

## **APPENDIX 8.5**

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ENERGY AND CLIMATE CHANGE  
ENVIRONMENT AND SUSTAINABILITY  
INFRASTRUCTURE AND UTILITIES  
LAND AND PROPERTY  
MINING AND MINERAL PROCESSING  
MINERAL ESTATES  
WASTE RESOURCE MANAGEMENT



**WELSH GOVERNMENT**

**COSMESTON**

**GREAT CRESTED NEWT SURVEY REPORT**

**AUGUST 2018**

*your earth our world*



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**COSMESTON**

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**AUGUST 2018**

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DRAWINGS	TITLE	SCALE
CA11040-001/RevA	Site Location Plan and Ecological Survey Area	1:25,000@A3
CA11040-011	Waterbody Location Plan & 2017 GCN Survey Results	1:10,000@A3

## EXECUTIVE SUMMARY

Wardell Armstrong LLP was commissioned by Welsh Government to undertake great crested newt surveys of suitable waterbodies within 500m of a site at Cosmeston, Penarth, located at approximate National Grid Reference ST17964 68945.

The area of detailed ecological study referred to as the 'site' comprises a working livery yard with stable block buildings, improved and semi-improved grassland fields utilised for horse pasture, arable fields, a disused railway line, boundary hedges and woodland blocks and covers of approximately 29 hectares. The Ty'r Orsaf Site of Importance for Nature Conservation (SINC) is located at the south west corner of the site.

A total of 26 waterbodies were identified within 500m of the site. Of these, 12 waterbodies were surveyed for a HSI index, and 9 were surveyed for GCN. Of the waterbodies surveyed, no GCN were found during the presence/absence surveys. Therefore, the development will not result in significant effects on GCN at any scale.

## **1 INTRODUCTION**

### **1.1 Terms of Reference**

1.1.1 Wardell Armstrong LLP (WA) was commissioned by Welsh Government (WG) to undertake great crested newt *Triturus cristatus* (GCN) surveys of suitable waterbodies within 500m of a site at Cosmeston, Penarth located at approximate National Grid Reference ST17964 68945.

### **1.2 Report Objectives**

1.2.1 The purpose of this report is to detail the results of the 2017 GCN surveys assessing presence/likely absence of GCN on or within 500m of the site.

1.2.2 Provisional mitigation and enhancement opportunities are also discussed, where appropriate.

### **1.3 Site Context**

1.3.1 The location of the site is shown on Drawing Number CA11040-001/RevA. The site is situated in the Vale of Glamorgan to the east of Lavernock Road (B4267) and south of 'Lower Penarth' housing estate as shown on Drawing Number CA11040-001 (Site Location and Survey Area). Farmland borders the site immediately to the east beyond which is the coastline of the Severn Estuary, with further agricultural land present to the south east. Part of the south-western part of the site is bordered by the 'Fort Road' which leads to the Lavernock Holiday Village.

1.3.2 The area of detailed ecological study referred to as the 'site' comprises a working livery yard with stable block buildings to the east of the site and semi-improved and improved grassland fields extending to north, south and west. The Ty'r Orsaf Site of Importance for Nature Conservation (SINC) is located in the south west corner of the site surrounded by broadleaved woodland. The north and eastern boundaries of the site are bordered by intact hedgerows, with broadleaved woodland dominating the western boundary and residences to the north.

### **1.4 Description of Development**

1.4.4 The ecological studies are required to inform an outline planning application with accompanying masterplan for a proposed residential development.

## **1.5 Legislative Framework**

- 1.5.1 In England and Wales the GCN is protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 and under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).
- 1.5.2 It is an offence to:
- Intentionally or deliberately capture, kill, or injure GCN;
  - Intentionally or recklessly damage, destroy, and disturb GCN in a place used for shelter or protection, or obstruct access to such areas;
  - Damage or destroy a GCN breeding site or resting place;
  - Possess a GCN, or any part of it, unless acquired lawfully; and
  - Sell, barter, exchange, transport, or offer for sale GCN or parts of them.
- 1.5.3 The legislation covers all newt life stages from eggs to adult newts, which are all equally protected. Actions that are prohibited can be made lawful by a licence issued by the appropriate Statutory Nature Conservation Organisation.
- 1.5.4 The GCN is a Priority Species under the UK and Local Biodiversity Action Plans and is a species of key significance to sustain and improve biodiversity in relation to Wales under section 7 of the Environment (Wales) Act (2016). This act replaces the duty in Section 42 of the Natural Environment and Rural Communities (NERC) Act 2006.

## **1.6 Great Crested Newt Ecology**

- 1.6.1 Like all British amphibians, GCN rely on waterbodies (typically ponds, but also slow moving small water courses) for breeding but otherwise they spend much of their time on dry land. GCN enter a period of low activity as temperatures fall to below 5°C. This generally begins in late September and by the end of November most are dormant for much of the time. Newts seek refuge over winter in sites similar to those sought during the day such as an underground crevice or crack, a void in a tree stump or bank or under refugia such as piles of rock or dead wood.
- 1.6.2 Newts migrate to breeding ponds in spring, and sometimes as early as the first frost free days, at the end of January. The majority of GCN reach the breeding ponds by mid-March. The peak courtship period is between mid-March and mid-May, after which adult newts will generally vacate the water body. Juveniles emerge from the water body from early August onwards, after metamorphosis is complete.

- 1.6.3 On land GCN engage in foraging, dispersing and resting. Foraging takes place mostly during hours of darkness over a range of habitats that support invertebrate species. Movement at night may reduce the risk of predation and desiccation.
- 1.6.4 Whilst on land, outside the over wintering period, newts may require refuges from extremes of weather (i.e. high temperatures and dry periods) and may rest in areas of dense vegetation, under refuges or underground.



## 2 METHODOLOGY

### 2.1 Desk Study

2.1.1 A Desk study was undertaken as part of the Preliminary Ecological Appraisal by Wardell Armstrong in February 2017. The desk study was informed by a review of existing available information provided by South East Wales Biodiversity Records Centre (SEWBRc) for a 2km search radius from the sites boundary. The desk study data from SEWBRc was received February 2017. Ordnance Survey (OS) and satellite mapping was also used to gain contextual habitat information and identify aquatic features within 500m of the site.

### 2.2 GCN Scoping Survey

2.2.1 The aquatic features were scoped for their suitability to support amphibians and subject to an HSI assessment during a scoping / HSI survey on the 24<sup>th</sup> April 2018. The reference and location of each is shown on Drawing Number CA11382-102 Waterbody Location Plan. A photograph and description of each waterbody is provided in Appendix 1.

#### ***Habitat Suitability Index***

2.2.2 The HSI has been developed as a way of evaluating habitat quality and quantity for great crested newts. The HSI score is now required as part of the Natural England disturbance licensing system for each water body that would be subject to activities likely to result in adverse impacts to a local GCN population. The HSI is a numerical index between 0 and 1 (with 1 being optimal habitat) and uses ten suitability indices, all of which are factors thought to affect GCN but can only be calculated for still waterbodies and not moving watercourses. The HSI is a numerical index, between 1 and 0 and can be broken down into:

<0.5	=	Poor
0.5 – 0.59	=	below average
0.6 – 0.69	=	average
0.7 – 0.79	=	good
>0.8	=	excellent

## **2.3 GCN Survey**

- 2.3.1 Surveys for GCN were undertaken on suitable features between 2<sup>nd</sup> May and 2<sup>nd</sup> June 2017 with overnight low temperatures above 5°C.
- 2.3.2 The principal guidance for undertaking GCN surveys is provided in the English Nature document 'Great crested newt mitigation guidelines' (August 2001). Further guidance on survey effort is also provided in the Method Statement Template for a Natural Resources Wales disturbance licence application amended in February 2018.
- 2.3.3 The guidelines recommend that up to four visits should be undertaken in order to determine presence / likely absence of great crested newts under a survey licence from Natural Resources Wales.
- 2.3.4 If GCN presence is confirmed, then two additional survey visits are required (giving a total of 6), in order to carry out a GCN population size class assessment.
- 2.3.5 Surveys should be undertaken between the months of mid-March and mid-June, with at least two (for presence / likely absence) or three (for population size class) of these surveys undertaken between mid-April to mid-May.
- 2.3.6 Three survey methods are recommended in the guidelines, preferably torchlight inspections after dusk, overnight "bottle-trapping" and egg searching, although netting can also be used.

## **2.4 Torch Light Survey**

- 2.4.1 This method involves scanning the pond at night using a high powered torch (with a minimum of 50,000 candle power). This method can be a simple and effective way of detecting newts in clear ponds, however in turbid or heavily vegetated ponds can be limiting.

## **2.5 Bottle Trapping**

- 2.5.1 This method involves setting traps, which are made from 2-litre plastic bottles, around the margins of the pond at a density of approximately one trap per two metres of shoreline. Guidelines recommend that traps should be set at dusk and checked between 0600 and 1000 hours the following morning. This can be one of the most effective methods for detecting the presence of great crested newts, particularly in turbid or heavily vegetated ponds.

## 2.6 Egg Searching

2.6.1 This method involves searching submerged vegetative material (both live and dead) for GCN eggs. As this method requires the eggs to be 'unwrapped' from the leaf to confirm identification this has the potential to increase predation and exposure of the eggs to UV rays. Consequently, only small areas of vegetation are systematically unwrapped and once GCN eggs have reliably been identified this method is terminated. Egg searching can be an effective method for detecting presence of GCN, however eggs can prove difficult to find in heavily vegetated ponds, where a small population is present, or where vegetation is not easily accessible.

## 2.7 Nomenclature

2.7.1 Vascular plant names follow '*New Flora of the British Isles*' (Stace, 2010) with vernacular names as provided in the Botanical Society of the British Isles website (BSBI, 2013).

2.7.2 All fauna names follow those on the National Biodiversity Network (NBN) Gateway (NBN, 2013).

2.7.3 The common and scientific name of species/taxa is provided (if available) when first mentioned in the text, with only the vernacular name referred to thereafter.

## 2.8 Assessment Limitations

2.8.1 Waterbodies 1, 5, 11, 14 and 21 were surveyed using torch light only. Waterbodies 1, 5 and 21 were too shallow to bottle trap and had no aquatic vegetation. Waterbodies 11 and 14 were not surveyed due to health and safety access concerns (very steep banks).

2.8.2 Waterbody 20 was not surveyed as it was inaccessible due to the presence of a ditch, bund and scrub.

2.8.3 During the survey on the 1<sup>st</sup> June waterbody 1 was dry and vegetation growth obscured the banks of waterbody 21 making it unsafe to torch light survey.

## 2.9 Quality Assurance & Environmental Management

2.9.1 The surveys were undertaken by a suitably experienced and NRW licenced ecologist.

2.5.1 The assessments have been overseen by and the report checked and verified by a member of CIEEM and thus bound by its code of professional conduct. All surveys and

assessments have been undertaken with reference to the recommendations given in British Standard BS 42020, and as stated within specialist guidance, as appropriate and referenced separately.

### 3 RESULTS AND DISCUSSION

#### 3.1 Desk Study

3.1.1 The desk study returned three records of GCN approximately 1.63km to the south west and the Council's ecologist informed that there are GCN present at Cosmeston Lakes to the north of the site.

#### 3.2 Field Survey

3.2.1 Photographs are provided in Appendix 1 and HSI sheets are provided in Appendix 2. The location of waterbodies and survey results are shown on Drawing Number CA11040-011. A total of 26 waterbodies were identified within 500m of the site. 12 waterbodies were found to be dry. Waterbody 20 could not be accessed due to steep banks with mature scrub and grassland surrounding the pond. Waterbody 15 is a large lake also not considered suitable breeding habitat for GCN. Waterbody 22 was covered in duckweed and there was no access to the banks. Waterbodies 17 and 19 were streams and not considered to provide suitable breeding habitat for GCN. The remaining 9 waterbodies were surveyed for presence / absence of GCN.

3.2.2 Table 1 summarises the results of the GCN surveys undertaken in 2017. Raw survey data is provided in Appendix 3.

<b>Table 1 – HSI Scores and GCN Survey Results</b>			
<b><i>Waterbody Number</i></b>	<b><i>HSI (2017)</i></b>	<b><i>Categorisation of Score</i></b>	<b><i>GCN Present</i></b>
1	0.5	Poor	No
2	Dry	-	-
3	Dry	-	-
4	Dry	-	-
5	0.46	Poor	No
6	Dry	-	-
7	Dry	-	-
8	Dry	-	-
9	Dry	-	-
10	Dry	-	-
11	0.6	Average	No
12	Dry	-	-
13	Dry	-	-
14	0.57	Below Average	No
15	0.27	Poor	Large Lake – Not surveyed

16	Dry	-	-
17	Stream	-	-
18	0.77	Good	No
18a	0.72	Good	No
19	Stream	-	-
20	0.59	Below Average	In accessible to conduct further surveys
21	0.66	Average	No
22	0.65	Average	No
23	0.8	Excellent	No
24	Dry	-	-
25	0.72	Good	No

3.2.3 Of the waterbodies surveyed no GCN were observed during the presence/absence surveys. Other amphibians were observed, including smooth newts, palmate newts, and common frog tadpoles and adults.

3.2.4 Therefore, the development will not result in significant effects on GCN at any scale.

3.2.5 No further mitigation is considered necessary.

#### **4 ENHANCEMENT MEASURES**



- 4.1.1 In accordance with the requirements of the Planning Policy Wales 2016 and BSI 42020:2013, ecological enhancements should be proposed which will result in a net gain in biodiversity.
- 4.1.2 Sustainable drainage measures which may be implemented as part of the development could potentially provide opportunities for a variety of wildlife including amphibians.
- 4.1.3 Enhancement measures could include the creation of wildlife friendly aquatic features, hibernacula such as wooden log piles and earth and stone / log mounds and terrestrial habitat creation and enhancement.



## **APPENDICES**








**Appendix 1**  
**Pond Descriptions and Photographs**



### Appendix 1 Pond Descriptions and Photographs



Reference	Pond Description	Photograph
1	<p>Very shallow, small pond surrounded by woodland and scrub. Has steep banks &gt; 45 degrees covered in bramble scrub. Algae mat covering pond.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	
2	<p>Dry field ditch adjacent to woodland.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	



Reference	Pond Description	Photograph
3	<p>Overgrown dry ditch.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	
4	<p>Dry, overgrown field ditch adjacent to hedgerow.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	

Reference	Pond Description	Photograph
5	<p data-bbox="355 248 660 421">Small woodland pond, with soft ground around small patch of water. &lt; 45 degree shallow bank.</p> <p data-bbox="355 488 619 566">Photo 1 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="355 880 611 958">Bankside vegetation of mature trees.</p> <p data-bbox="355 1025 619 1104">Photo 2 taken 25<sup>th</sup> April 2017.</p>	<p data-bbox="699 248 715 271">1</p>  <p data-bbox="699 797 715 819">2</p> 
6	<p data-bbox="355 1413 627 1491">Dry ditch surrounded by mature scrub.</p> <p data-bbox="355 1559 667 1592">Photo taken 25<sup>th</sup> April 2017.</p>	



Reference	Pond Description	Photograph
7	<p data-bbox="357 248 624 322">Dry ditch surrounded by mature scrub.</p> <p data-bbox="357 394 663 423">Photo taken 25<sup>th</sup> April 2017.</p>	
8	<p data-bbox="357 1126 663 1249">Dry depression in field with dry ditch leading away from it.</p> <p data-bbox="357 1321 663 1350">Photo taken 25<sup>th</sup> April 2017</p>	

Reference	Pond Description	Photograph
9	Ditch dry	
10	Dry ditch.	1
	Photo 1 taken 25 <sup>th</sup> April 2017.	
	Photo 2 taken 25 <sup>th</sup> April 2017.	2
		


Reference	Pond Description	Photograph
11	<p data-bbox="355 248 647 517">2m wide ditch in medieval village garden. Steep &gt;45 degree banks. Bankside vegetation supports amenity grassland and scrub.</p> <p data-bbox="355 636 619 712">Photo 1 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="355 1122 651 1397">Floating vegetation of duckweed (<i>Lemnoideae</i>) and some water mint (<i>Mentha citrata</i>). Marginal vegetation of black sedge (<i>Carex nigra</i>).</p> <p data-bbox="355 1464 619 1541">Photo 2 taken 25<sup>th</sup> April 2017.</p>	<p data-bbox="699 248 715 271">1</p>  <p data-bbox="699 1070 715 1093">2</p> 




Reference	Pond Description	Photograph
12	<p data-bbox="357 248 520 277">Dry field ditch.</p> <p data-bbox="357 344 667 374">Photo taken 25<sup>th</sup> April 2017.</p>	
13	<p data-bbox="357 1028 662 1102">Dry drainage ditch adjacent to track.</p> <p data-bbox="357 1171 667 1200">Photo taken 25<sup>th</sup> April 2017.</p>	








Reference	Pond Description	Photograph
<p data-bbox="201 253 236 275">14</p> <p data-bbox="360 253 635 376">2m wide ditch within medieval village gardens. Steep &gt; 45 degree banks.</p> <p data-bbox="360 443 619 521">Photo 1 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="360 1077 671 1249">Floating vegetation of algae. Marginal vegetation of common reed (<i>Phragmites australis</i>).</p> <p data-bbox="360 1317 619 1395">Photo 2 taken 25<sup>th</sup> April 2017.</p>		<p data-bbox="695 253 715 275">1</p>  <p data-bbox="695 1032 715 1055">2</p> 



Reference	Pond Description	Photograph
15	<p data-bbox="355 248 676 568">Large lake at Cosmeston Park. Mature scrub around some sections of the bank, others sections with a very steep bank (&gt;45 degree) and some reeds along other sections.</p> <p data-bbox="355 589 663 712">Agreed with Council's Ecologist no further surveys required.</p> <p data-bbox="355 732 619 808">Photo 1 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="355 882 647 1055">Shallow &lt; 45 degree bank. Marginal vegetation of common reed (<i>Phragmites australis</i>).</p> <p data-bbox="355 1075 608 1198">Bankside vegetation of amenity grassland and mature scrub.</p> <p data-bbox="355 1272 619 1348">Photo 2 taken 25<sup>th</sup> April 2017.</p>	<p data-bbox="699 248 715 271">1</p>  <p data-bbox="699 853 715 875">2</p> 



Reference	Pond Description	Photograph
16	<p data-bbox="355 248 655 421">Water level &lt;0.5m. Steep &gt; 45 degree banks, very overgrown with scrub and common reed.</p> <p data-bbox="355 490 619 566">Photo 1 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="355 880 619 956">Photo 2 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="355 1413 619 1489">Photo 3 taken 25<sup>th</sup> April 2017.</p>	<p data-bbox="699 248 715 271">1</p>  <p data-bbox="699 835 715 857">2</p>  <p data-bbox="699 1417 715 1440">3</p> 

Reference	Pond Description	Photograph
17	<p>1.5m wide slow flowing stream with shallow water (approx.. 5-10cm deep) and no aquatic vegetation. Mature scrub and common reed along steep &gt; 45 degree banks.</p> <p>Photo 1 taken 25<sup>th</sup> April 2017.</p> <p>Photo 2 taken 25<sup>th</sup> April 2017.</p> <p>Photo 3 taken 25<sup>th</sup> April 2017.</p>	<p>1</p>  <p>2</p>  <p>3</p> 



Reference	Pond Description	Photograph
18	<p>Section of ditch 18 adjacent to track which was dry,</p> <p>Photo 1 taken 25<sup>th</sup> April 2017.</p> <p>3m wide wet section of the ditch on golf course.</p> <p>Photo 2 taken 25<sup>th</sup> April 2017.</p> <p>Duckweed (<i>Lemnoideae</i>) present. Marginal vegetation of yellow flag iris (<i>Iris pseudacorus</i>) and rushes (<i>Juncaceae</i>). Steep &gt; 45 degree bankside of amenity grassland.</p> <p>Photo 3 taken 25<sup>th</sup> April 2017.</p>	<p>1</p>  <p>2</p>  <p>3</p> 



Reference	Pond Description	Photograph
18a	<p>Continuation of 4m wide ditch on gold course. Steep &gt; 45 degree bank of amenity grassland. Contained duckweed (<i>Lemnoideae</i>). Marginal vegetation comprising bulrush (<i>Typha</i>), common reed (<i>Phragmites australis</i>) and yellow flag Iris (<i>Iris pseudacorus</i>).</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	
19	<p>Stream dry at Cosmeston lakes end.</p> <p>Photo 1 taken 25<sup>th</sup> April 2017.</p>	<p>1</p> 

Reference	Pond Description	Photograph
	<p data-bbox="355 248 676 667">Slow flowing stream with shallow water (approx. 5-10cm deep) with no aquatic vegetation along golf course. Steep &gt; 45 degree bank with mature scrub. Agreed with Council's Ecologist could be scoped out for further survey.</p> <p data-bbox="355 734 619 813">Photo 2 taken 25<sup>th</sup> April 2017.</p> <p data-bbox="355 1126 619 1205">Photo 3 taken 25<sup>th</sup> April 2017.</p>	<p data-bbox="699 248 715 271">2</p>  <p data-bbox="699 1099 715 1122">3</p> 

Reference	Pond Description	Photograph
20	<p>Small pond surrounded by large bund. No access due to ditch and steep banks with mature scrub and grassland surrounding pond. Marginal vegetation of rushes and sedges.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	
21	<p>Heavily vegetated ditch. Shallow bank &lt; 45 degrees with vegetation of rushes and grassland.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	



Reference	Pond Description	Photograph
22	<p>Medium sized pond covered in duckweed (<i>Lemnoideae</i>). Surrounded by steep &gt; 45 degree banks and marshy areas. Bankside vegetation of mature scrub, hogweed (<i>Heracleum sphondylium</i>) and common reed (<i>Phragmites australis</i>).</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	
23	<p>Medium sized pond surrounded by common reed (<i>Phragmites australis</i>). Boardwalk out onto pond. Steep &gt; 45 degree bank. Lily pads (<i>Nymphaeaceae</i>) present.</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	

Reference	Pond Description	Photograph
24	<p>Marshy pond area covered in common reed (<i>Phragmites australis</i>) and sedges (<i>Cyperaceae</i>).</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	
25	<p>Small field pond adjacent to stream corridor. Shallow &lt; 45 degree bank of mature scrub and semi-improved grassland. Marginal vegetation of rushes (<i>Juncaceae</i>) and bulrushes (<i>Typha</i>). Lily pads (<i>Nymphaeaceae</i>) and broad-leaved pondweed present (<i>Potamogeton natans</i>).</p> <p>Photo taken 25<sup>th</sup> April 2017.</p>	

**Appendix 2**  
**Habitat Suitability Index Calculations**

## Appendix 2 Habitat Suitability Index Calculations

### Waterbody 1

Geographic Location	0.5
Size of Waterbody	0.1
Permanence	0.5
Water Quality	0.67
Shade	0.2
Fowl	1
Fish	1
Pond Count	0.9
Terrestrial Habitat Quality	1
Macrophyte Cover	0.3
HSI Score	0.49618183

### Waterbody 5

Geographic Location	0.5
Size of Waterbody	0.1
Permanence	0.5
Water Quality	0.33
Shade	0.2
Fowl	1
Fish	1
Pond Count	0.8
Terrestrial Habitat Quality	1
Macrophyte Cover	0.3
HSI Score	0.45684568

## Waterbody 11

<b>Geographic Location</b>	0.5
<b>Size of Waterbody</b>	0.1
<b>Permanence</b>	0.5
<b>Water Quality</b>	0.67
<b>Shade</b>	1
<b>Fowl</b>	1
<b>Fish</b>	1
<b>Pond Count</b>	1
<b>Terrestrial Habitat Quality</b>	0.67
<b>Macrophyte Cover</b>	0.5
<b>HSI Score</b>	0.59553318

## Waterbody 14

<b>Geographic Location</b>	0.5
<b>Size of Waterbody</b>	0.1
<b>Permanence</b>	0.5
<b>Water Quality</b>	0.33
<b>Shade</b>	1
<b>Fowl</b>	1
<b>Fish</b>	1
<b>Pond Count</b>	1
<b>Terrestrial Habitat Quality</b>	0.67
<b>Macrophyte Cover</b>	0.7
<b>HSI Score</b>	0.57380282

## Waterbody 15

Geographic Location	0.5
Size of Waterbody	0.8
Permanence	0.9
Water Quality	0.33
Shade	1
Fowl	0.01
Fish	0.01
Pond Count	1
Terrestrial Habitat Quality	0.67
Macrophyte Cover	0.3
HSI Score	0.27403198

## Waterbody 18

Geographic Location	0.5
Size of Waterbody	0.4
Permanence	1
Water Quality	0.67
Shade	1
Fowl	1
Fish	1
Pond Count	0.9
Terrestrial Habitat Quality	0.33
Macrophyte Cover	0.5
HSI Score	0.77382826

## Waterbody 18a

Geographic Location	0.5
Size of Waterbody	0.4
Permanence	1
Water Quality	0.67
Shade	1
Fowl	1
Fish	1
Pond Count	0.9
Terrestrial Habitat Quality	0.33
Macrophyte Cover	1
HSI Score	0.72441282

## Waterbody 20

Geographic Location	0.5
Size of Waterbody	0.1
Permanence	0.5
Water Quality	0.67
Shade	1
Fowl	1
Fish	1
Pond Count	1
Terrestrial Habitat Quality	1
Macrophyte Cover	0.3
HSI Score	0.58899771

## Waterbody 21

<b>Geographic Location</b>	0.5
<b>Size of Waterbody</b>	0.1
<b>Permanence</b>	0.5
<b>Water Quality</b>	0.67
<b>Shade</b>	1
<b>Fowl</b>	1
<b>Fish</b>	1
<b>Pond Count</b>	1
<b>Terrestrial Habitat Quality</b>	1
<b>Macrophyte Cover</b>	0.9
<b>HSI Score</b>	0.65739399

## Waterbody 22

<b>Geographic Location</b>	0.5
<b>Size of Waterbody</b>	0.2
<b>Permanence</b>	0.5
<b>Water Quality</b>	0.33
<b>Shade</b>	1
<b>Fowl</b>	1
<b>Fish</b>	1
<b>Pond Count</b>	1
<b>Terrestrial Habitat Quality</b>	1
<b>Macrophyte Cover</b>	0.8
<b>HSI Score</b>	0.64872016



## Waterbody 23

<b>Geographic Location</b>	0.5
<b>Size of Waterbody</b>	0.6
<b>Permanence</b>	0.9
<b>Water Quality</b>	1
<b>Shade</b>	1
<b>Fowl</b>	1
<b>Fish</b>	1
<b>Pond Count</b>	1
<b>Terrestrial Habitat Quality</b>	1
<b>Macrophyte Cover</b>	0.4
<b>HSI Score</b>	0.80046505

## Waterbody 25

<b>Geographic Location</b>	0.5
<b>Size of Waterbody</b>	0.2
<b>Permanence</b>	0.9
<b>Water Quality</b>	0.67
<b>Shade</b>	1
<b>Fowl</b>	1
<b>Fish</b>	1
<b>Pond Count</b>	0.9
<b>Terrestrial Habitat Quality</b>	1
<b>Macrophyte Cover</b>	0.7
<b>HSI Score</b>	0.72105067

### Habitat Suitability Index Record Sheet

<b>Job Number</b>	CA11040
<b>Client</b>	Welsh Government
<b>Location</b>	Cosmeston Livery Yard
<b>Project</b>	Cosmeston Ecological Surveys
<b>Date HSI Undertaken</b>	25.04.17
<b>Surveyor</b>	Sally Caveill

<b>Pond Number</b>	<b>HIS Score</b>	<b>Pond suitability</b>
1	0.5	Poor
5	0.46	Poor
11	0.6	Average
14	0.57	Below Average
15	0.27	Poor
18	0.77	Good
18a	0.72	Good
20	0.59	Below Average
21	0.66	Average
22	0.65	Average
23	0.8	Excellent
25	0.72	Good

**Appendix 3**  
**Raw Survey Data**











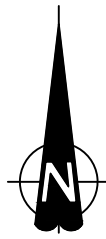








## **DRAWINGS**



316

317

318

319

171

170

169

168

167

DO NOT SCALE FROM THIS DRAWING

**REFERENCE**

Site boundary (29.14Ha) \_\_\_\_\_

2Km Search area \_\_\_\_\_

Original site boundary EP1 Habitat Survey in September 2016 \_\_\_\_\_

Additional land included within site boundary and subject to EP1 Habitat Survey in April 2017 \_\_\_\_\_

A	Amended to show revised site boundary.	05/10/17	RJH	JLH	JLH
---	--	----------	-----	-----	-----

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D
----------	---------	------	------	-------	-------

CLIENT

**WELSH GOVERNMENT**

PROJECT

**COSMESTON ECOLOGICAL SURVEY**

DRAWING TITLE

**SITE LOCATION PLAN & ECOLOGICAL SURVEY AREA**

DRG No.	CA11040-001	REV	A
---------	-------------	-----	---

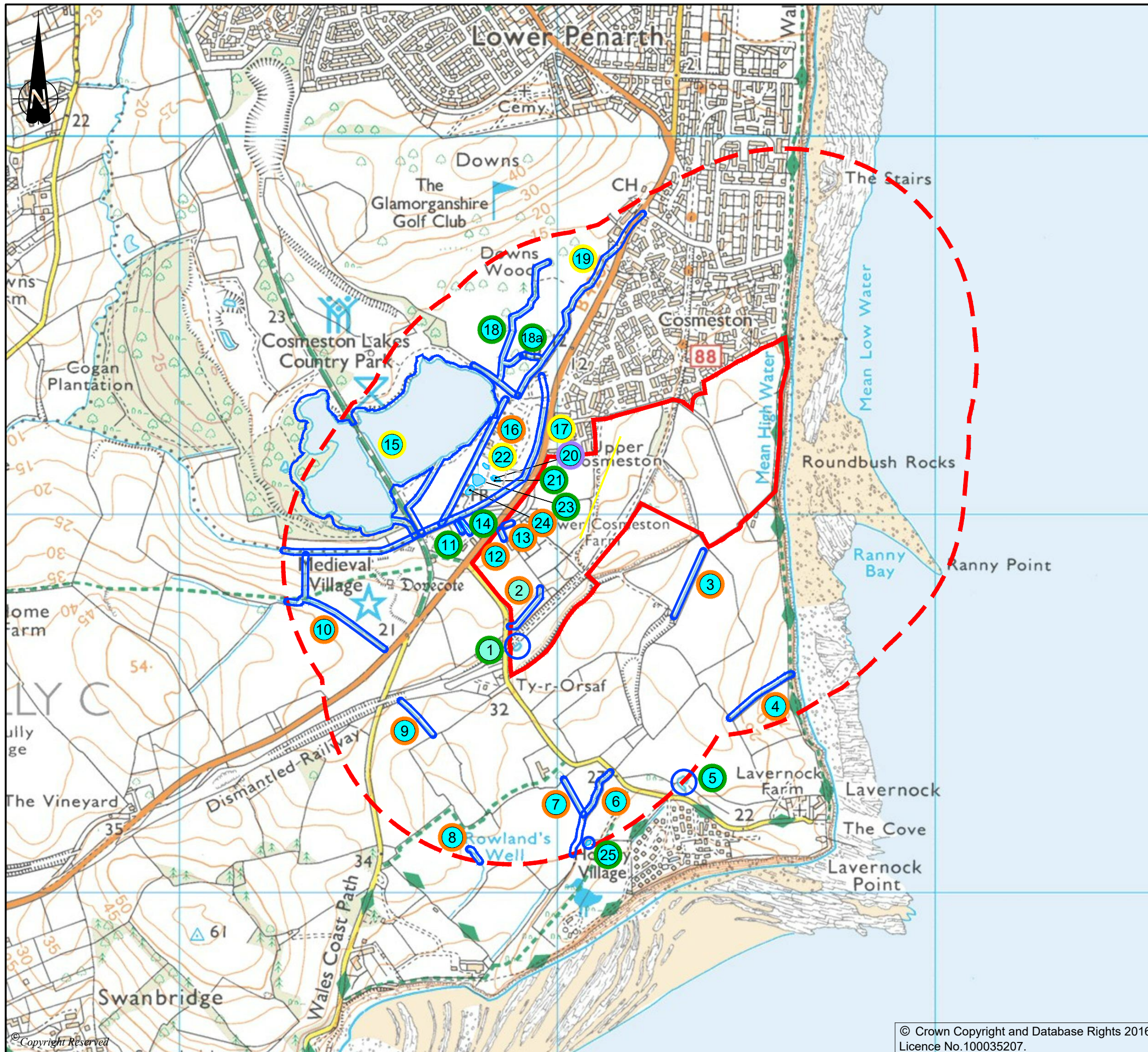
DRG SIZE	A3	SCALE	1:25,000	DATE	17/10/16
----------	----	-------	----------	------	----------

DRAWN BY	RJH	CHECKED BY	JLH	APPROVED BY	JLH
----------	-----	------------	-----	-------------	-----

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DO NOT SCALE FROM THIS DRAWING

**REFERENCE**

Site boundary	---	---
500m Search area	-.-.-	-.-.-
Waterbody reference number	○	①
Surveyed	---	①
Dry	---	②
Unsuitable for GCN	---	⑮
Access constraints	---	⑳

REVISION	DETAILS	DATE	DR'N	CHK'D	APP'D
----------	---------	------	------	-------	-------

CLIENT  
**WELSH GOVERNMENT**

PROJECT  
**COSMESTON ECOLOGICAL SURVEY**

DRAWING TITLE  
**WATERBODY LOCATION PLAN & 2017 GCN SURVEY RESULTS**

DRG No.	CA11040-011	REV	
DRG SIZE	A3	SCALE	1:10,000
		DATE	06/08/18
DRAWN BY	RJH	CHECKED BY	KH
		APPROVED BY	AB

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