limbs may need to be removed from the trees to promote strong healthy growth and maintain their shape.</p> <p>Shrubs coppiced to encourage bushy growth.</p>
<b>Woodland - management</b>	Welsh Water	Year 0, 5 and 10	<p>Limbs may need to be removed from the trees to promote strong healthy growth and maintain their shape.</p> <p>Shrubs coppiced to encourage bushy growth.</p> <p>Shrubs cut on rotation to ensure that the woodland maintains a structure with a canopy layer of trees and an understorey of shrubs</p> <p>The woody material generated by site management to be: disposed of offsite; chipped and placed in a suitable storage area for use as a mulch later; or chipped and placed in a suitable area for composting; or used to form habitat piles in suitable locations on site</p>
<b>Amenity grassland</b>	Welsh Water	Annually in March, July and September	<p>Cut three times a year: in March, July and September. Cuttings removed for composting on site.</p>
<b>Species-rich Grassland</b>	Welsh Water	Annually – Spring, summer and autumn	<p>Yr 1 - cut the sward several times during the first growing season (up to 4 times), to encourage the sward to develop.</p> <p>Yr 2 onwards – main cut in late August when the majority of plant species have set seed to maintain its plant species diversity. Cuts should be to sward height of 25-40mm. Further cuts in spring (March) and autumn (September).</p> <p>Arisings left for 7 days to dry and allow seeds to set. The arisings then composted or set aside in piles for wildlife.</p> <p>Areas close to hedgerows and areas close to tree and shrub planting, cut once every two years to provide tall grass habitat for overwintering invertebrates.</p> <p>Annual spot treatment of pernicious weeds in May.</p>
<b>SINC Grassland</b>	Welsh Water	Annually – late July/early August	<p>Re-instated SINC grassland to be cut several times during the first growing season (up to 4 times), to encourage the sward to develop. Then to be treated as below.</p> <p>Cuts in late July/early August when most plant species have set seed to maintain its plant species diversity to a sward height of 40-75mm.</p> <p>If there is a reduction in plant species diversity due to dense grass growth further cuts in September, and/or March.</p> <p>Arisings left for 7 days to dry and allow seeds to set. The arisings composted or set aside in piles for wildlife.</p> <p>Manual removal of perennial weeds. In the case of thistles, mowing conducted before the plants set seed, as seeding would dramatically increase the weed problem in subsequent years. Herbicide use to be avoided.</p>

## APPENDIX C

### PROGRAMME OF MAINTENANCE AND MANAGEMENT OPERATIONS

X = timing of operations X – operations may be required depending on monitoring

YEAR	2018	1	2	3	4	5	6	7	8	9	10	11 →
<b>GENERAL SITE WIDE OPERATIONS</b>												
Install bird & bat boxes, hibernacula and log piles and if required dormouse boxes	X											
Maintain and replace bird nest boxes		X	X	X	X	X	X	X	X	X	X	X
Replace damaged bat boxes after check by licenced ecologist and dormouse boxes						X					X	
Replace/repair hibernacula and log piles if necessary						X					X	
Eradication of non-native invasive species	X	X	X	X	X	X	X	X	X	X	X	X
Erect boundary fence	X											
Check boundary fence; undertake repairs as necessary		X	X	X	X	X	X	X	X	X	X	X
Check for litter and flytipping and remove as necessary		X	X	X	X	X	X	X	X	X	X	X
New ditches and culverts created	X											
Ditch and culvert clearance and management	X					X					X	
<b>OPERATIONS TO WOODLAND AND HEDGEROWS</b>												
New woodland and shrub planting including infill of hedgerows and translocation of coppiced tree stools	X											
Replacement planting of dead/damaged specimens		X	X	X	X	X						
Replacements stakes, guards and ties		X	X	X	X	X						
Hedgerow management	X					X					X	
Woodland management to establish varied structure	X					X					X	
<b>OPERATIONS TO GRASSLAND</b>												
New planting and re-seeding including re-instatement of topsoil	X											
Remedial sowing of bare ground		X	X	X	X	X	X	X	X	X	X	X
Mowing/strimming		X	X	X	X	X	X	X	X	X	X	X
Removal of extensive areas of scrub, weedy and injurious species	X	X	X	X	X	X	X	X	X	X	X	X
<b>MONITORING</b>												
Monitoring		X	X	X	X	X	X	X	X	X	X	
Botanical survey and monitoring review report						X					X	



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