

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

## Landscape Management Plan

DECEMBER 2017

Incorporating

**EC HARRIS**  
BUILT ASSET  
CONSULTANCY



# CONTACTS

**SUSANNE FRAEDRICH**  
**Associate Technical Director**

dd +44 (0) 2920 926846  
m +44 (0) 7736 497912  
e [susanne.fraedrich@arcadis.com](mailto:susanne.fraedrich@arcadis.com)

**Arcadis.**  
1<sup>st</sup> Floor  
2 Glass Wharf  
BS2 0FR  
Bristol  
United Kingdom



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# DRAWINGS

**Drawing 4798-S-202-HYD-XX-XX-DR-NX-06133 – Figure 16: Landscape Planting Plan**



## 1 Introduction

1.1 Arcadis was commissioned by Dŵr Cymru Welsh Water (DCWW) to produce a Landscape Management Plan to accompany the planning application for the development of an Advanced Anaerobic Digestion (AAD) Plant at the site of the existing Cog Moors WwTW, south of Dinas Powys, hereafter referred to as ‘the proposed Development’.

1.2 The proposed AAD plant comprises a number of new process and storage tanks and buildings, together with the demolition of and modifications to some existing items of plant and equipment.

The proposed development is shown on the Proposed Site Layout Plan (Drawing Ref: 4798-S-202-HYD-XX-XX-DR-XX-06106 to 06109).

The proposed development would provide for:

- Additional digestion capacity;
- Conditioning of the sludge generated on the site, (dewatering and removal of contaminating rags and plastic);
- Reception facilities for sludge imported to the site from satellite WwTWs;
- Blending of the indigenous sludge and imported sludge;
- A thermal hydrolysis plant (THP), which uses steam to increase the temperature and pressure in a reaction vessel to pre-treat the sludge;
- Boilers to generate the steam for thermal hydrolysis;
- A siloxane plant to remove contaminants from the biogas generated;
- A combined heat and power (CHP) plant to generate useable heat and electricity, which can be used on site, exported to the grid, or both.
- A UV plant to treat some of the final effluent water from the WwTW, to provide better quality process water, for the THP sludge preparation downstream of thermal hydrolysis;
- Tanks to hold sludge and liquor, resulting from the thickening and dewatering processes;
- A cake storage silo;
- Odour control equipment;
- New internal site access roads and drainage;
- Site clearance and earthworks and new fencing;
- New MCC equipment and control kiosks; and
- Appropriate mitigation planting and ecological mitigation measures;

1.3 Temporary construction compounds would be sited on an area of mown grassland, immediately adjacent to the existing final settlement tanks, and on an area of grassland to the east of the proposed AAD plant.

1.4 Vehicular access to the proposed development would continue to be gained from the A4055 via Green Lane.

## 2 PLANTING IMPLEMENTATION

### General Planting Notes

2.1 All plants to be healthy, hardened-off and with good fibrous root systems and to comply with the requirements of BS3936 Specification for Nursery Stock. All planting to be undertaken in accordance with BS4428 Code of Practice for General Landscape Operations, which outline:

- All plants to be protected from wind exposure at all times. All plants to be soaked in water for several hours prior to planting and to be well watered in;
- No planting to be carried out during poor weather conditions, i.e. when ground is frozen, waterlogged, or during droughts, hot sunshine or persistent dry or cold winds. All plant material to receive enough water to ensure healthy establishment;
- The seed origin of all native shrub species for use on the scheme shall be sourced, as far as reasonably practical, from the Forestry Commission Local Seed Zones 302 (Forestry Commission Practice Note 8: Using Local Stock for Planting Native Trees and Shrubs). Written evidence of provenance shall be provided;
- Time of year for planting: November to March, inclusive; and
- Watering: Provide as necessary.

## Vegetation Clearance

- 2.2 In areas to be planted or seeded, all grass and other herbaceous vegetation shall be cut to a height of between 50mm and 75mm and the arising's removed and herbicide applied. Prior to applying herbicide, the contractor shall await active vegetative re-growth sufficient for the herbicide to be at its most effective.

## Weed Control

- 2.3 The Contractor shall apply a non-residual translocated herbicide to all areas to be planted and seeded between 21 and 25 days prior to planting. The treatment for total herbicide control shall kill all treated growth including their root systems. The Contractor shall not commence any excavation or cultivation of the areas where herbicide has been applied until the vegetation has been effectively controlled.
- 2.4 In the event of finding particular pernicious weeds on site, steps shall be taken to eradicate them as follows:
- Indian Balsam- for best results cut plants to 50-75mm (below the lowest node) or hand-pull plants in April or early May prior to the plants flowering and setting seed.
  - Japanese Knotweed- Refer to 'The Knotweed Code of Practice-Managing Japanese Knotweed on development sites' Environment Agency; and
  - Giant Hogweed- for best results remove soil up to 4 metres away from plants to a depth of 0.5m. Check for regrowth regularly and spray with herbicide in April or May before the plants flower.

## Planting Protection

- 2.5 All individual plants shall be protected with protective tubes to the size of 60cm height x 16cm diameter. The size of the supporting stakes and the fixings shall be in accordance with the protective tube manufacturer's recommendations.

## Tree Planting

- 2.6 Tree planting shall be undertaken in the locations shown on Figure 16 - Planting Plan, as follows:
- Refer to Table 1 for individual tree planting schedule;
  - Refer to Table 2 for woodland belt planting schedule;
  - All trees to be planted in pits with depth of 500mm and width of 600mm;
  - The base of each pit to be broken up to 150mm with all topsoil thoroughly broken up from the carefully excavated material, and any soil additives and/or ameliorants added in accordance with best practice, prior to backfilling;

- Trees shall be secured in position using round timber stakes (top diameter of 50-75 mm), peeled of bark, straight in length and free of snags, pests and diseases with adjustable 25mm tree ties, made of black PVC or reinforced rubber;
- Stakes for all trees shall be firmly driven and positioned into the tree planting pit before planting to a minimum depth of 300 mm below the bottom of the pit; and
- The stake shall be positioned off centre on the prevailing windward side of the tree as near to the tree as possible but shall not interfere with the free movement of the branches and shall cause no rubbing.

Table 1 Individual Tree Schedule

Name	Symbol	Common Name	Root	Height	Brks	Age	Girth	Form	No.
<i>Quercus robur</i>	QR	Common Oak	BR	175-200	3	2x	8-10cm	Standard	6
<i>Alnus glutinosa</i>	AG	Alder	BR	175-200	3	2x	8-10cm	Standard	5
<i>Prunus avium</i>	PA	Wild Cherry	BR	175-200	5	2x	8-10cm	Standard	5

Table 2 Woodland Belt Planting Schedule

%	Name	Common Name	Size	Height (cm)	Spacing (m)	No
40	<i>Quercus robur</i>	Pedunculate Oak	1+1 Forestry transplant; Bare root; .	40-60	1.5	492
20	<i>Corylus avellana</i>	Hazel	1+1 Forestry transplant; Bare root; .	40-60	1.5	246
10	<i>Ilex aquifolium</i>	Holly	2L Pot; 1.5m spacing.	30-40	1.5	123
10	<i>Alnus glutinosa</i>	Alder	1+1 Forestry transplant; Bare root; 1.5m spacing.	40-60	1.5	123
10	<i>Prunus avium</i>	Wild Cherry	1+1 Forestry transplant; Bare root; .	40-60	1.5	123
10	<i>Betula pendula</i>	Silver Birch	1+1 Forestry transplant; Bare root; .	40-60	1.5	123

## Species-rich Grassland

2.7 Species-rich grassland shall be managed as follows:

- Sowing to be undertaken during Spring or Autumn;
- Existing soil to be used, imported topsoil not required. For wildflower seeded areas cultivate the soil of all areas prior to sowing. This should include loosening, aerating and breaking up the soil by harrow or rake to produce a medium tilth to depths of 150mm. Remove any undesirable material brought to surface to a depth of 100mm including visible weeds, roots and large stones or clay balls with any dimension exceeding 30mm. Following cultivation surfaces should be rolled or treaded to produce a firm surface.
- After cultivation operations have been carried out, margins to be seeded should be sown with a wildflower seed mix (see below) which has been stored off the ground in a clean, dry place free from vermin;

- Sowing shall be carried out by evenly distributing the seed at a rate of approximately 5g/m<sup>2</sup>. Exact sowing rates to be confirmed with supplier prior to activity being undertaken;
- Seeds should be surface sown and can be applied by machine or broadcast by hand;
- Following an even distribution of seed, the contractor shall firm in the seed with a firm roll to give a good soil/seed contact, but ensure the seed is not incorporated or covered; and
- All reasonable precautions shall be taken to ensure that pedestrian and other traffic does not cross areas during cultivation and until the vegetation is established.
- Total area of Wildflower Grassland 3136sqm, to include the species indicated in Table 2

Table 2 Wildflower Grassland Specification

<b>Species-rich Grassland</b>		
<i>Festuca rubra litoralis</i>	Slender Creeping Red Fescue	30%
<i>Cynosurus cristatus</i>	Crested Dogstail	25%
<i>Festuca ovina</i>	Sheep's Fescue	5%
<i>Festuca pratensis</i>	Meadow Fescue	5%
<i>Phleum bertolonii</i>	Timothy Grass	5%
<i>Trisetum flavescens</i>	Golden Oat-Grass	5%
<i>Centaurea nigra</i>	Common Knapweed	3%
<i>Plantago lanceolata</i>	Ribwort Plantain	3%
<i>Agrostis capillaris</i>	Browntop Bent	2%
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass	2%
<i>Trifolium pratense</i>	Red Clover	2%
<i>Trifolium repens</i>	White Clover	2%
<i>Leucanthemum vulgare</i>	Ox-eye Daisy	1.60%
<i>Ranunculus acris</i>	Meadow Buttercup	1%
<i>Achillea millefolium</i>	Yarrow	1%
<i>Galium verum</i>	Lady's Bedstraw	1%
<i>Lotus corniculatus</i>	Birdsfoot Trefoil	1%
<i>Sanguisorba minor</i>	Salad Burnet	1%
<i>Agrimonia eupatorium</i>	Agrimony	0.50%
<i>Filipendula ulmaria</i>	Meadowsweet	0.50%
<i>Prunella vulgaris</i>	Self Heal	0.50%
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	0.50%
<i>Rhinanthus minor</i>	Yellow Rattle	0.50%
<i>Dactylis glomerata</i>	Cocksfoot	0.50%
<i>Agrostis stolonifera</i>	Creeping Bent	0.50%
<i>Arrhenatherum elatius</i>	False Oat Grass	0.50%
<i>Leontodon autumnalis</i>	Autumn Hawkbit	0.20%
<i>Leontodon hispidus</i>	Rough Hawkbit	0.20%

## Amenity Grassland

2.8 Amenity grassland shall be managed as follows:

- Existing and Proposed areas of amenity grassland would be maintained at a relatively short sward
- Proposed amenity grass seed is to be sown at a rate of 35g/sqm with seed percentages by weight as follows: 30% Creeping, Red Fescue, 25% Perennial Ryegrass, 20% Hard Fescue, 12.5% Crested Dogstail, 10% Browntop Bent, and 2.5%, Miniature White Clover.
- Grassland seed shall be sown during the period 1 March to 15 May or 1 September to 31 October unless otherwise agreed.
- In seeded areas the upper 50mm of topsoil shall be reduced to a fine tilth by use of a chain harrow or other suitable plant, prior to seeding.
- Total area of proposed Amenity Grassland 235sqm.

## 3 Maintenance and Management

3.1 This section sets out the maintenance and management regime for the first five years following construction of the proposed development.

### Maintenance Operations (General)

3.2 Following Completion, the Contractor should visit the site periodically to inspect, carry out and complete the maintenance operations as shown in Table 3 (see below) and described below.

### Existing Tree and Woodland Maintenance

3.3 Works would be undertaken in accordance with BS3998 and current best horticultural practice.

3.4 Management of woodland areas would involve selective removal of limbs and coppicing of shrubs to promote healthy growth, and the control of invasive plants with the aim of eradication

3.5 Existing trees to be pruned in accordance with BS3998 and current best horticultural practice.

3.6 Shrubs coppiced to encourage bushy growth.

3.7 Shrubs cut on rotation to ensure that the woodland maintains a structure with a canopy layer of trees and an understorey of shrubs

3.8 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

### Weed Control

3.9 Weeds located within shelters, guards or mulch would be hand-pulled and arisings left in situ.

3.10 Where deemed necessary, spot treatment of weeds would take place between mid-April and the end of May. The Contractor would be required to carry out further treatments outside this period in the event of new growth or new areas of infestation being found. If this occurs a translocated, non-residual herbicide approved for initial total weed control shall be applied in accordance with the manufacturer's instructions, and arising's removed from site.

### Plant Replacement

3.11 Where proposed planting has failed to establish, plant replacement shall be undertaken at the beginning of each planting season following initial planting for the duration of the construction period and for the duration of the post certification period. The replacement planting shall be the same as the original stock size when first planted.

## Tree Maintenance

3.12 Trees would be maintained as follows

- During the establishment phase both watering and weed control (Refer to section 2.3) will be carried out as necessary.
- Formative pruning to be undertaken on planted trees in accordance with BS3998 and current best horticultural practice.
- Stakes and their ties shall be inspected each year and adjusted to allow for the growth of each plant; stakes and ties shall be removed from plants where they are no longer required.

## Woodland Belt Planting

3.13 Woodland Belt Planting would be maintained as follows:

- 500mm dia. of weed free area to be maintained for establishment around each plant;
- During the establishment phase both watering and weed control (Refer to 2.3) will be carried out as necessary;
- Stakes and their ties shall be inspected each year and adjusted to allow for the growth of each plant; stakes and ties shall be removed from plants where they are no longer required;
- Annually monitor and prune planting as and when required to maintain.
- Dead or diseased plants replaced.
- After five years, limbs may need to be removed from the trees to promote strong healthy growth and maintain their shape.

## Species-rich Grassland Maintenance

3.14 The Species-rich grassland would be maintained as follows:

- It should be noted that most of the sown meadow species are perennial and would be slow to germinate and grow. They would not usually flower in the first growing season;
- In the first year top the growth to 15cm monthly from May – October. Spot spray pernicious weeds. These arising from the soil seed bank would be common, and should be controlled to minimise competition and weed seed production;
- Following this, control of pernicious weeds should be undertaken annually within the wildflower grassland by spot application of herbicide to the quantities advised by the manufacturer. Applications would be undertaken in May during dry, benign weather conditions;
- Following establishment, traditional meadow management with a main summer cut to a height of between 25-40mm should be undertaken. To maintain maximum diversity and flowering interest cutting should take place in sections at different times from mid- July to the end of August in warm, dry weather.
- The grass should be removed from the sward after 7 days of drying. Arisings then set aside and placed in heaps at suitable sacrificial parts of the site.
- Mowing or grazing of regrowth should be undertaken through to later autumn / winter to maintain a 50mm height. Approximately 10% of the meadows edge should be left uncut through the winter to provide refuge for insects.
- 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

## **SINC Grassland Maintenance**

- 3.15 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.
- 3.16 If there is a reduction in plant species diversity due to dense grass growth further cuts in September, and/or March.
- 3.17 Arisings left for 7 days to dry and allow seeds to set. The arisings composted or set aside in piles for wildlife.
- 3.18 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

## **Amenity Grassland Maintenance**

- 3.19 The area beneath the main solar array would be maintained at a relatively short sward.
- 3.20 Cut three times a year: in March, July and September. Cuttings removed for composting on site.

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

Table 3 Summary Maintenance Operations

OPERATIONS	J	F	M	A	M	J	J	A	S	O	N	D
<b>GENERAL OPERATIONS (ANNUALLY UNLESS STATED)</b>												
Detailed Programme from Contractor		X										
Contractor to provide written confirmation of all operations undertaken	X	X	X	X	X	X	X	X	X	X	X	X
Watering	X	X	X	X	X	X	X	X	X	X	X	X
<b>OPERATIONS TO TREES (ANNUALLY UNLESS STATED)</b>												
Inspect stakes and ties, adjust where necessary and remove if no longer required.	X	X	X	X	X	X	X	X	X	X	X	X
Works to existing trees if necessary	X										X	X
<b>OPERATIONS TO WOODLAND BELT PLANTING (ANNUALLY UNLESS STATED)</b>												
Firming up of plants, tree/shrub shelters and stakes					X				X			
Annually monitor and prune planting to maintain vehicle sightlines along Station Land (as and when required)	X	X	X	X	X	X	X	X	X	X	X	X
<b>OPERATIONS TO AMENITY (ANNUALLY UNLESS STATED)</b>												
Cut – height not exceeding 100mm – arisings baled and removed off-site			X				X		X			
Control & Removal of Pernicious Weeds					X				X			
<b>OPERATIONS TO SPECIES-RICH GRASSLAND (ANNUALLY UNLESS STATED)</b>												
Annual cut, rake off sward and deposit as directed.					X (Y1 only)	X (Y1 only)	X	X (Y1 only)	X (Y1 only)	X (Y1 only)		
Control & Removal of Pernicious Weeds.					X	X (Y1 only)	X (Y1 only)	X (Y1 only)	X (Y1 only)	X (Y1 only)		



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

OPERATIONS TO SPECIES-RICH GRASSLAND (ANNUALLY UNLESS STATED)												
Cut – height not exceeding 100mm – arisings left for 7days to dry and set aside for wildlife							X		X (if require)			

## Drawings

**Drawing 4798-S-202-HYD-XX-XX-DR-NX-06133 – Figure 16: Landscape Planting Plan**

**OUTLINE PLANTING SPECIFICATION**

To be read in conjunction with: **LANDSCAPE AND VISUAL IMPACT ASSESSMENT AND LANDSCAPE MANAGEMENT PLAN.**

**TIMING:** All planting is to be carried out during November-March, inclusive

**VEGETATION CLEARANCE:** In areas to be planted, all grass and other herbaceous vegetation shall be cut to a height of between 50 mm and 75 mm and the arising's removed. Prior to applying herbicide the contractor shall await active vegetative re-growth sufficient for the herbicide to be at its most effective.

**WEED CONTROL:** The Contractor shall apply a non-residual translocated herbicide to all areas to be planted and seeded between 21 and 25 days prior to planting. The treatment for total herbicide control shall kill all treated growth including their root systems. The Contractor shall not commence any excavation or cultivation of the areas where herbicide has been applied until the vegetation has been effectively controlled.

**TOPSOIL AND CULTIVATION:** Existing soil to be used, imported topsoil not required. Cultivate the soil of all areas prior to seeding. This should include loosening, aerating and breaking up soil into particles 2-8mm to depths of 150mm. Remove any undesirable material brought to surface to a depth of 100mm including visible weeds, roots and large stones or clay balls with any dimension exceeding 30mm. Final cultivation prior to seeding topsoil shall be brought to a fine till by approved mechanical means or by hand raking, and if necessary re-grading of the surface will be carried out to conform to the prescribed finished levels.

**PLANT PROTECTION:** Where new planting is taking place in the vicinity of grazing stock all new planting needs to be protected by a temporary post and wire fence during its establishment. All trees and shrubs to be protected against rabbit grazing by using Tubex shelters. For suggested sizes refer to LBMP.

**TREE PLANTING:**

- All trees to consist of heavy standard trees planted in pits at the base of hedgerows, with depth of 500mm and width of 600mm.
- The base of each pit to be broken up to 150mm with all topsoil thoroughly broken up from the carefully excavated material, and any soil additives and/or ameliorants added in accordance with best practice, prior to backfilling.
- Trees shall be secured in position using round timber stakes (top diameter of 50-75 mm), peeled of bark, straight in length and free of snags, pests and diseases; with adjustable 25mm tree ties, made of black PVC or reinforced rubber
- Stakes for all trees shall be firmly driven and positioned into the tree planting pit before planting to a minimum depth of 300 mm below the bottom of the pit.
- The stake shall be positioned off centre on the prevailing windward side of the tree as near to the tree as possible but shall not interfere with the

**PLANTING SCHEDULES**

**Tree Planting**

**Woodland Belt Planting**

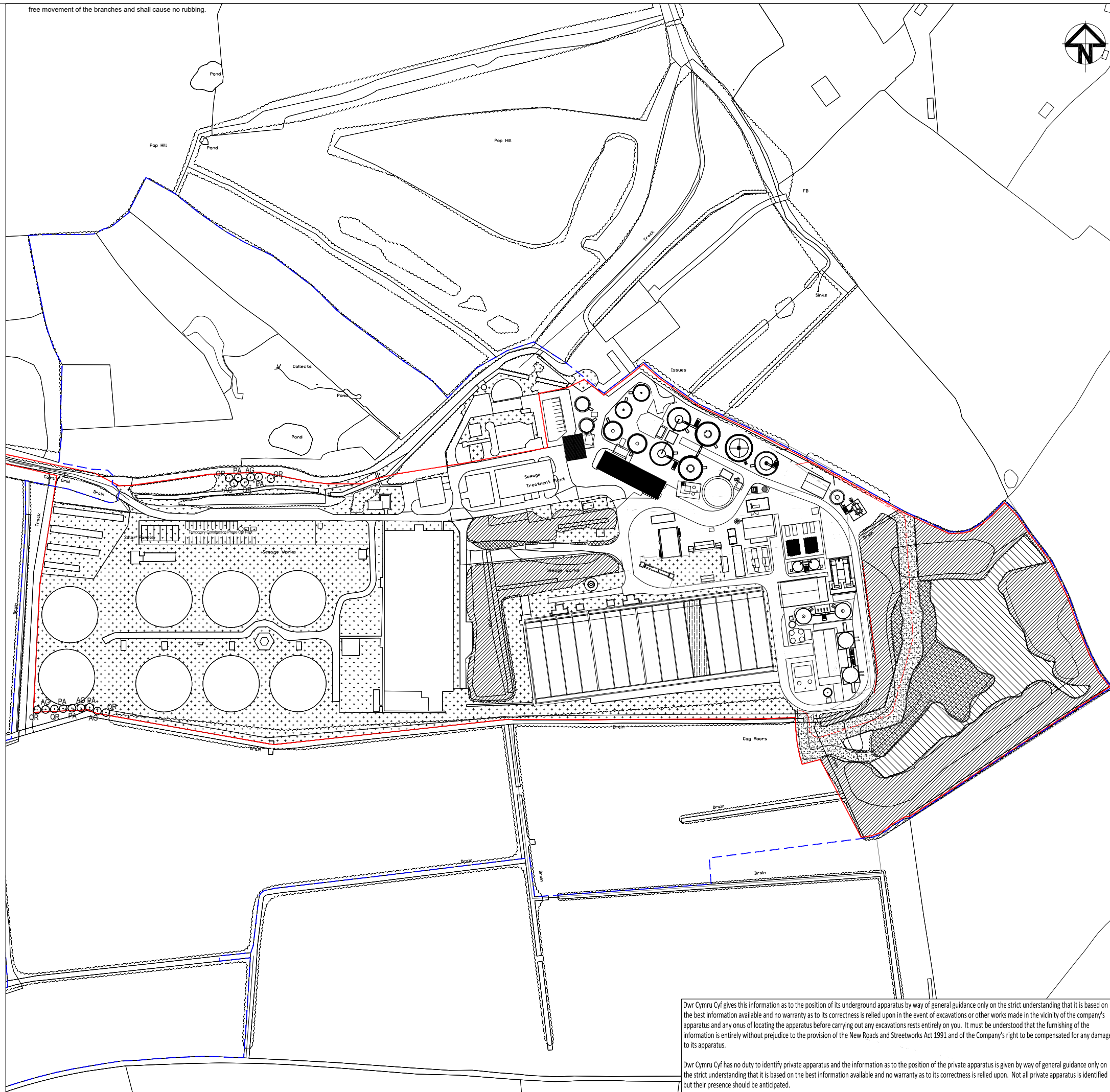
Area of woodland to be under planted - 2796m<sup>2</sup>

**WILDFLOWER GRASSLAND PLANTING SCHEDULE**

Area of wildflower seeding: 3136m<sup>2</sup>

Seed mix to consist of a traditional hay meadow or similar. Indicative species:

free movement of the branches and shall cause no rubbing.



**LEGEND:**

- Planning Application Boundary
- - - DCWW Land Ownership Boundary
- 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
- Area to be Managed for Wildlife
- SINC Grassland Management Area
- Proposed Amenity Grassland
- Proposed Species Rich Grassland
- Proposed Woodland Belt Planting
- Proposed Individual Tree Planting

P01	15.12.17	RG	FIRST ISSUE	SF	LW	15.12.17
Rev.	Date	Drawn	Description	Chkd	Appd	Date



Project Name: **COG MOORS WwTW AAD**

Drawing Title: **FIGURE 16 LANDSCAPE PLANTING PLAN**

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

Originator:	Designer:	Date:
R.G.	S.F.	15.12.17
Internal Project Number:	Scale:	Rev:
UA007902	1:1250@A1	P01

Drawing Number: **4798-S-202-HYD-XX-XX-DR-NX-06133**

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Arcadis Consulting (UK) Limited

Arcadis Cymru House  
St Mellons Business Park, Fortran Road  
Cardiff  
CF3 0EY  
United Kingdom  
T: +44 (0)29 2092 6700

[arcadis.com](https://www.arcadis.com)