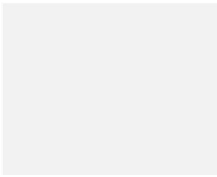


COG MOORS WWTW – PROPOSED ADVANCED ANAEROBIC DIGESTION (AAD) PLANT

Great Crested Newt Survey Report

NOVEMBER 2017

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Great Crested Newt Survey Report

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Report No 4798-S-202-HYD-XX-XX-RP-NX-10169

Date NOVEMBER 2017

VERSION CONTROL

Version	Date	Author	Changes
1	July 2017	Porscha Thompson	Issue of final document
2	August 2017	Lucy Fay	Red line boundary updated
3	November 2017	Lucy Fay	Non-technical summary added

This report dated 01 November 2017 has been prepared for Dwr Cymru 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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Appendix A - HSI Assessment Results

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Non-technical Summary

Surveys were undertaken to determine the presence/likely absence of great crested newts in waterbodies within 250 m of the proposed Development at Cog Moors Wastewater Treatment Works.

A number of the waterbodies were on private land and could not be accessed and several of the waterbodies that could be accessed were found to be dry. Only two waterbodies were subject to targeted surveys.

The surveys found no evidence of great crested newt, only tadpoles, European eel and water shrew.

As a large number of the waterbodies could not be surveyed and as the site offers suitable terrestrial habitat for great crested newts, vegetation clearance will take place in stages under method statement and will be overseen by an ecologist as a precautionary approach to avoid harm/injury to amphibian species.

Executive Summary

This report presents the results of Great Crested Newt (GCN) (*Triturus cristatus*) Habitat Suitability Index (HSI) surveys, presence/absence surveys and environmental DNA (eDNA) surveys associated with the proposed Advanced Anaerobic Digestion (AAD) plant at Cog Moors Wastewater Treatment Works (WwTW) undertaken by Arcadis Consulting (UK) Ltd on behalf of Dŵr Cymru Welsh Water.

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, equipment and infrastructure.

The aims of the study were to assess waterbodies within a 250m buffer area of the proposed Development in order to determine their suitability to support GCN and, where appropriate, undertake additional surveys to determine the presence/ likely absence of GCN in order to inform mitigation requirements.

Surveys undertaken in 2006 by Cresswell Associates and 2007 by Arup found no evidence of GCN within any of the waterbodies that were surveyed within 250 m of the site. One waterbody within 250 m of the site boundary was found to support a small population of palmate newts (*Lissotriton helveticus*) and common toad (*Bufo bufo*) were found at several locations around the site.

A Preliminary Ecological Appraisal was undertaken by Mott MacDonald Bentley in October 2016 and found 26 GCN records within 2 km of the site. No records of amphibians were identified within the site boundary. However, field surveys identified suitable habitat to support amphibians, including GCN, throughout the year.

A Preliminary Ecological Appraisal produced by Arcadis Consulting (UK) Ltd in November 2017 identified records of common frog (*Rana temporaria*) and common toad within 2 km of the site. GCN records were found at Cosmeston Lakes Country Park approximately 500 m south-east of the existing WwTW. The proposed Development site was found to contain suitable terrestrial habitat for all amphibian species and a number of ponds and ditches were identified within 250 m of the proposed Development site.

Where access allowed, a Habitat Suitability Index assessment was undertaken on eight waterbodies located up to 250 m from the proposed Development site boundary on 4th April 2017 to determine their suitability for GCN.

Waterbodies 17A and 18 were subject to further survey to confirm presence / likely absence of GCN. Surveys of these waterbodies were undertaken on 3rd May 2017 and included bottle trapping, torchlight surveys and egg searching. Environmental DNA (eDNA) surveys of the two waterbodies were undertaken on 27th April 2017.

The eDNA survey produced negative results for GCN DNA in both waterbodies therefore no further presence/absence surveys were undertaken. Palmate newts were found within waterbody 18 during the presence/absence survey as were tadpoles, European eel (*Anguilla anguilla*) and water shrew (*Neomys fodiens*). Tadpoles were also found in waterbody 17A.

During reptile surveys undertaken in April-June 2017 by Arcadis (UK) Ltd the presence of common toad and common frog within the proposed Development boundary was confirmed.

As a number of waterbodies surrounding the site were not surveyed, and as the site offers suitable habitat for GCN, a three-stage approach to vegetation removal under method statement and overseen by an ecologist would be undertaken as a precautionary approach. This approach diminishes the suitability of the proposed working corridor for amphibians and encourages the movement of amphibians to adjacent areas of suitable retained habitats. It is also recommended that all contractors receive a toolbox talk prior to commencing works.

This is consistent with proposed mitigation for reptiles as detailed in the Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant - Reptile Survey Report 4798-S-202-HYD-XX-XX-RP-NX-10168.

Post-development measures to enhance the site for amphibians include the creation of a hibernaculum.

1 Introduction and aims

This report presents the results of Great Crested Newt (GCN) (*Triturus cristatus*) Habitat Suitability Index (HSI) surveys, presence/absence surveys and environmental DNA (eDNA) surveys associated with the proposed Advanced Anaerobic Digestion (AAD) plant at Cog Moors Wastewater Treatment Works (WwTW) undertaken by Arcadis Consulting (UK) Ltd on behalf of Dŵr Cymru Welsh Water.

The aims of the study were to assess waterbodies within a 250 m buffer area of the proposed Development in order to determine their suitability to support GCN and undertake targeted GCN surveys where appropriate. The survey findings will inform the design process and appropriate mitigation and enhancement measures.

2 Background information and proposed development

2.1 Site Location

The site is located in the Vale of Glamorgan south of Dinas Powys at grid reference ST 16327 69571 (see Drawing 4798-S-202-HYD-XX-XX-DR-NX-08016 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.

2.2 Proposed Development

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 Drawing 4798-S-202-HYD-XX-XX-DR-XX-06120.

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 sludge 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.

The proposed Development will not involve the use of any hazardous substances in notifiable quantities.

The proposed AAD plant will operate in conjunction with the existing sewage sludge treatment facilities and is located, therefore, on the eastern side of the existing Cog Moors WwTW, adjacent to the existing sewage sludge treatment infrastructure.

Part of the proposed AAD plant would be located within the existing operational area of the WwTW. The balance of the proposed development would be sited immediately to the east of the existing operational area, on an area of woodland, scrub and ruderal vegetation. This area immediately adjacent to the existing WwTW (Cog Moors Site of Importance for Nature Conservation (SINC)) is designated for its series of species-rich rush pastures.

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 within Cog Moors SINC to the east of the proposed AAD plant.

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

In addition, an upgrade to the electricity connection will be required.

2.3 Background Information

Cresswell Associates surveyed four ponds within 250 m of the site in 2006 and found no evidence of GCN within any of the waterbodies that were surveyed (Ref 1). Two of the waterbodies within the 250 m survey area (one identified as waterbody 18, the other an unsurveyed pond located to the west of Green Lane as shown on Drawing 4798-S-202-HYD-XX-XX-DR-NX-08016) were found to support small populations (maximum count of three individuals) of palmate newts (*Lissotriton helveticus*).

Surveys undertaken by Arup in 2007 found common toad (*Bufo bufo*) at several locations immediately north of the WwTW foraging in the species rich neutral grassland habitats. The site was found to offer breeding and foraging opportunities for this and other amphibian species, although surveys at the site indicated the likely absence of GCN (Ref 2).

A Preliminary Ecological Appraisal of the existing WwTW was undertaken in October 2016 by Mott McDonald Bentley (Ref 3) including a desk study which was undertaken in order to identify any existing ecological information relating to the proposed Development site and its surroundings. The South East Wales Biological Recording Centre (SEWBRc) were consulted to obtain any records of protected species or species of conservation concern within 2 km of the proposed Development site. Their desk study found 26 GCN records within 2 km of the site. No records were found within the site boundary - the closest record is located approximately 0.9 km south west of the site with few barriers to the movement of GCN between this location and the proposed Development site. During the Preliminary Ecological Appraisal, no amphibians or evidence of amphibians were recorded on site. Five ponds were recorded within 250 m of the existing WwTW site using

both O/S maps and aerial photography and four hibernacula features that could be suitable to support amphibians were recorded on site.

A Preliminary Ecological Appraisal (dated November 2017) was produced by Arcadis Consulting (UK) Ltd (Ref 4), focusing on the proposed working area. This identified two records of common frog (*Rana temporaria*) and one record of a common toad approximately 1.5 km east of the site within Cosmeston Lakes. GCN are also known to be present at Cosmeston Lakes Country Park approximately 500 m south-east of the existing WwTW (Ref 4). The habitat between the recorded GCN and the proposed Development is predominately agricultural land with hedgerows and minor roads. Hedgerows offer suitable places of shelter for GCN and minor roads would not be a barrier to dispersal.

The proposed working area was found to contain suitable terrestrial habitat (scrub and woodland habitat) for all amphibian species for both foraging and commuting. A number of ponds and ditches were identified within 250 m of the proposed Development site. These ponds and ditches were considered suitable to support all amphibian species.

During reptile surveys undertaken in April-August 2017 by Arcadis (UK) Ltd, the presence of common toad and common frog within the proposed Development boundary was confirmed, with individuals recorded on a mound covered with tall ruderal vegetation and in a clearing within broadleaved plantation woodland, both on the southern boundary of the existing WwTW (Ref 5).

3 Legislation and policy

The legislative protection afforded to amphibians most likely to be found on site (GCN, smooth newt (*Lissotriton vulgaris*) palmate newt, common toad and common frog) and relevant local policy is summarised in Table 1 below:

Table 1: Legislative protection for amphibians

Legislation	Offences
Conservation of Habitats and Species Regulations 2010 (as amended)	<ul style="list-style-type: none"> • Deliberate capturing, injuring or killing of a great crested newt; • Deliberate disturbance of great crested newts*; • Deliberate taking or destroying the eggs of a great crested newt; and • Damaging or destroying a breeding site or resting site of a great crested newt. <p>[* ‘Deliberate’ disturbance has been defined as that which is likely to:</p> <ul style="list-style-type: none"> – impair their ability to survive, breed or reproduce, or to rear or nurture their young; – impair their ability to hibernate or migrate; or – affect significantly the local distribution or abundance of their species.] (Ref 6)
Wildlife and Countryside Act 1981 (as amended)	<ul style="list-style-type: none"> • Intentional or reckless disturbance of any great crested newt while it is occupying a structure or place which it uses for shelter or protection; and • Intentional or reckless obstruction of access to any structure or place which any great crested newt uses for shelter or protection (Ref 7).
Environment (Wales) Act 2016	<p>Section 7 of the Environment (Wales) Act 2016 lists the living organisms of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales. Species included on this list are great crested newt and common toad.</p> <p>Section 6 of the Environment (Wales) Act 2016 places a duty on all public authorities (including statutory undertakers) to “seek to maintain and enhance biodiversity” and to “promote the resilience of ecosystems” (Ref 8).</p>

Legislation	Offences
<p>Vale of Glamorgan Local Biodiversity Action Plan (LBAP)</p>	<p>GCN are a Vale of Glamorgan LBAP species and are considered to be “scarce but widespread in the Vale”.</p> <p>The overall objective of the Vale of Glamorgan LBAP is to conserve and enhance the biodiversity of the Vale by:</p> <ul style="list-style-type: none"> • Protecting all habitats and species important at a local as well as national or international level for nature conservation; • Promoting optimum management for these sites; • Where appropriate, improving degraded habitats or creating new habitats; • Creating a healthy environment in which the commoner species can thrive; and • Creating public awareness of local biodiversity through education and information to all sectors (Ref 9).
<p>Vale of Glamorgan Local Development Plan 2011-2026</p>	<p>Policy MG21 of the Local Development Plan states that:</p> <p>“Development proposals likely to have an adverse impact on Priority species will only be permitted where it can be demonstrated that:</p> <ol style="list-style-type: none"> 1. The need for the development clearly outweighs the nature conservation value of the site; 2. Adverse impacts on nature conservation and geological features can be avoided; 3. Appropriate and proportionate mitigation and compensation measures can be provided: and 4. The development conserves and where possible enhances biodiversity interests” (Ref 10).

4 Methodology

4.1 Habitat Suitability Index (HSI)

Waterbodies that were located up to 250 m from the proposed Development site boundary, as identified from Ordnance Survey mapping, were surveyed on the 4th April 2017 to determine their habitat suitability for GCN. The surveys were carried out by a licensed newt surveyor (Julie Player, licence number 68265a:OTH:SA:2017).

At each of these waterbodies, a Habitat Suitability Index (HSI) assessment was undertaken (Ref 11). The HSI scoring system scores a waterbody against ten habitat suitability indices such as water quality, the likely presence/absence of fish and aquatic plant cover. From these ten suitability indices, a geometric mean is calculated, which gives an overall numerical index, ranging between zero and one. A score of near zero indicates sub-optimal habitat whilst a score near one represents optimal habitat for use by breeding GCN. However, the HSI is not a suitable substitute for undertaking newt surveys - if a waterbody is awarded a high HSI score this does not guarantee that GCN will be present, only that they are more likely to be present in this waterbody than in a sub-optimal waterbody. As such, HSI scores alone cannot be used to rule the ponds in or out from further survey. Detailed HSI scores and results can be found in Appendix A.

A total of eight waterbodies were assessed in this way (see Drawing 4798-S-202-HYD-XX-XX-DR-NX-08016).

Of the eight waterbodies that were identified within 250 m of the proposed Development, six were not subject to further survey due to the waterbodies drying up after undertaking the HSI survey. In total only two of the eight waterbodies (17A and 18) were subject to further survey to confirm presence / likely absence of GCN. These waterbodies were surveyed using the techniques listed below.

4.2 Environmental DNA (eDNA) surveys

Environmental DNA (eDNA) surveys were undertaken on 27th April 2017 by licenced newt surveyor Julie Player to confirm the presence/absence of GCN in waterbodies 17A and 18. GCN release their DNA into ponds via their saliva, skin cells and urine where it will remain for several weeks. EDNA surveys are undertaken by obtaining water samples from the waterbody (in accordance with guidance published by Biggs *et. al.*, 2014 (Ref 12)) which are analysed in a laboratory to identify the presence/absence of GCN DNA which will determine if GCN have used the pond. The samples were analysed by Sure Screen Scientific.

Three possible results will be presented by the testing:

- positive – GCN eDNA has been detected in the pond;
- negative – GCN eDNA has not been detected within the pond; or
- inconclusive Results – GCN eDNA has not been detected but the sample may have been degraded (e.g. not stored correctly and/or at the correct temperature before testing) or the test inhibited (e.g. by an unexpected chemical identified within the sample).

4.3 Presence/absence surveys

While eDNA samples were being analysed, presence/absence surveys of waterbodies 17A and 18 (following English Nature guidance (Ref 13)) were progressed. This involved the following techniques:

- Bottle trapping involved setting bottle traps (comprising 2-litre plastic drinks bottles with the top end cut off and inverted inside the main body of the bottle) along the waterbody margins. Canes were used to support the traps. Traps were set at 2 m intervals wherever access allowed. Traps were set in the evening and checked early the following morning (before 10am). All amphibians captured were identified to species level and sexed before being released back into the pond. The information collected was used to inform population size class estimates.
- Torchlight surveys comprised a single walk around each waterbody at night at a measured pace using a bright torch (Clulite CB2-L2) to locate and identify amphibians. During the survey, all animals observed were counted, sexed and identified to species level where possible.
- Egg searching involved checking marginal and aquatic vegetation around the waterbodies for GCN (and other newt species') eggs. Newts often wrap their eggs in the leaves of vegetation around the margins of ponds. GCN eggs can be relatively easily distinguished from smooth or palmate newt eggs by their larger size and different colouration. Once GCN eggs are found in any waterbody no further egg searches are undertaken, as the survey technique can only be used for determining presence or absence, not for producing population size class estimates.

Presence/absence surveys were carried out on the 2nd-3rd May 2017 by a licensed newt surveyor (Lucy Fay, licence number 74026a:OTH:SA:2016) and assistant (Porscha Thompson).

5 Survey Constraints

A number of the ponds outside of the Development site were located on private land. Despite best efforts, access permission to ponds on land outside of the ownership of DCWW was unsuccessful and surveys were therefore restricted to waterbodies within Cog Moors WwTW and adjacent land owned by DCWW. It is therefore possible that GCN (and other amphibians) may be present within these unsurveyed ponds and could use suitable terrestrial habitat within the site boundary.

The HSI assessment was originally developed for ponds and some elements are not directly applicable to ditches/reens, due to their linear and continuous/interconnecting nature. Beyond the southern boundary of the site lies a network of interconnected reens/ditches making it extremely difficult to accurately quantify the number of ditches within the surrounding landscape. To address this constraint, the suitability index (SI) for the number of other waterbodies within a 1 km radius (SI₆) was omitted from the assessment calculations.

Waterbody 17A contained limited amounts of water therefore survey methods applied were limited. It was not possible to bottle trap or sweep net this waterbody and the vegetation surrounding the waterbody was very overgrown resulting in only small areas where the vegetation was less dense where torch surveys could be

carried out. Although a constraint to the presence/absence surveys, this was overcome through the use of eDNA surveys as a reliable method for confirming presence/absence of GCN.

6 Results

6.1 HSI assessment

The HSI assessment of the identified waterbodies within DCWW owned land found one waterbody considered to have “poor” suitability, four waterbodies considered “below average”, two waterbodies considered “average” and one waterbody considered “good” for breeding GCN (Table 2).

Table 2: Waterbody HSI assessment results summary

Waterbody number	HSI Score	Suitability for breeding GCN (Ref 11)
5	0.55	Below average
7	0.52	Below average
8	0.48	Poor
10A	0.60	Average
10B	0.58	Below average
13	0.61	Average
17A	0.53	Below average
18	0.74	Good

The detailed results of the HSI assessments are shown in Appendix A, locations of the waterbodies are shown on Drawing 4798-S-202-HYD-XX-XX-DR-NX-08016 and photos and descriptions of the waterbodies can be found in Appendix B.

6.2 Presence/absence and eDNA surveys

Presence/absence surveys found no evidence of GCN within either of the waterbodies surveyed, although tadpoles, smooth/palmate newts, water shrew (*Neomys fodiens*) and European eel (*Anguilla anguilla*) were found.

Table 3 summarises the findings from the GCN surveys at waterbodies 17A and 18.

Table 3: GCN presence/absence survey results.

Waterbody	Survey Date	Weather conditions	Egg search	Torching	Bottle Trapping
17A	02/05/2017	19°C; no wind; 80% cloud cover; dry	No eggs	Small number of tadpoles	N/A
18			9 smooth/palmate eggs	31 smooth/palmate newts Large numbers of tadpoles Stickleback and European eel	Palmate newts (6 male, 4 female) Stickleback Large numbers of tadpoles Water shrew x 4

No further presence/absence surveys were undertaken due to the eDNA survey producing **negative** results for GCN DNA in both waterbodies 17A and 18.

7 Discussion

No GCN were found in waterbodies surveyed; however, common toad were found within the site boundary and a European eel was found within 250 m of the site boundary and both of these species are considered of “principal importance” under Section 7 of the Environment (Wales) Act 2016.

There are several areas of suitable terrestrial habitat within the site boundary that could offer foraging and refuge areas for amphibians including woodland, scrub and ruderal vegetation with connectivity between the waterbodies and these habitats throughout the site. It is possible that common toad (and other amphibians) may be present in areas of vegetation that are required to be removed as part of the proposed Development works.

European eel are known to travel over flooded land to access pools unconnected by streams or ditches. It is possible that eel may travel across the site in order to access other waterbodies and may be present within the proposed Development boundary, although this is considered unlikely given the industrial/built-up nature of the site and distance between waterbodies.

The only waterbodies directly impacted by the proposed Development are waterbodies 5, 13 and the eastern end of 10A, which are average/below average suitability for breeding GCN and were dry from May 2017, therefore currently pose no risk of GCN being present.

However, a number of ponds within 250 m of the site could not be accessed – it is possible that GCN may utilise these unsurveyed ponds. Habitat connectivity between these ponds and terrestrial habitat within the Development site could result in GCN being present within the Development site, although this is considered low risk.

8 Conclusions

The surveys undertaken did not confirm the presence of GCN within any of the ponds surveyed. Palmate newts were confirmed present adjacent to the site and common toad were identified within the site (Ref 5). As there is a risk of encountering common toad (and potentially GCN) during construction, some mitigation is recommended as a precautionary approach.

9 Mitigation and Enhancement

9.1 Mitigation

A three-stage approach to vegetation removal under an ecological method statement is recommended. This approach would reduce the suitability of the working corridor for amphibians and other species including reptile and small mammals, and encourage amphibians to move to adjacent habitat and ensure that the working corridor is not suitable for amphibians to recolonise. The following steps would be taken to achieve this.

1. Strim vegetation down to 250 mm using hand tools (e.g. brush-cutter). Rake off the cut vegetation and remove from working corridor. Leave the cleared area undisturbed for at least 24 hours of dry weather.
2. Strim vegetation to ground level using hand tools (e.g. brush-cutter). Rake off the cut vegetation (including removal of the dead thatch) and remove from works footprint. Leave undisturbed for at least 24 hours of dry weather.
3. Undertake a destructive search removing any natural refugia (e.g. brash, log piles, tussocks) and the surface 250 mm of topsoil from the working corridor using a small excavator.

The above steps may only be undertaken between March and September (the period when both amphibians and reptiles are active) and would be carried out under ecological supervision. Vegetation removal would be undertaken starting in areas furthest away from habitat that will be retained, moving towards retained habitat to encourage movement of amphibians towards these retained areas.

Should GCN be found at any stage during site clearance/construction, all works would cease and advice sought from the project ecologist.

Should other amphibian species be found during vegetation clearance works the following process will be followed:

- Works will be temporarily halted;
- The amphibian will be allowed to move out of the area on its own accord;
- If the amphibian does not move on its own accord, it can carefully be moved by hand by the ecologist, taking care to avoid any injury and placed in suitable cover (e.g. grass tussock / beneath scrub) within the immediate surroundings but where it will not be harmed by the works or susceptible to predation.

Compounds/material storage within areas assessed as being suitable to support amphibians would be avoided. Any areas used for these purposes will require vegetation clearance and destructive search as detailed above.

After completion of works, the working corridor should be reinstated to encourage amphibians to recolonise the area once works are complete.

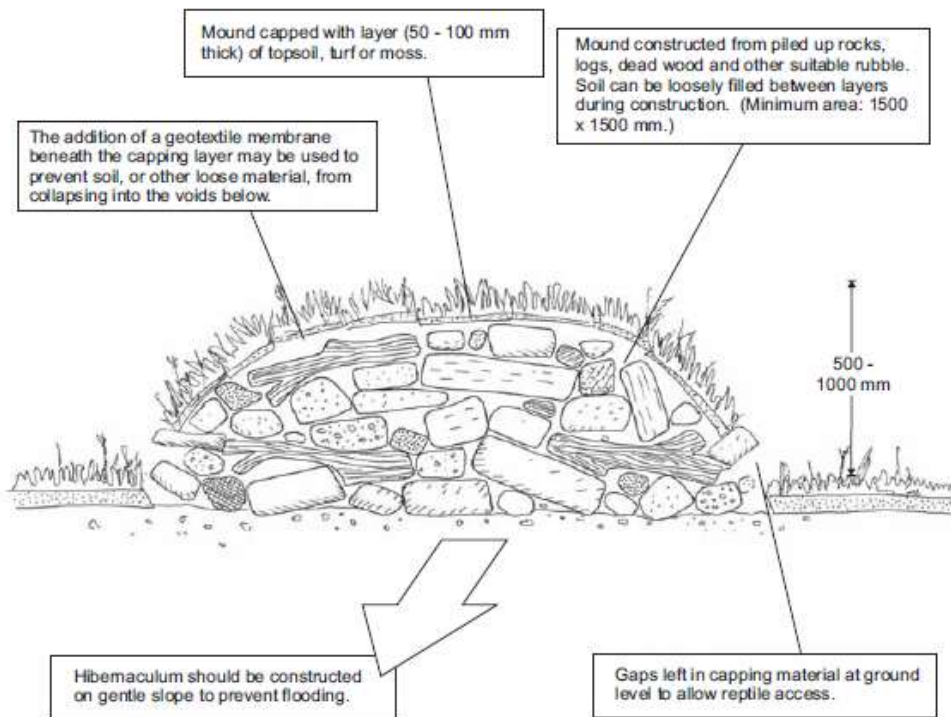
9.2 Toolbox Talk

All contractors would be provided with a toolbox talk prior to construction works commencing on the site. The toolbox talk would cover the identification and potential presence of amphibians, mitigation (including areas to be avoided/undisturbed) and action to be taken in the event of discovering amphibians unexpectedly.

9.3 Enhancement Measures

Cut/cleared vegetation from the working corridor would be used to create habitat piles within the retained habitat outside of the working corridor. A hibernaculum would also be built, using logs and arisings from vegetation clearance in an area advised by the ecologist. Hibernacula would be created as per Figure 1 below (Ref 14).

Figure 1: Hibernacula design (Ref 14)

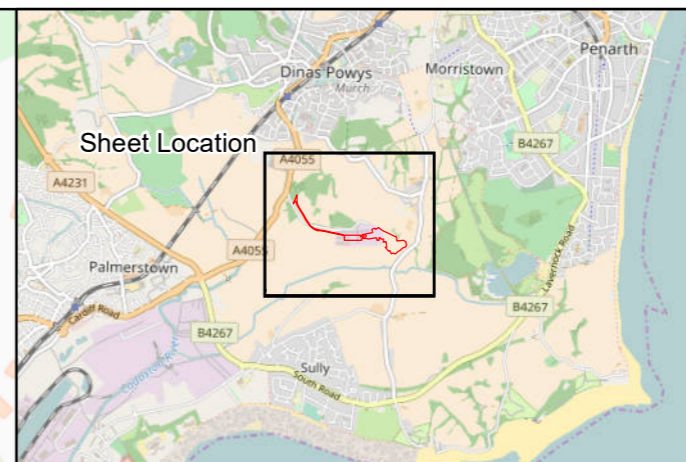
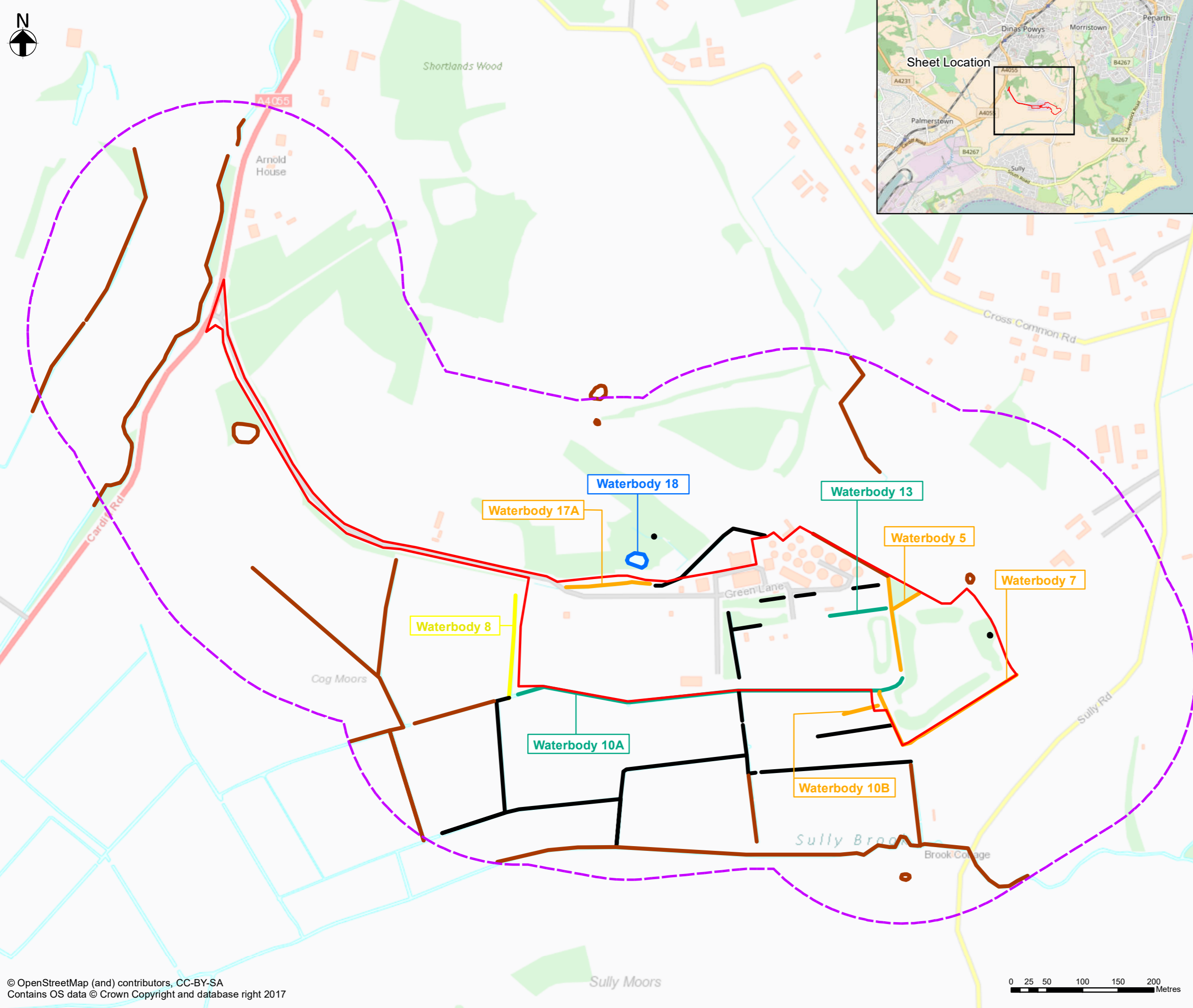


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- Ref 4: Arcadis Consulting (UK) Ltd (2017). Cog Moors WwTW - Proposed Advanced Anaerobic Digestion (AAD) Plant. Addendum Preliminary Ecological Appraisal (Rev 4) (Report number 4798-S-202-HYD-XX-XX-RP-NX-10406).
- Ref 5: Arcadis Consulting (UK) Ltd (2017). Cog Moors WwTW - Proposed Advanced Anaerobic Digestion (AAD) Plant. Reptile Survey Report (Rev 2) (Report number 4798-S-202-HYD-XX-XX-RP-NX-10168).
- Ref 6: Conservation of Habitats and Species Regulations 2010 (as amended).
- Ref 7: Wildlife and Countryside Act 1981 (as amended). HMSO.
- Ref 8: Environment (Wales) Act 2016. HMSO.
- Ref 9: Vale of Glamorgan Council (2002) Vale of Glamorgan Local Biodiversity Action Plan.
- Ref 10: Vale of Glamorgan Council (2017). Vale of Glamorgan Local Development Plan 2011-2026. Written Statement.
- Ref 11: Amphibian and Reptile Groups of the United Kingdom (2010). ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.
- Ref 12: Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, R, A., Foster, J., Wilkinson, J., Arnett, A., Williams, P., and Dunn, F. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.
- Ref 13: English Nature (2001). Great crested newt mitigation guidelines.
- Ref 14: Highways Agency (2005). Design Manual for Roads and Bridges (Volume 10, Section 4, Part 7) - Nature Conservation Advice in Relation to Reptiles and Roads.

DRAWINGS

Drawing 4798-S-202-HYD-XX-XX-DR-NX-08016 - Waterbody Locations



LEGEND

- Planning Application Boundary
- 250m Study Area
- Waterbody Type**
- Average HSI Score
- Below Average HSI Score
- Dry
- Good HSI Score
- Poor HSI Score
- Unsurveyed

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Rev.	Date	Drawn	Description	Chkd.	Appd.	Date
01	14JUN17	AH	Waterbody Locations	PT		14JUN17



Ty Awon, Spooner Close, Coed Kernew, Newport, NP108FZ

Project Name: Cog Moors WwTW

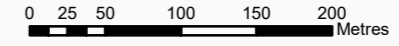
Drawing Title: Waterbody Locations

Suitability: For Information Suitability Code: S2

Originator: A.Hankinson Designer: P.Thompson Date: 14JUN17

Internal Project Number: UA007902 Scale: 1:5,000 Rev: 01

Drawing Number: 4798-S-202-HYD-XX-XX-DR-NX-08016



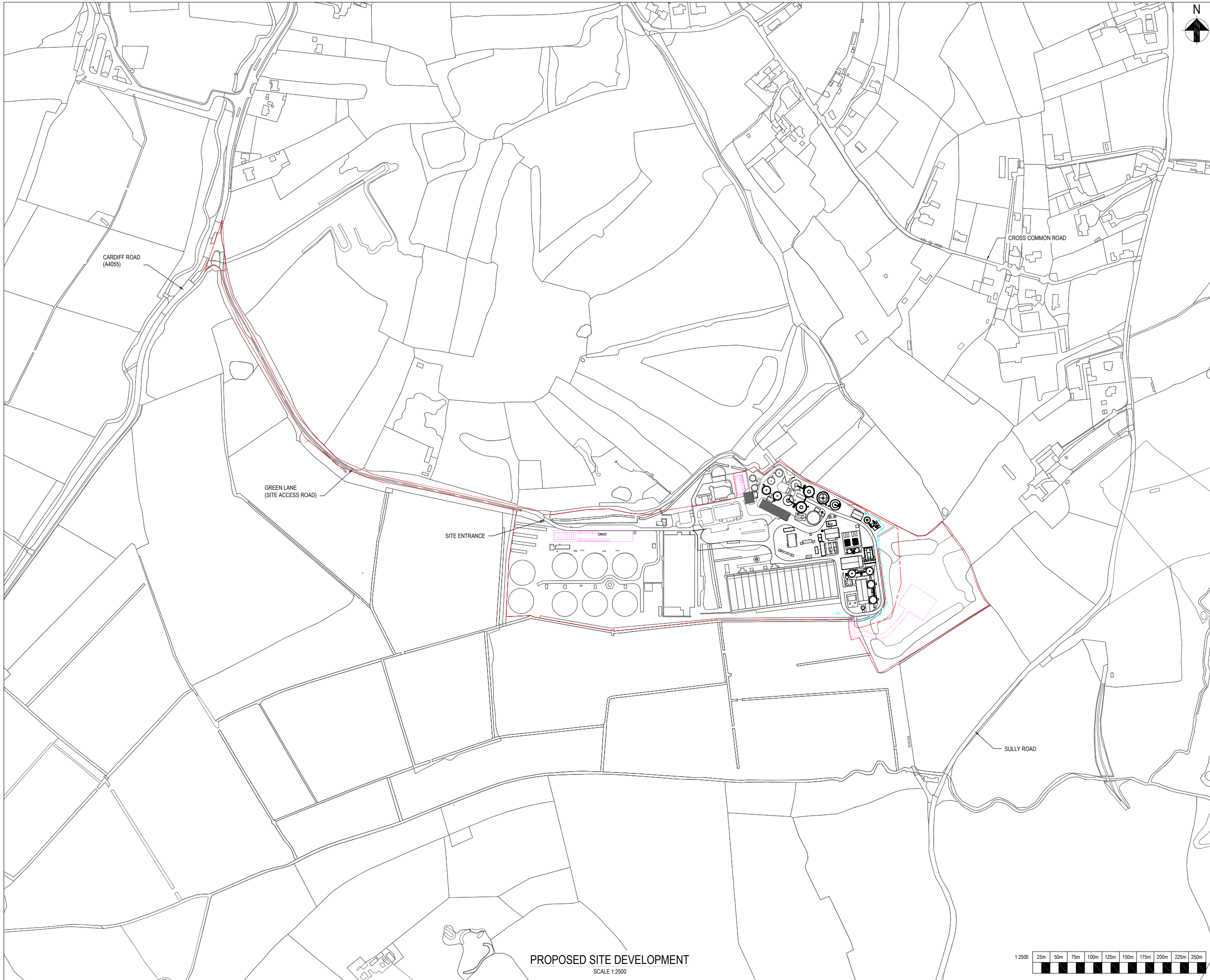
Cog Moors WwTW – Proposed Advanced Anaerobic Digestion (AAD) Plant

**Drawing 4798-S-202-HYD-XX-XX-DR-XX-06120 – Proposed Site
Development**

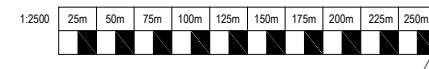


- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
 2. ALL LEVELS ARE IN METERS ABOVE GROUND LEVEL.
 3. DO NOT SCALE FROM THIS DRAWING.

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



PROPOSED SITE DEVELOPMENT
SCALE 1:2500



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	Appd.	Date.



Ty Awen, Spooner Close, Coad Kernew, Newport, NP108FZ

Project Name: **COG MOORS WwTW AAD**

Drawing Title: **PROPOSED SITE DEVELOPMENT**

Suitability: **ISSUED FOR INFORMATION** Suitability Code: **S2**

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

Internal Project Number: **UA007902** Scale: **1:2500** Rev: **P02**

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

APPENDICES



Appendix A - HSI Assessment Results

	Waterbody number	Geographic Location	Area (m ²)	Permanence	Water quality	Shade	Waterfowl	Fish	Terrestrial Habitat	Macrophytes	HSI score	Pond suitability
Description	5	Zone B	173	Dries between 3-9 years in 10	Moderate	95%	Absent	Absent	Good	2%	0.55	Below average
SI score		0.5	0.3	0.5	0.67	0.3	1	1	1	0.3		
Description	7	Zone B	266	Dries between 3-9 years in 10	Poor	100%	Absent	Absent	Good	5%	0.52	Below average
SI score		0.5	0.5	0.5	0.33	0.2	1	1	1	0.35		
Description	8	Zone B	140	Dries annually	Poor	95%	Absent	Absent	Good	95%	0.48	Poor
SI score		0.5	0.3	0.1	0.33	0.3	1	1	1	0.85		
Description	10A	Zone B	819	Dries 2 years in 10 or less	Poor	100%	Absent	Absent	Good	0%	0.60	Average
SI score		0.5	0.98	1	0.33	0.2	1	1	1	0.3		
Description	10B	Zone B	45	Dries between 3-9 years in 10	Moderate	40%	Absent	Absent	Good	60%	0.58	Below average



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

	Waterbody number	Geographic Location	Area (m ²)	Permanence	Water quality	Shade	Waterfowl	Fish	Terrestrial Habitat	Macrophytes	HSI score	Pond suitability
SI score		0.5	0.05	0.5	0.67	1	1	1	1	0.9		
Description	13	Zone B	160	Dries 2 years in 10 or less	Moderate	90%	Absent	Absent	Good	0%	0.61	Average
SI score		0.5	0.3	1	0.67	0.4	1	1	1	0.3		
Description	17A	Zone B	118	Dries annually	Moderate	50%	Absent	Absent	Good	20%	0.53	Below average
SI score		0.5	0.2	0.1	0.67	1	1	1	1	0.5		
Description	18	Zone B	392	Never dries	Moderate	70%	Absent	Minor	Good	70%	0.74	Good
SI score		0.5	0.8	0.9	0.67	0.8	1	0.33	1	1		


Appendix B - Waterbody Descriptions


Pond Number	Photo	Description
5		<p>Shaded ditch which is drying in some areas with very little macrophyte cover of sedge species (<i>Carex</i> sp.) and Yellow Iris (<i>Iris pseudacorus</i>). The surrounding habitat is comprised of woodland and scrub.</p>
7		<p>Shaded ditch with very dense vegetation cover. Very little macrophyte cover comprising Hemlock Water-dropwort (<i>Oenanthe crocata</i>), Broad-leaved Dock (<i>Rumex obtusifolius</i>) and Meadowsweet (<i>Filipendula ulmaria</i>). The surrounding habitat is comprised of woodland, scrub and hedgerow.</p>

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

Pond Number	Photo	Description
8		<p>Mostly dry ditch with a pool of deeper water. Large amounts of perimeter shading and macrophyte cover comprising Common Reed (<i>Phragmites australis</i>), Wild Teasel (<i>Dipsacus fullonum</i>) and Pond Sedge (<i>Carex riparia</i>). The surrounding habitat is comprised of grassland, scrub and woodland.</p>
10A		<p>Shaded ditch with no macrophyte cover. The surrounding habitat is comprised of scrub and woodland.</p>

Pond Number	Photo	Description
10B		<p>Ditch with partial perimeter shading. Macrophyte cover is comprised of Bulrush (<i>Typha latifolia</i>), Rush species (<i>Juncus</i> sp.) and Sedge species (<i>Carex</i> sp.).</p>
13		<p>Ditch with large amounts of perimeter shading and no macrophyte cover. The surrounding habitat is comprised of woodland and scrub.</p>

Pond Number	Photo	Description
17A	 A photograph showing a ditch with moderate perimeter shading and little macrophyte cover. The ditch is surrounded by scrub and woodland. The water in the ditch is dark and still. The surrounding vegetation includes yellow irises and common reeds. The background shows a line of trees and a clear sky.	<p>Ditch with moderate perimeter shading and little macrophyte cover comprising Yellow Iris and Common Reed. The surrounding habitat is comprised of scrub and woodland.</p>

Pond Number	Photo	Description
18		<p>Pond with moderate perimeter shading. The macrophyte cover is comprised of Yellow Iris, Common Reed, Water Mint (<i>Mentha aquatica</i>), Rosebay Willowherb (<i>Chamerion angustifolium</i>) and Fool's-Watercress (<i>Apium nodiflorum</i>). The surrounding habitat is comprised of woodland and scrub.</p>

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