



**ECOLOGY**SOLUTIONS

Part of the ES Group

St. Modwen Developments

North Site Reservoir,  
Coed Darcy, Llandarcy, Neath

## **Ecological Assessment**

May 2023  
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## 1. INTRODUCTION

### 1.1. Background & Proposals

#### Introduction

- 1.1.1. Ecology Solutions (Manchester) Limited was commissioned on behalf of St. Modwen Developments Limited (hereafter 'St. Modwen') to undertake an Ecological Assessment (EA) of North Site Reservoir (NSR) at Coed Darcy, Llandarcy, Neath, SA10 6FG (see Plan ECO1), hereafter referred to as the Application Site.
- 1.1.2. Full planning permission is sought for discontinuance of the NSR. A description of development is provided below:
- 1.1.3. *"The Proposed Development comprises a series of engineering works which will modify and discontinue the NSR in such a manner that it is no longer capable of impounding a volume of water equal or above 10,000m<sup>3</sup>. The proposals therefore seek the removal of the reservoir dam embankment which forms the western bank of the NSR waterbody".*
- 1.1.4. In broad terms, the Proposals seek to remove the existing, engineered reservoir and, in so doing, restore the Site to its historic, valley state, with open space and the historic watercourse reinstated.

#### Background

- 1.1.5. The emerging Proposals have been subject to pre-application engagement, in addition to a scoping request, with Neath Port Talbot Council (NPTC). This previous engagement included for the submission of a technical note to NPTC which provided detailed baseline information, as well as background context to the Proposals. Whilst it is not proposed to reiterate the background context in full, a summary is provided for context.
- 1.1.6. The Site comprises the NSR, a large artificial waterbody constructed during the operation of the former Llandarcy Oil Refinery. It is understood to have primarily been used to store water for use in firefighting in association with the former oil refinery operations. There is no longer a requirement for the NSR within the proposed Coed Darcy Development.
- 1.1.7. The construction of the NSR was permitted under a long-term lease agreement. Throughout this lease (which remains extant), the Application Site has remained under the ownership of Coombe Tennant Estate. The lease includes a legal obligation for the land within the Site to be restored to its historic condition following cessation of the NSR's operational use. Discontinuance effectively requires the NSR to be permanently modified, such that it is no longer capable of impounding a volume of water above 10,000m<sup>3</sup>. The intention to achieve discontinuance of the NSR is supported, in principle, by Natural Resources Wales (NRW). Restoration of the land is therefore inherently linked to discontinuance of the NSR.

- 1.1.8. Water levels within the NSR are understood to have been artificially managed for many decades, both as part of the operational use of the former oil refinery, and since the refineries decommissioning. This management, which has remained on-going, has been in the form of pumping and discharge of water from the NSR via the consented trade effluent which outfalls to the River Neath. As of December 2021, the rates of pumping have been increased to allow the partial drawdown of the reservoir, such that water volumes remain at or below approximately 10,000m<sup>3</sup>, the volume required for discontinuance. It is understood of St Modwen's intention hereon is for this reduced volume to be retained through pumping.
- 1.1.9. In addition to variation in pumping rates, further works were undertaken in 2022 to facilitate ongoing remediation of the Site. These works are referenced for completeness:
- Ongoing surface water sampling to establish water quality dataset.
  - Formation of small stockpiles of exposed basal sediments at the eastern end of NSR to facilitate safe access for sediment sampling.
  - Removal of the original bund separating East Bay from the NSR to mitigate ongoing impacts on surface water quality from pockets of free phase hydrocarbons identified within the bund. A replacement bund was reinstated with chemically suitable material.
  - Formation of a temporary drainage channel along the southern bank of the NSR to temporarily divert the historic flows away from the centre of the NSR where potentially contaminated basal sediments were identified, and to allow basal sediments to dry to facilitate further sampling and investigation.
- 1.1.10. As previously stated, there is no requirement for the NSR in the proposed Coed Darcy development, nor does the landowner, Coombe Tennant Estate, have a requirement for the land to continue be used as a reservoir. There is therefore no scope (nor intention) for the re-filling of the reservoir with water to original operational levels. In the absence of formal discontinuance, the reduced water levels therefore represent the current and future baseline scenario (in a no development scenario). This is the baseline situation upon which evaluation and impact assessment will be undertaken.
- 1.1.11. Notwithstanding this position, reference is made to survey data obtained prior to partial drainage, where relevant.

## 1.2. Site Characteristics

- 1.2.1. The Site is located approximately 6.1km north-east of Swansea, and approximately 3.1km west of Neath (as shown on Plan ECO1). It comprises a historic reservoir, as detailed above, to store water for use in firefighting by the former BP oil refinery.

- 1.2.2. As detailed above, a change in pumping rates was initiated by St Modwen in December 2021 to allow partial drawdown of NSR to a volume of <10,000m<sup>3</sup> (the requisite level required to fall below reservoir status). Following this partial drawdown, pumping rates were set to maintain the water volume at this reduced extent. This pumping regime is anticipated to remain until such a time that formal discontinuation is achieved, and water flows can be reinstated to the Crymlyn Bog.
- 1.2.3. As a result of this drawdown, and subsequent testing undertaken, the current baseline ecological position is an area of open water measuring approximately 1.33ha, with the wider basin comprising bare, unvegetated ground. Given its artificial nature, the NSR is effectively absent of marginal and aquatic vegetation. No true aquatic vegetation was recorded following the partial drawdown of the NSR.
- 1.2.4. Boundary vegetation present along the northern, southern, and eastern banks includes secondary, scrubby boundary woodland which is anticipated to be retained. A raised grass embankment has been created which forms the west boundary of the Site and represents the current dam.

### 1.3. **Ecological Assessment**

- 1.3.1. This document assesses the ecological interest of the Site as a whole. The importance of the habitats present are evaluated with regard to current guidance published by the Chartered Institute of Ecology and Environmental Management (CIEEM)<sup>1</sup>.
- 1.3.2. The report also sets out the existing baseline conditions for the Site, setting these in the correct planning policy and legal framework, and assessing any potential impacts which may occur from the Proposed Development. Appropriate mitigation, where necessary, is identified such that it will offset any negative impacts and, where possible, provide for ecological enhancement, in accordance with relevant planning policy.

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<sup>1</sup> CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1*. Chartered Institute of Ecology and Environmental Management, Winchester.

## 2. SURVEY METHODOLOGY

- 2.1. The methodology utilised for the survey work was split into three areas. Namely desk study, habitat survey, and faunal survey. These are discussed in more detail below.

### 2.2. Desk Study

- 2.2.1. In order to compile background information on the Site and its immediate surroundings, Ecology Solutions contacted South-East Wales Biodiversity Records Centre (SEWBRc).
- 2.2.2. Information has been provided by SEWBRc and is referenced within this report, where appropriate. Information regarding designated sites is also shown where appropriate on Plan ECO1.
- 2.2.3. Further information on designated sites from a wider search area was obtained from the online Multi-Agency Geographic Information for the Countryside (MAGIC)<sup>2</sup> database. This information is reproduced at Appendix 1 and where appropriate on Plan ECO1.

### 2.3. Habitat Survey Methodology

- 2.3.1. A habitat survey was carried out by Ecology Solutions in August 2022 to ascertain the general ecological value of the land contained within the boundaries of the Site, and to identify the main habitats and associated plant species.
- 2.3.2. Surveys sought to ascertain the general ecological value of the land contained within the boundaries of the Site, and to identify the main habitats and associated plant species, with notes on fauna utilising the Site.
- 2.3.3. The Application Site was surveyed with regard to extended Phase 1 Methodology<sup>3</sup>, as recommended by the Joint Nature Conservation Committee (JNCC), whereby the habitat types present were identified and mapped, together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential which require further survey. Any such areas can then be examined in more detailed.
- 2.3.4. Using the above method, the Site was classified into areas of similar botanical community types, with a representative species list compiled for each habitat identified. The habitats within the Site are illustrated on Plan ECO2.
- 2.3.5. All the species which occur in each habitat would not necessarily be detected during survey work carried out at any given time of the year, since different species are apparent during different seasons.

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<sup>2</sup> <http://magic.defra.gov.uk>

<sup>3</sup> Joint Nature Conservation Committee (2010). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit*. England Field Unit, Nature Conservancy Council, reprinted JNCC, Peterborough.

- 2.3.6. Whilst the habitats within the Site itself were not directly surveyed by Ecology Solutions in previous years, the Site has been subject to faunal survey work in 2020 and 2021. These surveys allowed for a high level habitat assessment of the Site prior to 2022. Reference is made to previous (pre-2022) baselines where relevant in this report.

## 2.4. Faunal Survey

- 2.4.1. General faunal activity observed during the course of the habitat survey, whether visually or by call, was recorded. Specific attention was paid to the potential presence of any protected, rare, notable or Priority Species.
- 2.4.2. The habitats present within the Site are of generally low potential value to faunal species, comprising predominantly of an area of unvegetated, turbid open water and a large area of bare ground. The grassed embankment offers some potential opportunities for fauna, as do the areas of boundary vegetation woodland and scrub (albeit the latter are understood to be off-site and unaffected by the Proposals).
- 2.4.3. Given the low value of the habitats within the Site, that the Proposals for the Site seek restoration of semi-natural habitats (i.e. no net loss of semi-natural habitat) and, moreover, that considerable ecological survey data has been collected across the wider Coed Darcy Outline Planning Application (OPA) site which provides valuable contextual data, limited faunal survey work has been deemed necessary to support the Proposals. This approach is consistent with the best practice principle of ensuring surveys are proportionate to the potential for ecological harm/risk associated with a proposal.
- 2.4.4. Consideration is given to relevant faunal groups below.
- 2.4.5. **Badgers**. The Site was surveyed for Badgers *Meles meles*, in August 2022. The surveys comprised two main elements: firstly, searching thoroughly for evidence of Badger setts. For any setts encountered each sett entrance was noted and plotted, even if the entrance appeared disused. The following information was recorded:
- i) The number and location of well used or very active entrances; these are clear of any debris or vegetation and are obviously in regular use and may, or may not, have been excavated recently.
  - ii) The number and location of inactive entrances; these are not in regular use and have debris such as leaves and twigs in the entrance or have plants growing in or around the edge of the entrance.
  - iii) The number of disused entrances; these have not been in use for some time, are partly or completely blocked, and cannot be used without considerable clearance. If the entrance has been disused for some time all that may be visible is a depression in the ground where the hole once

was, together with the remains of the spoil heap.

- 2.4.6. Secondly, evidence of Badger activity, such as well-worn paths, run-throughs, snagged hair, footprints, latrines, and foraging signs was recorded to build up a picture of the use of the Site by Badgers.
- 2.4.7. **Great Crested Newts (GCN)**. The NSR waterbody itself has historically been assessed as of very low suitability to support GCN *Triturus cristatus*, with poor water quality and absence of marginal/aquatic vegetation being key contributing factors. Historic survey work (i.e. that associated with the consented OPA) excluded specific amphibian surveys due to the presence of contamination.
- 2.4.8. More recently, and prior to further drawdown, the NSR waterbody was subject to further assessment by Ecology Solutions between 27 April and 7 June 2021. This included for the completion of eDNA survey work, as well as torching surveys of accessible bankside areas. No records of GCN were recorded during specific eDNA and torching surveys undertaken in 2021. A number of Palmate Newts *Lissotriton helveticus* were recorded, as detailed at Appendix 2. It should be noted, the survey effort was limited to the eastern dam/embankment due to access limitations (i.e. health and safety associated with soft silt / mud, steep banks and dense woody vegetation).
- 2.4.9. In addition to the conventional GCN survey work undertaken above, the NSR waterbody was subject to an extensive netting exercise, via a boat transect, in March 2021. This survey was undertaken by APEM Limited and adopted the following methodologies:
- Deployment of five Fyke nets left overnight to soak in deeper areas;
  - Use of electro fishing of the whole perimeter of the Reservoir in shallower areas.
- 2.4.10. Whilst the primary purpose of this exercise was to assess the potential presence of fish, it provides further contextual information supporting the likely absence of GCN.
- 2.4.11. Whilst the NSR itself is considered unsuitable to support breeding GCN, multiple suitable waterbodies are present within 500m of the NSR.
- 2.4.12. Waterbodies in proximity to NSR were surveyed in 2021, with updated surveys, to assess the population size of GCN at the Site and wider Coed Darcy site, ongoing in 2023. The locations of the waterbodies surveyed within 500m of the Site boundary are shown in Plan ECO3. Surveys included the completion of eDNA (2021 only), Habitat Suitability Index (HSI) (2021 and 2023) and Population Size Class Assessments (2021, and ongoing in 2023).
- 2.4.13. The HSI for GCN was developed by Oldham et al. (2000) and was applied during the surveys, according to guidance set out by the National Amphibian and Reptile Recording Scheme.

2.4.14. An HSI survey is a measure of habitat suitability for GCN and is based on ten suitability indices. The ten suitability indices are:

- Location;
- Pond area;
- Pond drying;
- Water quality;
- Shade;
- Fowl;
- Fish;
- Ponds;
- Terrestrial habitat; and
- Macrophytes cover.

2.4.15. Scores are attributed to each index and then converted to SI scores, on a scale from 0.01 to 1. The ten scores are then multiplied together, and the tenth root of this number is then calculated.

2.4.16. The calculation gives a score of between 0 and 1 (1 represents optimal suitability, a score of below 0.5 represents poor suitability) and the overall HSI of a pond can then be determined. The scoring system is shown in Table 2.1 below.

HSI Score	Pond Suitability
<0.5	Poor
0.5 – 0.59	Below Average
0.6 – 0.69	Average
0.7 – 0.79	Good
>0.8	Excellent

**Table 2.1.** Habitat Suitability Index (HSI)  
for GCN Scores Summary

2.4.17. Updated Population Size Class Assessment surveys were undertaken between March and April 2023. All surveys were undertaken in suitable weather conditions in accordance with the best practice guidelines, primarily set out in English Nature's (now Natural England [NE]) GCN Mitigation Guidelines, and as agreed with both NPTCBC and NRW. The dates and weather conditions for the surveys are detailed in Table 2.2. below.

Survey Number	Date	Weather Conditions
1	21 March 2023	12C day, 10C night. Heavy cloud with rain, light wind
2	28 March 2023	10C day, 10C night. Wet, overcast and misty
3	4 April 2023	10C day, 6C night. Dry, clear and sunny
4	18 April 2023	14C day, 8C night. Cloudy, warm and dry with light wind
5	25 April 2023	13C day, 6C night. Overcast, warm and light wind.
6	27 April 2023	TBC

**Table 2.2.** Dates and Weather Conditions of GCN Surveys Undertaken Within Proximity of the Application Site

- 2.4.18. Surveys undertaken by Ecology Solutions utilised three methods per visit (torch survey, bottle-trapping, and egg searches), where possible. Given the nature of the multiple waterbodies (many of which comprise near vertical excavations, or flooded tanks remaining from the wider sites past as a refinery), full access to each waterbody was not possible in some instances for reasons of health and safety. The locations of waterbodies are shown on Plan ECO3, and survey methods employed are detailed below in Table 2.3.

Waterbody Name/Reference	Survey Methods Employed	Limitations/Rational for Approach
P1, P4, P8, P13, and P17	Egg search, torching, bottle trapping, refuge search	No limitation (minimum three survey methods adopted)
P2, P3, P5, P7, P9, P10, P11, P12, P14, P15, P16, Drain 1	Egg search, torching, refuge check	Bottle trapping not undertaken as this was not feasible on the grounds of health and safety and/or an impenetrable ground layer
P6 and P21	N/A	No safe access for surveying
NSR	Refuge check	No safe access to undertake aquatic surveys, therefore refuge checks were undertaken
P18	N/A	No access due to heras fencing
P19	N/A	Pond no longer holds water (destroyed)

**Table 2.3.** Survey Methods Employed on Waterbodies in Proximity to the Application Site

- 2.4.19. Suitable survey weather conditions are deemed to be on those nights when air temperature is more than 5C, with little or no wind, and no rain. Surveys are to be conducted during such conditions.
- 2.4.20. Torch counting involves the use of high powered torches to find and, if possible, count the number of adults of each amphibian species. As recommended in English Nature's guidance, the entire margin of each waterbody is to be walked once, slowly checking for GCNs.
- 2.4.21. Bottle-trapping involves setting traps, made from 2 litre plastic bottles, around the margin of each waterbody, and leaving the traps set overnight before checking them the following morning. A density of at least one trap per 2m of shoreline was utilised, where possible, as recommended in the guidance.
- 2.4.22. In addition, egg searches are undertaken of any aquatic vegetation, to search for any evidence of breeding GCN.
- 2.4.23. GCN surveys were undertaken with regard to appropriate biosecurity measures, as recommended by NRW.
- 2.4.24. As detailed above, a suite of eDNA surveys were completed for ponds within 500m of the Application Site in 2021. The results and methodologies for these surveys are detailed at Appendix 2.
- 2.4.25. **Bats.** Trees with the potential to be impacted by the Proposals were assessed for their potential to support roosting bats (ground-based roost assessments). Features typically favoured by bats, or evidence of past use by bats, were searched for, including:
- Obvious holes, e.g. rot holes and old Woodpecker *Picidae* holes;
  - Dark staining on the tree, below the hole;
  - Tiny scratch marks around a hole from bat claws;
  - Cavities, splits and/or loose bark from broken or fallen branches, lightning strikes etc.; and
  - Very dense covering of mature Ivy *Hedera* over the trunk.
- 2.4.26. The main requirement for a winter/hibernation roost site is it maintains a stable (cool) temperature and humidity. Sites commonly utilised by bats as winter roosts include cavities/holes in trees, underground sites, and parts of buildings. Whilst different species may show a preference for one of these types of roost site, no species is solely dependent on a single type.
- 2.4.27. Whilst no specific bat activity surveys were undertaken of the Site in 2022, a suite of surveys were undertaken on the wider Coed Darcy site in 2020 (as shown in Appendix 2) to ascertain bat activity within the wider site. These surveys are considered to provide valuable contextual data of relevance to the current Proposals. A total of eight static SM4BAT bat detectors were placed within the wider site for at least five nights in each of the months of June, July, August, September and October 2020, to record any foraging or commuting

activity throughout the night. These detectors were programmed to record from half an hour before sunset to half an hour after sunrise.

- 2.4.28. In addition to the static SM4BAT detectors, the Site was also subject to activity surveys between June and October 2020, across a set transect route which extended across the wider site, particularly focusing on the features more likely to attract heightened bat activity (see Appendix 2).
- 2.4.29. The transects commenced 15 minutes before sunset and continued for approximately two hours, in order to maximise the encounter rate of bats i.e. both early and late emerging species. The surveys were undertaken with regard to guidelines issued by the Bat Conservation Trust, and aimed to identify any bats using the Site for foraging or commuting.
- 2.4.30. The echolocation call data of bats was recorded using iPads combined with Echo Meter Touch 2 PRO bat detectors which, together with direct observations, were used to identify the species present and record the number of bat passes. If bats were detected, walking stopped and observations were made on the bats' behaviour; i.e. foraging or commuting, species identification, and numbers present.
- 2.4.31. On completion of the surveys, all the recorded data was subsequently analysed using the Kaleidoscope Pro bat sound analysis software.
- 2.4.32. Surveys were conducted when the night temperature was above 10°C. The insectivorous diet of bats means there is reduced food available when temperatures fall below this level, and consequently levels of activity are low and may not accurately reflect the value of the Site for bats. The weather conditions during the surveys were recorded, and any limitations noted.
- 2.4.33. Field surveys were undertaken with regard to best practice guidelines issued by NE (2004<sup>4</sup>) and the Bat Conservation Trust (2016<sup>5</sup>).
- 2.4.34. **Breeding Birds.** The Application Site is not assessed to be of raised potential interest for breeding bird assemblages, comprising predominantly of bare ground (within which active soil remediation is taking place) and a turbid, unvegetated waterbody. There is no significant marginal or aquatic vegetation that would offer potential refuge or breeding opportunities for waterfowl species.
- 2.4.35. On the basis of the habitats present, it was considered specific breeding bird surveys of the Application Site would not be of merit. In reaching this conclusion careful consideration has been given to the survey results obtained from breeding bird surveys of the wider Coed Darcy masterplan site, which provides valuable contextual data.

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<sup>4</sup> Mitchell-Jones, A. J. (2004). *Bat Mitigation Guidelines*. English Nature, Peterborough.

<sup>5</sup> Collins, J. (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 3<sup>rd</sup> Edition. The Bat Conservation Trust, London.

- 2.4.36. In summary, a total of three surveys were carried out during April, May and June 2020 at the wider Coed Darcy site (see Appendix 2), and updated surveys checks, targeted at key ground nesting bird species (such as Little Ringed Plover *Charadrius dubius*, Ringed Plover *Charadrius hiaticula* and Lapwing *Vanellus vanellus*), were undertaken within the wider site in April 2020 and July 2021 (See Appendix 2).
- 2.4.37. The breeding bird surveys followed a modified version of the Common Birds Census (CBC) technique. The CBC involves walking transect routes through the study area and recording and plotting all bird species observed or heard, together with their behaviour.
- 2.4.38. An experienced ornithologist walked a circuitous route around all parts of the Site, recording the locations, numbers, and activity of all bird species present within (and around) the area during this time. The transect was designed to take in all the different habitats within the Site, and to allow visual inspections of all open habitats within these areas.
- 2.4.39. All birds seen or heard within the survey area were identified and recorded, as was their behaviour. Binoculars and a telescope were used when necessary. The surveys began at around sunrise and took approximately two hours.
- 2.4.40. Special attention was given to determine whether the Site supported Owl species, by searching for evidence such as Owl pellets or other direct evidence of Owls, during bat surveys.
- 2.4.41. To ascertain the breeding status of birds using the Site, the following criteria were applied following the methodology used in the 'Atlas' surveys (Gibbons et al., 1993)<sup>6</sup>. This accepts the following activities as denoting breeding (including those probably breeding although proof was lacking):
- Bird apparently holding territory.
  - Courtship and display, including distraction display or feigning injury.
  - Nest-building (including excavating nest-hole).
  - Adult carrying faecal sac or food.
  - Adult entering or leaving an apparently occupied nest site.
  - Nest with eggs or eggshells found, or bird sitting but not disturbed.
  - Nest with young; or downy young of ducks, game-birds, waders and other nidifugous species.
  - Recently fledged young.
- 2.4.42. **Wintering Birds.** A suite of three wintering bird surveys were undertaken on the Site and wider Coed Darcy site in December 2021, January and February 2022.

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<sup>6</sup> Gibbons, D., Reid, J. & Chapman, R. (1993). *The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991*. Poyser, London.

- 2.4.43. On each survey an experienced ornithologist slowly walked a circuitous route taking in all parts of the area, recording the locations, numbers, and activity of all bird species present in (and around) the area during this time. It is considered three visits provide a reliable picture of winter bird activity, although some species that may use the Site as part of a larger territory, especially nocturnal species such as Owls, may be missed.
- 2.4.44. A total of 54 species of bird were recorded during the three surveys, with further detail summaries below and as shown on Appendix 3.
- 2.4.45. **Reptiles.** No specific reptile surveys have been undertaken within the Site itself. However, surveys to identify the presence or absence of reptiles were undertaken within the wider Coed Darcy site between June and September 2021. Again, this included habitats continuous with the Application Site.
- 2.4.46. Following an initial assessment to identify areas of suitable reptile habitat, refugia surveys were undertaken within the Site.
- 2.4.47. This survey effort involved the deployment of artificial refugia along the woodland boundaries, clearings, scrub boundaries and grassland rides within the wider Coed Darcy site. A total of 375 'tins' (0.5 x 0.5m squares of heavy roofing felt which are often used as refuges by reptiles) were distributed within specific areas of suitable reptile habitat within the Site in June 2021, as shown on Appendix 2.
- 2.4.48. These tins were left in place for two weeks to 'bed in', and subsequently surveyed for reptiles beneath or on the tins during suitable weather conditions between June and September 2021. Suitable weather conditions to carry out surveys are typically when the air temperature is between 9°C and 18°C, with periods of heavy rain and windy conditions avoided.
- 2.4.49. A total of eight survey visits were undertaken between June and September 2021, as opposed to the typical seven survey visits, due to a single visit in late June 2021 experiencing sub-optimal temperature (>20C), as per survey guidelines.
- 2.4.50. The tins provide shelter, heat up quicker than the surroundings in the morning, and can remain warmer than the surroundings in the late afternoon. Being ectothermic (cold blooded), reptiles use them to raise their body temperature, which allows them to forage earlier and later in the day.
- 2.4.51. **Invertebrates.** From historic survey work, including a detailed suite of surveys in 2020 undertaken by Richard Wilson Ecology Limited (see Appendix 4), the wider Coed Darcy redevelopment site has been identified to be of high entomological value.

- 2.4.52. Notwithstanding the value of the Site overall, the NSR itself is assessed as not likely to be of any raised invertebrate interest. For this reason, site specific surveys are not deemed necessary.
- 2.4.53. **Fish**. A suite of fish surveys was undertaken by APEM in March 2021, and deployed a range of techniques in both the deeper and shallower areas of the Application Site prior to drawdown. No fish were caught as part of this survey effort. Although this does not confirm absence per-se, it suggests at best only very small populations of fish would likely be present.
- 2.4.54. Further Site assessment in the form of a Site walkover was undertaken after the Site drawdown in March 2022. No further evidence of fish was noted as part of this walkover. This further indicates fish populations are likely absent from the Site.
- 2.4.55. **Dormice**. A full suite of Dormouse *Muscardinus avellanarius* presence/absence surveys were undertaken across the wider Coed Darcy site between August 2020 and July 2021. These surveys, which were completed in accordance with adopted best practice, recorded no evidence of Dormouse within the wider site.
- 2.4.56. Given the extent of these surveys, including habitats continuous with the NSR, and given historic surveys of the wider site also recorded no evidence of Dormouse, this protected species group is considered absent from the Site.
- 2.4.57. The full results and methodology of previous Dormouse surveys across the wider site are included at Appendix 2.

### 3. ECOLOGICAL FEATURES

- 3.1. Habitat surveys were undertaken across the Application Site in August 2022 by Ecology Solutions.
- 3.2. The vegetation recorded during these surveys enabled the habitat types to be satisfactorily identified, and an accurate assessment of the ecological interest of the habitats to be undertaken.
- 3.3. The following main habitat/vegetation types were identified within the Site during the surveys undertaken:
  - Bare ground
  - Marginal vegetation
  - Grassland
  - Boundary woodland (Broad-leaved)
  - Scrub
- 3.4. The locations of these habitats are shown on Plan ECO2, and described individually below.

#### 3.5. Bare Ground

- 3.5.1. Significant areas of the Site support predominantly bare ground which has been exposed relatively recently, due to the draining down of the NSR. The underlying substrates present comprise exposed soils within bunded areas of contaminated silts and other man-made debris.
- 3.5.2. Whilst areas of bare ground are primarily unvegetated, small areas of marginal vegetation consisting predominantly of Bulrush *Typha latifolia* are located in damper, lower lying areas.
- 3.5.3. Areas of bare ground are of no intrinsic ecological interest.
- 3.5.4. For ease of reference, the former level/extent of standing water is also identified on Plan ECO2.

#### 3.6. Marginal Vegetation

- 3.6.1. On the peripheries of the former NSR, where the water level lay prior to draining, localised areas of marginal vegetation consists of Bulrush and Common Reed *Phragmites australis* with occasional Water Mint *Mentha aquatica*.
- 3.6.2. Given their limited extent and the sparsity of the vegetative cover, these habitats are of low ecological interest.

#### 3.7. Grassland

- 3.7.1. The Site supports a small area of semi-improved grassland measuring approximately 0.66ha, at the western end of the NSR, located on the artificial embankment. The grassland supports a modest diversity, being dominated by common grass species

generally indicating neutral soil composition, with species such as dominant Yorkshire Fog *Holcus lanatus*, Annual Meadows Grass *Poa annua*, Cocksfoot *Dactylus glomerate*, and Red Fescue *Festuca rubra*, with abundant Crested Dog's Tail *Cynosurus cristatus*. Herbs included for dominant Red Clover *Trifolium pratense*, White Clover *Trifolium repens*, Common Eyebright *Euphrasia officinalis*, abundant Ribwort Plantain *Plantago lanceolata*, Creeping Buttercup *Ranunculus repens*, Occasional Wild Strawberry *Fragaria vesca* and Cat's Ear *Hypochaeris radicata*, and locally occurring Ox-eye Daisy *Leucanthemum vulgare*, Maretail sp. *Equisetum* sp., and Male Fern *Dryopteris filix-mas*. Occasional patches of Bracken *Pteridium aquilinum*, Bramble *Rubus fruticosus* and Gorse *Ulex europaeus* were present across the grassland area.

- 3.7.2. Located on the steeper eastern side of the grassland embankment/dam leading towards the location of the water's edge prior to draining, flora which indicates acidic tendencies were noted. This included species such as Sheep's Fescue *Festuca ovina* and Bilberry *Vaccinium myrtillus* (both rarely present). In addition, occasional Oak *Quercus* sp., and Willow *Salix* sp. saplings were present on the slope.

### 3.8. Boundary Woodland (Broad-leaved).

- 3.8.1. Located off-site, much of the periphery of the Site supports a band of secondary woodland. The woodland is predominantly young in nature; approximately 30 years of age. Semi-mature to early mature trees dominate.
- 3.8.2. The boundary woodland habitats support a modest range of native woody trees, frequently being dominated by Willow sp., Ash *Fraxinus excelsior*, Alder *Alnus glutinosa*, Silver Birch *Betula pendula* and Sycamore *Acer pseudoplatanus*. They typically lack a distinct woodland structure and appear to have colonised areas of disturbed ground and rubble, with frequent debris and materials indicative of previous industrial works/earth moving.
- 3.8.3. Whilst of limited maturity or species composition, areas of boundary woodland are of comparatively greater interest in the context of the Site, albeit located off-site.

### 3.9. Scrub

- 3.9.1. Small areas of scrub located in the peripheries of the Site are shown on Plan ECO2. The species composition is dominated by young Silver Birch, Pedunculate Oak *Quercus robur* and Willow sp. Other species present include for Holly *Ilex aquifolium*, Sycamore, Wild Cherry *Prunus avium*, Hawthorn *Crataegus monogyna* and rarely occurring Gorse, Rowan *Sorbus aucuparia* and Elder *Sambucus nigra*. In addition, localised patches of Japanese Knotweed *Fallopia*

*japonica* were noted within the north and south of the Site, as shown on Plan ECO2.

- 3.9.2. Ground flora consists of Ivy, Bramble, Bracken, Male Fern, Soft Rush *Juncus effusus*, Hard Rush *Juncus inflexus*, Yorkshire Fog, Colt's-foot *Tussilago farfara*, Broad-leaved Willowherb *Epilobium montanum*, White Bryony *Bryonia dioica*, Hogweed *Heracleum sphondylium*, Cow Parsley *Anthriscus sylvestris*, Common Fleabane *Pulicaria dysenterica*, Frequently occurring; Rosebay Willowherb *Chamerion angustifolium*, Hemlock Water-dropwort *Oenanthe crocata*, Common Nettle *Urtica dioica*, Snowberry *Symphoricarpos albus*, Ground Ivy *Glechoma hederacea*, Ragwort *Senecio jacobaea* and Hemp Agrimony *Eupatorium cannabinum*.

### 3.10. Desk Study

- 3.10.1. The desk study information collected from SEWBRc returned a total of 1,212 records of plants within a 2km radius of the Site boundary. A significant proportion of these species are associated with Crymlyn Bog Site of Special Scientific Interest (SSSI), situated approximately 0.6km south-west of the Site boundary at its closest point. Many LBAP species are recorded, such as Slender Cottongrass *Eriophorum gracile* and Tufted Sedge *Carex elata*, both recorded in Crymlyn Bog, approximately 1.1km south-west from the Site boundary at its closest point, dating from 2020.
- 3.10.2. Other species of note are Bee Orchids *Ophrys apifera*, the closest of which was recorded on the wider Coed Darcy site, located approximately 1.4km south of the Site boundary at its closest point and dating from 2001. A single Bee Orchid was also recorded during GCN surveys, located approximately 250m from the Application Site boundary at its closest point, in April 2023. There are no other records of notable species recorded on the Site.
- 3.10.3. Information received from SEWBRc also returned 214 records of invasive species. A single record of Rhododendron *Rhododendron ponticum* located in the OPA site boundary, approximately 0.8km south-west of the Site boundary at its closest point, dates from 2001.

#### **4. WILDLIFE USE OF THE APPLICATION SITE**

4.1. The habitats present within the Site are of generally low potential value to faunal species, comprising predominantly an area of unvegetated, turbid open water and a large area of bare ground. The grassed embankment offers some potential opportunities for the fauna, as for the areas of boundary woodland and scrub (albeit the latter are understood to be off-site and unaffected by the Proposals). Consideration is given to relevant faunal groups below.

4.2. For context, and as detailed in the Methodology Section above, data on the faunal use of the NSR prior to 2022 Site drawdown is provided, where relevant.

##### **4.3. Great Crested Newts (GCN)**

4.3.1. The NSR waterbody has historically been assessed as of very low suitability to support GCN, with the poor water quality and the absence of marginal/aquatic vegetation being key contributing factors. Historic survey work excluded specific amphibian surveys due to the presence of contamination.

4.3.2. As detailed in the Methodology Section above, the NSR waterbody was subject to assessment by Ecology Solutions between 27 April and 7 June 2021. This included for the completion of eDNA survey work, as well as torching surveys of accessible bankside areas. No records of GCN were recorded during specific eDNA and torching surveys undertaken in 2021. A number of Palmate Newts were recorded, as detailed at Appendix 2. It should be noted, in 2021 the survey was limited to the eastern dam/embankment due to access limitations (i.e. health and safety).

4.3.3. The above survey effort was not repeated in 2023 due to unsafe access (the area of standing water being encapsulated by deep silt and soft mud).

4.3.4. In addition to the conventional GCN survey work undertaken above, the NSR waterbody was subject to an extensive netting exercise, via a boat transect, in March 2021. This survey was undertaken by APEM Limited and adopted the following methodologies:

- Deployment of five Fyke nets to left overnight to soak in deeper areas.
- Use of electro fishing of the whole perimeter of the reservoir in shallower areas.

4.3.5. Whilst the primary purpose of this exercise was to assess the potential presence of fish, it provides further contextual information supporting the likely absence of GCN. No GCN were found during specific fish surveys undertaken by APEM Limited in 2022. Palmate

newts were recorded and were returned to the waterbody. No fish were caught.

- 4.3.6. Following partial drawdown as detailed above, the Application Site is considered to remain of very low suitability as a potential breeding habitat for GCN, with no aquatic vegetation and poor water quality. A HSI assessment undertaken in 2023 returned a score of 0.31 (poor). This is detailed in table 4.1 below.

Suitability Index	Score/Suitability	Comment
1	0.5	Location within south-east Wales
2	n/a	Waterbody size >2000m <sup>2</sup> therefore omitted from calculation as per guidance
3	0.9	Pond assessed as never drying (with exception of full artificial drainage)
4	0.01	Waterbody shows clear signs of pollution, and no submerged plants
5	1	Shade from shoreline vegetation <60%
6	0.67	Some occasional waterfowl observed but very minor impact
7	1	No fish recorded from casual observations or during specific surveys
8	1	21 x ponds/waterbodies within 500m of the Site = 6.89
9	0.01	Terrestrial habitat surrounding the NSR is soft bare ground i.e. unsuitable habitat
10	0.3	0% Macrophyte cover recorded
<b>Total:</b>	<b>0.31/Poor</b>	

**Table 4.1.** Habitat Suitability Index Results of the Application Site

- 4.3.7. On the basis of survey work undertaken, the NSR waterbody is not assessed to represent a likely breeding resource for GCN.
- 4.3.8. In addition, the terrestrial habitats consist of predominantly bare ground which is generally unsuitable as a terrestrial resource for GCN. The grassland located on the western embankment does offer suitable terrestrial habitat for GCN, albeit it is considered improved opportunities for GCN are available in the wider area.
- 4.3.9. Notwithstanding the above, GCN are known in the wider area, in particular within 11 waterbodies within 500m of the Application Site

as recorded in 2021 and 2023 (as shown on Plan ECO3). The closest confirmed breeding ponds (Pond 9 and Pond 10) are located adjacent to the Application Site's southern boundary, albeit separated by an elevated bund.

- 4.3.10. GCN surveys were carried out in April and June 2021, and are to be repeated between March and April 2023.
- 4.3.11. These surveys indicate ponds within a 500m radius of the Application Site collectively support a medium population of GCN, with a peak count of 18 recorded during any one survey in 2021, and 17 in 2023. The full results are provided at Table 4.2 below.

Waterbody Reference	2021 Peak Count	2023 Peak Count
P8	0	1
P9	6	7
P10	9	12
P11	0	4
P12	0	1
P14	3	0
P16	1	0
P17	0	1
P20	1	3
South Site Reservoir	0	1
Drain 1	0	1

**Table 4.2.** Peak GCN Survey Count within the Application Site During 2021 and 2023

- 4.3.12. Noting the proximity of known GCN breeding ponds to the Application Site, it is considered likely suitably vegetated terrestrial habitats within the Application Site will provide a component (albeit a small one), of the resting, sheltering, and foraging resource for the local GCN meta-population. As such, further consideration is given to GCN in the Evaluation Section of this Ecological Assessment (see Section 5).
- 4.3.13. **Background Records.** Information returned from SEWBRc returned a total of 27 records of amphibians within 2km of the Site boundary. Of those, six related to GCN, the closest of which was at a location approximate 300m south-west of the Site at its closest point, within the OPA site boundary (P20), and dates from 2020.

- 4.3.14. The remainder of the records relate to Common Frog *Rana temporaria*, Common Toad *Bufo bufo*, Palmate Newt and a single record of Smooth Newt *Lissotriton vulgaris*.

#### 4.4. Invertebrates

- 4.4.1. The wider Coed Darcy redevelopment site has been identified to be of high entomological value through historic survey work, including a detailed suite of surveys in 2020 undertaken by Richard Wilson Ecology Limited. Full details are included in Appendix 4.
- 4.4.2. Notwithstanding the value of the Site overall, the larger artificial waterbodies were assessed as likely to be of limited invertebrate interest. This conclusion was reached due to the very limited aquatic/emergent vegetation, and the steep sided banks of reservoirs.
- 4.4.3. Consistent with this conclusion, prior to partial drawdown, the Site was of very limited interest to invertebrates and therefore no detailed surveys of the NSR were carried out in 2020.
- 4.4.4. It is considered, given the significantly reduced volume of water now present in the NSR, and that much of the Site consists of bare ground, the Application Site remains of very low ecological interest to either aquatic or terrestrial invertebrates.
- 4.4.5. Reflecting the above, the Site is not considered to comprise a valuable component of the wider open habitat resource which is of value to invertebrate populations in the local landscape. For this reason, Site specific surveys are not deemed necessary.
- 4.4.6. In any event, and as detailed at Section 5, the Proposals seek to restore the Application Site to a naturalistic state of a grassed open valley together with the reinstatement of a historic watercourse through the site. Given the enhancements sought, and that no net loss of semi-natural habitats will arise, no adverse impacts are predicted.
- 4.4.7. **Background Records.** Information received from SEWBRcC returned 296 records of invertebrate within 2km of the Site boundary. No records were returned from within the Site boundary.
- 4.4.8. A number of records were returned from within the wider Coed Darcy site, including but not limited to Black-tailed Skipper *Orthetrum cancellatum*, Broom Moth *Ceramica pisi*, Cuff Ermine *Spilosoma lutea*, Dingy Skipper *Erynnis tages*, Hairy Dragonfly *Brachytron pratense*, Triangle Plume *Platyptilia gonodactyla* and Twin-spot Plume *Stenoptilia bipunctidactyla*. The vast majority of these records date from 2001, with the remainder dating from 2006.
- 4.4.9. The majority of records relate to Fen Raft Spider *Dolomedes plantarius*, located approximately 1.8km south of the Site boundary at its closest point, and date from 2020.

#### 4.5. Breeding Birds

- 4.5.1. The Site is not assessed to be of raised potential interest for breeding bird assemblages, comprising predominantly of bare ground (within which active soil remediation is taking place) and a turbid, unvegetated waterbody. There is no significant marginal or aquatic vegetation that would offer potential refuge or breeding opportunities for waterfowl species.
- 4.5.2. The boundary woodland habitats are likely to offer opportunities for a range of woodland/scrub nesting birds, albeit comparable and improved opportunities are present in the local area. In any event, it is proposed these habitats be retained and unimpacted.
- 4.5.3. On the basis of the habitats present, it is not considered specific breeding bird surveys of the Site would be of merit. In reaching this conclusion careful consideration has been given to the results obtained from breeding bird surveys of the wider Coed Darcy masterplan site, which provide valuable contextual data. The closest results are shown on Plan ECO4.
- 4.5.4. The breeding bird surveys carried out across the wider Coed Darcy site in 2020 identified the wider site to support a diverse breeding bird assemblage, primarily on account of their size and the range of habitats present. A full list is provided at Appendix 2. In broad terms, these surveys identified the following:
- The greatest interest was found across the open habitats where breeding species include good numbers of Lapwing, Ringed Plover, Little Ringer Plover, Skylark and Meadow Pipit *Anthus pratensis*, plus small numbers of Cuckoo *Cuculidae*, Tree Pipit *Anthus trivialis* and Linnet *Carduelis cannabina*. The majority of these species were recorded in open grassland areas, with the exception of Ringed Plover which was nesting exclusively in bare ground habitat.
  - The boundary woodland and scrub habitats across the wider Coed Darcy site support a range of species typical of such habitat, included Red Listed Song Thrush *Turdus philomelos*, Mistle Thrush *Turdus viscivorus*, and Lesser Redpoll *Acanthis cabaret*, and Amber Listed Dunnock *Prunella modularis*, Bullfinch *Pyrrhula pyrrhula* and Willow Warbler *Phylloscopus trochilus*.
  - The wider Coed Darcy wetland habitats, which support extensive marginal and wetland vegetation support an interesting assemblage, including Mallard *Anas platyrhynchos*, Tufted Duck *Aythya fuligula*, Little Grebe *Tachybaptus ruficollis*. Reed Bunting *Emberiza schoeniclus*, Cetti's Warbler *Cettia cetti*, Sedge Warbler *Acrocephalus schoenobaenus* and Reed Warbler *Acrocephalus scirpaceus*.
- 4.5.5. In contrast to the wider Coed Darcy masterplan site, the Site supports a markedly reduced range of habitats and very limited

vegetative cover. This greatly tempers its suitability to support notable bird assemblages.

- 4.5.6. For example, whilst the Site supports extensive areas of bare ground, these lack *any* vegetative cover, which greatly limits their suitability to support the 'open ground' assemblage present within the wider site. Moreover, even where bare ground is potentially suitable (for example, for Ringed Plover), on-going remediation works continue to passively discourage/prevent breeding attempts within the Site.
- 4.5.7. Regarding wetland assemblages, those within the wider Coed Darcy site were primarily reliant on the Coed Darcy wetlands, an area of well vegetated and diverse wetland. In contrast, the findings pertaining to the South Site Reservoir were markedly reduced with small numbers of Teal *Anas crecca*, Tufted Duck, Pochard *Aythya ferina*, Moorhen *Gallinula*, Coot *Fulica* and Little Grebe being recorded over the entirety of all bird surveys. The results associated with the South Site Reservoir are considered of particular relevance, noting this waterbody is of comparable size and construction to the NSR, with similar habitats overall.
- 4.5.8. On the basis of the habitats present, and with reference to the previous surveys of the wider Coed Darcy site, there is nothing to indicate the Site would be of potential breeding value for any of the qualifying bird species/assemblages within the Crymlyn Bog designated sites complex, namely the breeding populations of Reed and Sedge Warblers.
- 4.5.9. Given that the Site does not support habitats similar to those within the Crymlyn Bog designated site, it is unlikely those breeding populations would utilise the Site as a breeding or foraging resource. It is noted, the same conclusion was reached in respect of the main Coed Darcy redevelopment, for which the principal conclusions (i.e. no impacts as a result of supporting habitats) in the iHRA were agreed with both NRW and NPTC.
- 4.5.10. As for invertebrates, above, and notwithstanding the low ornithological value of the Site, the Proposals seek to restore a naturalistic valley system, inclusive of seeded open space and the reinstated watercourse. Further consideration is given to the enhancement opportunities for breeding birds in Section 5 of this Ecological Assessment.
- 4.5.11. **Background Records.** Information received from SEWBRcC returned 700 records of birds from within 2km of the Site boundary. A single record was returned adjacent to the southern Site boundary and relates to a Black-Headed Gull *Chroicocephalus ridibundus* dating from 2002.
- 4.5.12. A number of records were also returned from within the wider Coed Darcy site and include, but are not limited to, Barn Owl *Tyto alba*,

Bullfinch, Cuckoo, Gadwall *Anas strepera*, Kestrel, Lapwing, Mute Swan *Cygnus olor* and Peregrine *Falco peregrinus*.

#### 4.6. Wintering Birds

- 4.6.1. A suite of wintering bird surveys was carried out on the Site and the wider area between December 2021 and February 2022. The results are shown on Appendix 3. These surveys predated any material drawdown of the NSR and therefore were undertaken at a time when the NSR would have been of potential great value as a wintering resource (relative to the current/2022 baseline).
- 4.6.2. The surveys found a small number of species utilising the Site, including Pochard, Tufted Duck, Mallard and Teal. Overall, it was concluded the Site was not a resource of raised interest for wintering bird assemblages. Full details are included in Appendix 3.
- 4.6.3. In addition, the South Site Reservoir located approximately 0.3km south-west of the Site is similar in nature to that of the Application Site, and again supports a similar assemblage consisting of Teal, Tufted Duck and Pochard. This again supports the conclusion the Site is of overall low ecological interest to wintering birds.
- 4.6.4. With reference to the data search requested from SEWBRcC, no records of wintering bird have been returned on or adjacent to the Site since 2010. The closest record relates to a Kestrel located approximately 0.56km south of the Application Site, and dates from 2020.
- 4.6.5. As above, although the nearby Crymlyn Bog National Nature Reserve (NNR), SSSI, Special Area of Conservation (SAC) and Ramsar site are not specially designated on account of bird assemblages, breeding populations of both Reed and Sedge Warbler are identified as 'notable' within the designations. These species were not recorded within the study Site and, indeed, potentially suitable habitat for the species is absent. It is therefore considered the Site is not assessed to be of potential importance to bird assemblages, both prior to drawdown and in its current state.
- 4.6.6. As for breeding birds, above, the re-naturalisation of the Site is expected to offer enhanced opportunities for wintering birds, as is considered at Section 5 of this Assessment.
- 4.6.7. **Background Records.** Information received from SEWBRcC returned 74 records of wintering birds from within 2km of the Site boundary, dating back to 2010. No records were returned within the Site boundary, nor on the nearby South Site Reservoir. The closest and most recent records relates to a Kestrel and a Lapwing, located on the wider Coed Darcy site, approximately 0.6km south of the Site boundary at its closest point, and date from 2020.

#### 4.7. Foraging Birds

- 4.7.1. On the basis of the limited habitats present, with the Application Site overwhelmingly comprising unvegetated bare ground (much of which suffers from significant contamination), there is no reason to consider the Application Site would be of any significant value as a foraging resource in the wider area.
- 4.7.2. Even where open water is present, the poor water quality and absence of vegetation will greatly limit the invertebrate populations (a potential prey source), whilst no evidence of fish have been recorded within the NSR. As such, the Application Site is not assessed to be of any raised importance for foraging.

#### 4.8. Bats

- 4.8.1. During the habitat survey undertaken in August 2022, no trees or structures with potential roosting features were identified, and the boundary periphery woodland/scrub habitats are to be retained. Therefore no impacts are envisaged in respect of roosting bats.
- 4.8.2. No specific bat activity surveys have been undertaken on the Site. However, a suite of bat activity surveys and static bat detector deployments were undertaken in 2020 in the wider area, to the immediate south of the Site boundary. The activity surveys showed the wider area supports moderate levels of common and widespread species, predominantly consisting of *Pipistrelle* sp. and *Myotis* sp. Extracts from the submitted ES Chapter detailing the bat activity and bat static results with the transect and static locations is shown in Appendix 2.
- 4.8.3. The Application Site can be expected to offer a component of the wider habitat resource which supports those bat populations recorded within the wider Coed Darcy masterplan site. The open water of the reinstated watercourse in particular will offer suitable foraging and drinking opportunities for bats, albeit extensive open water (including much more naturalistic features) are present in the wider area.
- 4.8.4. As concluded for other faunal groups, given the very limited diversity of habitats, and the limited vegetative cover, not least the uniformity of bare ground present at the Application Site, it is considered to be of low ecological interest to foraging and commuting bats, especially with reference to the habitats present in the wider area.
- 4.8.1. **Background records.** Information received from SEWBRcC returned approximately 80 records of bats within 2km of the Site boundary. Two records were returned from within the Site boundary and relate to Noctule bat *Nyctalus noctula* and Common Pipistrelle *Pipistrellus pipistrellus*, and date from 2009.
- 4.8.2. A number of records of other bat species were returned from within the wider Coed Darcy site, most notably three records of Lesser Horseshoe bat *Rhinolophus hipposideros*, with the closest located

approximately 0.6km south of the Site boundary at its closest point, all dating from 2001.

#### 4.9. Dormouse

- 4.9.1. Notwithstanding an absence of any historic records of Dormice within the wider Coed Darcy site, noting the age of previous survey work (2009), an updated suite of Dormouse surveys was undertaken between August 2020 and August 2021 (as detailed above).
- 4.9.2. On the basis the surveys followed the methodology as set out in Appendix 2, the survey effort allowed a score of 25 points, and noting historical surveys, it can be reasonably assumed Dormouse are absent from the Site. As such, no further consideration is given to this species as part of this Assessment.
- 4.9.3. **Background Records.** No records of Dormouse were returned from SEWBRcC.

#### 4.10. Reptiles

- 4.10.1. Suitable habitats for reptiles are present within the Site, namely the grassland in the west of the Site. It is noted, however, that the value of this grassland is tempered by a long standing, periodic mowing regime.
- 4.10.2. Both Grass Snake *Natrix natrix* and Common Lizard *Zootoca vivipara* were recorded in the wider area as shown at Appendix 2. Full details of reptile surveys undertaken across the wider site in 2021 are also included within Appendix 2.
- 4.10.3. Given the presence of reptiles within the immediate surroundings of the Application Site, their presence is assumed, on a precautionary basis, within the grassland bund on Site. As such, a suite of precautionary working measures, consistent with those proposed in respect of the wider OPA site, are identified at Section 5 of this Ecological Assessment.
- 4.10.4. **Background Records.** The information received from SEWBRcC returned 6 records of reptiles from within 2km of the Site boundary, relating to Grass Snake, Common Lizard and Slow Worm *Anguis fragilis*. The closest record relates to a Common Lizard located approximately 0.5km north of the Site boundary at its closest point, and dates from 2009. The most recent record relates to a Common Lizard and is located approximately 1.8km south of the Site boundary at its closest point, and dates from 2020.

#### 4.11. Freshwater Fish

- 4.11.1. A suite of fish surveys was undertaken by APEM in March 2021. These deployed a range of techniques in both the deeper and shallower areas of the NSR prior to drawdown. No fish were caught as part of this survey effort. Although this does not confirm absence

per-se, it suggests that at best only very small populations of fish would likely be present.

- 4.11.2. Further Site assessment in the form of a Site walkover was undertaken after the Site drawdown in March 2022. No further evidence of fish was noted as part of this walkover. Given the much reduced extent of open water (within which fish would be more readily identified), and moreover the absence of any evidence of fish remains within the wider (drained) basin, this further indicates fish populations are likely absent from the Site.

- 4.11.3. **Background Records.** No records of fish species within 2km of the Site boundary were returned from SEWBRcC.

#### 4.12. Other Mammals

- 4.12.1. No evidence of other protected or notable species has been recorded during the course of the extensive survey work undertaken at both the Site and the wider Coed Darcy site. Noting this, and with regard to extensive habitat clearance which has been undertaken across the wider site, it is considered unlikely the Site will be of heightened value to any other protected or notable species.
- 4.12.2. Notwithstanding this conclusion, habitats within the wider Coed Darcy site are at least locally suitable to support a range of mammal species, such as European Hedgehog *Erinaceus europaeus*. The potential presence of a range of small mammals is given due regard as part of this Assessment.
- 4.12.3. **Background records.** Information received from SEWBRcC returned 112 records of terrestrial mammals within 2km of the Site boundary. The closest record relates to a Badger, is located approximately 30m south of the Site boundary at its closest point, and dates from 2002.
- 4.12.4. The vast majority of records returned relate to European Hedgehog, none of which are located either on Site or in the wider Coed Darcy site. The most recent record dates from 2018 and is located approximately 1.5km west of the Site boundary at its closest point.
- 4.12.5. The most recent record relates to Hare *Lepus*, located approximately 1.3km east of the Site boundary at its closest point, and dates from 2020.

## 5. ECOLOGICAL EVALUATION

### 5.1. The Principles of Site Evaluation

- 5.1.1. The latest guidelines for ecological evaluation produced by CIEEM propose an approach that involves professional judgement but makes use of available guidance and information, such as the distribution and status of the species or features within the locality of the project.
- 5.1.2. The methods and standards for site evaluation within the British Isles have remained those defined by Ratcliffe<sup>7</sup>. These are broadly used across the United Kingdom to rank sites so priorities for nature conservation can be attained. For example, current SSSI designation maintains a system of data analysis roughly tested against Ratcliffe's criteria.
- 5.1.3. In general terms, these criteria are size, diversity, naturalness, rarity, and fragility, while additional secondary criteria of typicalness, potential value, intrinsic appeal, recorded history, and the position within the ecological/geographical units are also incorporated into the ranking procedure.
- 5.1.4. Levels of importance can be determined within a defined geographical context from the immediate site or locality through to the international level.

### 5.2. Designated Sites

- 5.2.1. **Statutory sites.** Given the proximity of the Site to the Crymlyn Bog SSSI/SAC/Ramsar (approximately 0.6km at its closest point), potential ecological impacts of the emerging development upon these designated sites have been considered in particular detail.
- 5.2.2. Whilst the potential for impacts on the Crymlyn Bog are primarily considered within the shadow Habitat Regulations Assessment (sHRA) which accompanies this planning application, a summary assessment is provided below.
- 5.2.3. The primary potential impact pathway for consideration is through the hydrological impacts (water quality/ quantity). In this regard, it is noted the Site is located within the hydrological catchment of the Crymlyn Bog.
- 5.2.4. However, the longstanding pumping of the reservoir has temporarily 'broken' the 'natural' hydrological link between the NSR and this designated site (with waters instead diverted to the strategic sewer network). Therefore, under the current baseline scenario, there is no hydrological link between the Site and the Crymlyn Bog designated site complex.

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<sup>7</sup> Ratcliffe, D A (1977). *A Nature Conservation Review: the Selection of sites of Biological National Importance to Nature Conservation in Britain*. Two Volumes. Cambridge University Press, Cambridge.

- 5.2.5. It is the intention of the Development Proposals to adopt a two phase drainage strategy in this instance. This phased strategy has been designed with specific regard to the Crymlyn Bog, ensuring a precautionary approach to give certainty that adverse hydrological impacts can be avoided.
- 5.2.6. The intention under 'Phase 1' is to maintain pumping of waters within the Site, such that there is no initial hydrological link in the post-development scenario. In retaining this 'status-quo', the Proposals will ensure there is no hydrological connection between the Application Site and the nearby Crymlyn Bog designated sites complex under Phase 1 of the Proposals. All waters will continue to be discharged via the consented trade effluent which outfalls to the River Neath. This pumping regime will be retained whilst wider restoration works (including de-contamination, remediation, and land forming) are completed, and until sufficient hydrological monitoring data has been gathered to demonstrate waters held within the Site achieve suitable chemical quality to reinstate the historic discharge towards the Crymlyn Bog complex.
- 5.2.7. For clarity, the monitoring regime will consider both water quality and water quantity, ensuring both achieve appropriate environmental levels.
- 5.2.8. Following the completion of requisite remediation and restoration works, and the provision of monitoring data to the satisfaction of NRW and NPTC, the intention is to cease pumping and restore the natural (historical) hydrological link towards the Crymlyn Bog (i.e. Phase 2). For clarity, the long-term intention is for surface waters to discharge towards the Crymlyn Bog via the Tal-y-Wedu outfall. NRW are already committed to improving the quality of the Crymlyn Bog and its hydrological connections through the LIFEQuake restoration works. This application and associated works will re-establish a historic watercourse and flow through to the Crymlyn Bog. It is proposed for the timing of any hydrological 're-connection' to be informed by the LIFEQuake restoration works being implemented by NRW.
- 5.2.9. It is proposed for this two phase approach to be secured by a suitably worded planning condition which prevents advancement to 'Phase 2' until such a time as appropriate discharge (in terms of water quality and quantity) can be demonstrated and written approval has been provided by NRW and NPTC.
- 5.2.10. As such, and subject to the above approach being implemented, it is considered hydrological impacts will not have the potential to arise on the Crymlyn Bog complex, as a result of the emerging Proposals.
- 5.2.11. Consideration has also been given to other potential impact pathways, for example the potential for indirect impacts on qualifying bird species, or as arising through noise/dust pollution. However, noting the nature of the Proposals, and the low suitability of the habitats present within the Site, no other pathways for likely significant effects are predicted. This notwithstanding, standard

- construction safeguards will be implemented and secured by suitably worded planning conditions, as a further safeguard.
- 5.2.12. All other statutory designated sites are considered to be sufficiently distanced from the Site and therefore no impacts are envisaged.
- 5.2.13. **Non-Statutory Sites.** A number of non-statutory designated sites lie within close proximity to the Site, as shown on Plan ECO1 and detailed within Table 5.1 below. The closest of which is Main Swansea to Fishguard Railway Line Site of Importance for Nature Conservation (SINC), located approximately 0.66km north-west of the Site boundary at its closest point. The River Neath is also understood to form a component of the Neath Port Talbot Watercourses SINC.
- 5.2.14. Noting the hydrological connectivity between the Site and the River Neath, consideration has been given to the potential for adverse ecological impacts to arise through the emerging Proposals. However, it is important to note the Proposals (i.e. Phase 1 of the drainage strategy) simply seek to maintain the discharge of water from the Site to this watercourse. The water levels are currently being maintained at a reduced level until discontinuance can be achieved when the remaining waters will be drawn down. Moreover, and as detailed in relation to the Crymlyn Bog above, the Proposals include measures to remediate the Site and subsequently restore the hydrological flow back towards the Crymlyn Bog (as opposed to towards the River Neath). Betterment, in water quality terms can therefore be expected for this LWS in future years.
- 5.2.15. With the exception of the River Neath, there are understood to be no existing hydrological links to any non-statutory designated sites.
- 5.2.16. Given the separation of the Site from other non-statutory designations, the absence of any direct functional links, and the nature of the Proposals (i.e. re-establishment of a grassed open valley), it is not considered adverse impacts would have the potential to arise as a result of the Proposals.
- 5.2.17. With reference to the guidelines for the Selection of Local Sites in Wales, and in response to the Environment Strategy for Wales (adopted 2006), certain sites can qualify to automatically be designated as SINC sites, regardless of being formally surveyed by NTC. Broadly, there are two distinctions for SINC designation, with reference to Section 7 of the Environment (Wales) Act 2016: Habitats and Species.
- 5.2.18. With reference to the habitats and assemblages present, noting the artificial nature of the NSR, and the presence of contaminants, it is considered highly unlikely the Application Site would meet SINC criteria on account of its habitats. Equally, based on the surveys and assessment undertaken, the Application Site is not considered to qualify as SINC on account of the faunal species/assemblages likely to be present.

- 5.2.19. It is considered the Site does not meet any criteria for SINC designation under both the habitats and species lists. It is also not anticipated the Proposals will result in any adverse impacts of significance to non-statutory sites.

Site Name	Distance From Site	Reason for Designation
NPT Watercourses SINC	Adjacent/On Site	Much of the wider Coed Darcy site is designated as NPT Watercourses SINC, with no formal citation provided. It is understood the citation reflects the broad locations of watercourses in the borough.
Main Swansea to Fishguard Railway Line SINC	0.65km north-west	No citation provided.
M4 Corridor SINC	0.7km north-west	No citation provided.
Crymlyn Quarry Woodland SINC	0.75km west	Mosaic of habitats including acid heath, scrub mire and acid grassland. The site is described as a small broad-leaved woodland and meadow area.
Pentrefynnon SINC	0.93km east	Native woodland: mix of native tree species, lowland meadows, Purple Moor Grass <i>Molina caerulea</i> , rush pastures, and OMHs on previously developed land. Important species recorded utilising the site include Otter <i>Lutrinae</i> , Willow Warbler <i>Phylloscopus trochilus</i> , Linnet, Bullfinch and Song Thrush.
Junction 44 Heathlands SINC	0.96km north-west	No citation provided.
Tennant Canal SINC	1km east	The Tennant Canal supports a range of aquatic and emergent flora, as well as bankside vegetation including numerous Orchid species, Flag Iris <i>Iris pseudacorus</i> and Greater Spearwort <i>Ranunculus lingua</i> . Important species recorded utilising the site include Grass Snake, Fen Raft Spider, Otter and Golden Ringed Dragonfly <i>Cordulegaster boltonii</i> .
Llandarcy Village Green SINC	1km south	Designated as Purple Moor Grass and rush pastures. Described as part of the Llandarcy Conservation Area which is largely managed as amenity grassland. Important species include Bog Stitchwort <i>Stellaria alsine</i> , Meadow Vetchling <i>Lathyrus pratensis</i> , South Marsh Orchid <i>Dactylorhiza praetermissa</i> , Great Birdsfoot Trefoil <i>Lotus pedunculatus</i> and Yellow Iris <i>Iris pseudacorus</i> .

**Table 5.1.** Summary of Non-Statutory Sites Located Within a 1km Radius of the Site.

### 5.3. Ancient Woodland (AW)

- 5.3.1. No Ancient Woodland (AW) is located within the Site boundary. The closest area of AW is located approximately 38m west of the Site boundary at its closest point, as shown within Plan ECO1. No development or encroachment is proposed within a 15m radius of the AW boundary.
- 5.3.2. As such, no adverse impacts are anticipated as a result of the Proposals, and no avoidance or mitigation measures are proposed.

### 5.4. On-Site Habitats

- 5.4.1. As detailed in the Ecological Features Section above, the vast majority of the Site comprises bare ground which has been exposed relatively recently, and is of no significant intrinsic ecological value. Small areas of marginal vegetation predominantly consisting of Common Reed exist on the peripherals of the Site and, given the limited extent, are of low ecological value.
- 5.4.2. Equally of very low value is the existing area of standing water within the basin of the NSR (measuring approximately 1.33ha). This standing water appears of poor quality and has no associated aquatic or marginal community.
- 5.4.3. Of higher ecological value is the dam or artificial western embankment which consists of a range of grass and herb species, which is proposed to be removed in full. Given the Proposals seek to restore the historic valley with open grassland (as shown in Appendix 5), impacts are only considered to be short term and will be fully mitigated, replaced and enhanced in the long-term.
- 5.4.4. The off-site boundary woodland, which is of higher value in the context of the Site, is to be fully retained and unimpacted as part of the Proposals.
- 5.4.5. As detailed above, habitat impacts are anticipated to include the following:
- Removal of the grassed embankment which forms the western boundary of the Application Site.
  - Losses to bare ground habitats present in the NSR basin.
  - Minor losses of scrub and marginal vegetation present at the boundaries of the Application Site.
- 5.4.6. These impacts are further quantified in Table 5.2 below.

	<b>Baseline Habitat Area Ha</b>	<b>Predicted Habitat Loss Ha</b>	<b>Habitat Creation Ha</b>
Bare ground	7.06	7.06	1.85
Marginal vegetation	0.17	0.17	0.00
Grassland	0.62	0.62	7.18
Scrub	0.11	0.02	0.00
Boundary woodland	0.90	0.00	0.90
Recolonising vegetation/pump compound	0.10	0.02	0.08
Stream	0.00	0.00	0.19

Table 5.2 Predicted Habitat Losses

- 5.4.7. As detailed previously, these minor habitat losses will be more than mitigated for through the delivery of new landscaping within the Site, with this targeting the reversion of the Site to its historical, natural baseline condition (i.e. prior to the NSR creation).
- 5.4.8. As identified within the Landscape Masterplan submitted alongside this application (and included at Appendix 5), the Proposals seek to secure net gains in semi-natural habitat relative to the current, predominantly bare baseline scenario. Consideration is given to each of the habitat types proposed, below.
- 5.4.9. **Grassland.** The Proposals will deliver extensive areas of grassland and early successional, open sward habitats. Approximately 7.18 ha of these habitat types are proposed.
- 5.4.10. Prior to sowing commencing, necessary soil remediation works will be completed, after which soils will be suitably tilled and prepared to receive seed. In preparing soils for seeding, care will be taken to create a diverse surface microtopography to enhance structural and botanical diversity in future years. This will include for localised humps and small depressions within grassed areas.
- 5.4.11. Once prepared and sculpted, areas of proposed grassland will then be seeded with a neutral, wildflower seed mixture suitable for local conditions. This will include for wet favouring mixes in suitable parts of the Application Site, as detailed within the landscape plan at Appendix 5. In order to allow for a component of natural re-colonisation (noting the presence of notable open sward habitats within the wider Coed Darcy site), a proportion of proposed grassland (~25%) habitats are proposed to be left un-seeded. This approach will both improve overall habitat diversity and promote local genetic stock within the Site.
- 5.4.12. The provision of extensive areas of mixed species-rich grassland will more than mitigate for the loss of semi-improved grassland present on the existing NSR embankment.
- 5.4.13. **Woodland and Scrub.** All existing woodland within the Site (i.e. that present at or beyond the boundaries of the Site) is proposed to be

retained and safeguarded as part of the Proposals, with the exception of very small losses in proximity to the western dam.

- 5.4.14. Where existing trees are to be retained, appropriate construction safeguards will be employed to ensure potential adverse impacts are avoided. This may include, for example, the erection of appropriate fencing (in accordance with British Standard 5837:2012) and the use of ground protection measures, such as matting.
- 5.4.15. **Watercourse/Waterbody (including aquatic and marginal vegetation).** The Proposals seek to deliver a sinuous, naturalistic watercourse within the basin of the restored grassland valley. The provision of this watercourse will restore the topographical features which were effectively lost to the construction of the NSR.
- 5.4.16. The specification and design of this watercourse, including excepted channel depth and bank gradients, is proposed to be secured by a suitably worded condition. The structure of the bank is proposed to vary along its length, including for areas of steep and shallow bank which will in turn support varied aquatic communities.
- 5.4.17. The qualitative enhancements proposed through new watercourse creation will ensure a wetland feature of improved qualitative value relative to the unvegetated, standing water habitat currently present.
- 5.4.18. New aquatic habitats will be seeded with a range of aquatic and marginal vegetation which in turn will offer valuable opportunities for amphibians, waterfowl, and invertebrates, amongst other faunal groups.
- 5.4.19. **Invasive Species Management.** The presence of Japanese Knotweed off-site is noted, predominantly located in the boundary woodland/scrub (as shown on Plan ECO2).
- 5.4.20. On the basis this invasive species is outside the Site boundary, it is not anticipated it will be disturbed, nor that works will risk it being spread. As such, no specific mitigation is required. On a precautionary basis, the location of Knotweed will be made available to site personnel, with plans kept at the Site compound and a tool-box talk held prior to works commencing.
- 5.4.21. Should any potential for disturbance to the Japanese Knotweed be identified, specialist contractors will be appointed to design and implement an appropriate eradication regime. This may include either chemical treatment or excavation.

#### Habitat Summary

- 5.4.22. In summary, the Proposals will result in losses to a limited range of semi-natural habitats, most of which are of very limited or negligible ecological value. None of the habitats to be lost are assessed to be of any raised conservation value (i.e. beyond the context of the Site).

- 5.4.23. The Proposals deliver positive habitat creation within the Site, securing substantial net gains in vegetated, semi-natural habitats.
- 5.4.24. The adoption of a sensitive landscaping strategy for the Site, inclusive of areas of extensive areas of grassland, and qualitatively improved aquatic habitat will allow for ecological enhancements to be realised for the Site, permitting the restoration of a historic landscape of open valley (see Appendix 5).
- 5.4.25. Therefore it can be confidently concluded, meaningful ecological enhancements can be secured for the Application Site post-development, in accordance with relevant legislation and policy.

## 5.5. Faunal Evaluation

### *Badgers*

- 5.5.1. **Legislation.** The Protection of Badgers Act 1992 consolidates the previous Badgers Acts of 1973 and 1991. The legislation aims to protect the species from persecution, rather than being a response to an unfavourable conservation status.
- 5.5.2. As well as protecting the animal itself, the 1992 Act also makes the intentional or reckless destruction, damage, or obstruction of a Badger sett an offence. A sett is defined as “any structure or place, which displays signs indicating current use, by a Badger”. ‘Current use’ is defined by NE as any use within the preceding 12 months.
- 5.5.3. In addition, the intentional elimination of a foraging area sufficient to support a known social group of Badgers may, in certain circumstances, be construed as an offence by constituting ‘cruel ill treatment’ of a Badger.
- 5.5.4. Local authorities are therefore obliged to consult NRW over any application likely to adversely affect Badgers.
- 5.5.5. Any work which disturbs Badgers is illegal without a licence granted by NRW. Unlike the general conservation legislation, the Badgers Act 1992 makes specific provision for the granting of licences for development purposes, including for the destruction of setts.
- 5.5.6. Guidance produced by NE in 2002 developed guidelines on the types of activity it considers should be licensed within certain distances of sett entrances. For example, using heavy machinery within 30m of any entrance to an active sett, and lighter machinery within 20m, or light work such as hand digging within 10m, all may require a license.
- 5.5.7. ‘Interim guidance’ issued by NE in September 2007 specifically states “it is not illegal, and therefore a licence is not required, to carry out disturbing activities in the vicinity of a sett if no badger is disturbed and the sett is not damaged or obstructed.”

- 5.5.8. The guidance goes on to state, “Where interference with a sett showing signs of use cannot be avoided during the development, a licence should be sought from Natural England”.
- 5.5.9. This guidance does not make reference to any 30m/20m/10m radius as a threshold for whether a licence would be required. Nonetheless, it is stated that tunnels may extend for 20m, so care needs to be taken when implementing excavating operations within the vicinity of a sett, and to take appropriate precautions with vibrations and noise, etc. Fires/chemicals within 20m of a sett should specifically be avoided.
- 5.5.10. This interim guidance allows greater professional judgement as to whether an offence is likely to be committed by a particular development activity, and therefore whether a licence is required. For example, if a sett clearly orientates southwards into an embankment it may be somewhat redundant to have a 30m exclusion zone to the north.
- 5.5.11. It should be noted, a licence cannot be issued until the site is in receipt of a full and valid planning permission, and generally licences are not granted between December and June inclusive, to avoid disruption to the Badger breeding cycle.
- 5.5.12. **Site Usage.** No evidence of Badger activity was found adjacent or within the Site. It is also noted that no evidence of Badger activity was found.
- 5.5.13. **Avoidance, Mitigation and Enhancements.** Noting the absence of Badger activity, no impacts are considered to arise as part of the Proposals and therefore no mitigation is considered.
- 5.5.14. In line with best practice, and noting Badgers are a mobile species which can rapidly excavate new setts, an updated survey should be undertaken if construction works are not commenced within 12 months of the previous surveys.
- 5.5.15. The range of new/enhanced habitats proposed as part of the development, as detailed in the Habitat Section above, will provide an optimal foraging resource for Badger populations, should they be present within the local area. Given these Proposals it is considered enhanced opportunities will exist for Badgers in the long-term.

#### Bats

- 5.5.16. **Legislation.** All bats are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as Amended) and included on Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (“the Habitats Regulations”), as Amended. These include provisions making it an offence to:
- Deliberately kill, injure or take (capture) bats;
  - Deliberately disturb bats in such a way as to:

- i. be likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or to hibernate or migrate; or
    - ii. affect significantly the local distribution or abundance of the species to which they belong.
  - Damage or destroy any breeding or resting place used by bats;
  - Intentionally or recklessly obstruct access to any place used by bats for shelter or protection.
- 5.5.17. While the legislation is deemed to apply even when bats are not in residence, NE guidance suggests certain activities, such as re-roofing, can be completed outside sensitive periods when bats are not in residence, provided these do not damage or destroy the roost.
- 5.5.18. The words 'deliberately' and 'intentionally' include actions where a court can infer the defendant knew the action taken would almost inevitably result in an offence, even if that was not the primary purpose of the act.
- 5.5.19. The offence of damaging or destroying a breeding site or resting place (which can be interpreted as making it worse for the bat) is an absolute offence. Such actions do not have to be deliberate for an offence to be committed.
- 5.5.20. European Protected Species licences are available from NRW in certain circumstances, and permit activities that would otherwise be considered an offence.
- 5.5.21. Licenses can usually only be granted if the development is in receipt of full planning permission and it is considered:
- (i) The activity to be licensed must be for imperative reasons of overriding public interest or for public health and safety;
  - (ii) There is no satisfactory alternative; and
  - (ii) The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.
- 5.5.22. **Site Usage.** No trees present within the adjacent off-site boundary woodland, comprising specimens of limited maturity, were identified as suitable to support roosting bats. In any event, no loss or harm to trees is proposed.
- 5.5.23. The Site offers a component of the wider habitat resource which supports those bat populations recorded within the wider Coed Darcy masterplan site. The open water associated with the NSR will offer suitable foraging and drinking opportunities for bats, albeit extensive open water (including much more naturalistic features) is present in the wider area.
- 5.5.24. Given the very limited diversity of habitats, and the limited vegetative cover, not least the uniformity of bare ground present at the Site, it is considered to be of low ecological interest to foraging and commuting

bats, especially with reference to the habitats present in the wider area.

- 5.5.25. **Mitigation and Enhancements.** As detailed above, no potential roosting features have been identified which have the potential to be adversely impacted by the proposals and therefore no avoidance or mitigation measures are required.
- 5.5.26. In terms of potential impacts on foraging and commuting bats, and noting the nature of the Proposals (i.e. reversion of an engineered reservoir to a naturalistic valley), potential impacts are considered to be limited to short term losses of low value foraging habitats. Given the retention of boundary wooded habitats, no significant impacts are predicted in relation to commuting or navigational opportunities. For clarity, there will be no significant losses to areas of habitat of potentially raised value to foraging and commuting bats.
- 5.5.27. No lighting is proposed within the operational phase of the development. Should lighting be required during construction, this will be restricted to the minimum necessary footprint, ensuring light spill onto boundary habitats is avoided.
- 5.5.28. Given the low value of the habitats present, combined with the presence of extensive optimal habitat in the immediate area (not least Crymlyn Bog), short term habitat losses are not considered to be of significance for local bat populations, nor impact their Favourable Conservation Status (FCS).
- 5.5.29. In any event, and as detailed in the Habitats Section above, the Proposals seek large scale restoration and associated habitat creation, allowing substantial net gains in vegetated, semi-natural habitats. These measures will include for an open water habitat, in addition to grassland and open habitat creation, and will ensure uplift in foraging and commuting value relative to the baseline scenario.

#### Invertebrates

- 5.5.30. **Site Usage.** Invertebrate surveys of the wider site in 2020 identified the larger artificial waterbodies to be of limited invertebrate interest. This conclusion was reached due to the very limited aquatic/emergent vegetation, and the steep sided banks of the reservoirs. Consistent with this conclusion, prior to partial drawdown, the Site was of very limited interest to invertebrates and therefore no detailed surveys of the NSR were carried out in 2020.
- 5.5.31. It is considered, given the significantly reduced volume of water now present in the NSR, and that much of the Site consists of bare ground, the Site is of very low ecological interest to either aquatic or terrestrial invertebrates.
- 5.5.32. Reflecting the above, the Site is not considered to comprise a valuable component of the wider open habitat resource which is of value to invertebrate populations in the local landscape.

- 5.5.33. **Enhancements.** Given the low suitability of the Site at present, no specific mitigation would be required. This notwithstanding, the landscape proposals seek to achieve a diversification of habitat resources and qualitative enhancements of value to a wide range of invertebrate fauna.
- 5.5.34. The provision of extensive areas of grassland and early sward habitat in particular, alongside new wetland and marginal habitats, can be expected to improve the value of the Site for invertebrates post development. Design of these habitats has been carefully considered so as to further promote invertebrate interest, including the intention to create a diverse micro-topography within open sward habitat, and to create structurally varied wetland habitats.

#### Great Crested Newts

- 5.5.35. **Legislation.** All British amphibian species receive a degree of protection under the Wildlife and Countryside Act 1981 (as Amended). The level of protection varies from sale or trade only, as is the case with species such as Smooth Newt and Common Toad, to more rigorous protection afforded to GCN.
- 5.5.36. GCN are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as Amended) and included on Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as Amended). These include provisions making it an offence to:
- Deliberately kill, injure or take (capture) GCN;
  - Deliberately disturb GCN in such a way as to be likely-
    - To impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or to hibernate, or;
    - To affect their local distribution or abundance.
  - Deliberately take or destroy eggs of GCN;
  - Damage or destroy any breeding or resting place used by GCN.
  - Intentionally or recklessly obstruct access to any place used by GCN for shelter or protection (even if the newts are not present at the time).
- 5.5.37. The words 'deliberately' and 'intentionally' include actions where a court can infer the defendant knew the action taken would almost inevitably result in an offence, even if that were not the primary purpose of the act. European Protected Species licences are available from NRW in certain circumstances, and permit activities which would otherwise be considered an offence.
- 5.5.38. **Site Usage.** On the basis of the survey work undertaken over multiple years, the NSR waterbody is not assessed to represent a likely breeding resource for GCN. This conclusion is further informed by updated Site inspections in 2023 which identify the waterbody of low suitability for GCN.
- 5.5.39. In addition, the terrestrial habitats consist of predominantly bare ground which is generally unsuitable as a terrestrial resource for

GCN. Suitable habitat is effectively limited to the grassland located on the western embankment. It is considered improved opportunities for GCN are available in the wider area.

- 5.5.40. Noting the proximity of known GCN breeding ponds to the Application Site, it is considered likely suitably vegetated terrestrial habitats within the Application Site will provide a component (albeit a small one), of the resting, sheltering and foraging resource for the local GCN meta-population. It is therefore anticipated a protected species licence may be required to support the planning proposals and this will be discussed with NRW as the application progresses.
- 5.5.41. **Avoidance/Mitigation/Enhancements.** The Proposals will allow for landscape scale enhancements for on Site habitats. Amongst other matters, this will include for a considerable net gain in suitable GCN terrestrial habitat. Noting that the NSR is unsuitable as a breeding resource (and sub-optimal as a foraging resource), the significant increase in optimal terrestrial habitat will ensure functional enhancements for the benefit of GCN in the local area.
- 5.5.42. Moreover, the Proposals will ensure areas of standing or slow flowing water habitat will be created in the restoration of the historic watercourse. The naturalistic design of this new wetland habitat will offer further opportunities for GCN as a foraging resource.
- 5.5.43. Notwithstanding the above, it is acknowledged that construction works in the short term would have the potential to give rise to adverse impacts on GCN in the absence of an effective avoidance and mitigation strategy being implemented. As such, it is proposed for the Site to be subject to a capture and translocation exercise under an NRW GCN licence.
- 5.5.44. Whilst a detailed licence methodology and approach would need to be determined and agreed with NRW in due course, a summary conservation strategy is provided below. This strategy has been structured to address previous NRW consultation responses received in relation to the wider site.

#### Impact Assessment

- 5.5.45. It is expected NRW will seek the following information in relation to impact assessment:

*An assessment of impacts during the construction and operational phases of the scheme. This, to include an evaluation of the nature, extent, and duration of the likely direct and indirect impacts of the development. This assessment should include:*

- *Tabulated review of the extent, distribution, and quality of GCN habitat (aquatic and terrestrial) to be removed, retained, enhanced and created, supported by drawings as appropriate, including those showing and labelling the locations of existing and replacement waterbodies;*

- *Consideration of habitat functionality and connectivity during and post construction;*

5.5.46. **Overview.** The Proposals will not result in any losses of breeding habitat. However, the Application Site is located within close proximity to known GCN breeding ponds. Resultantly, the vegetated semi-natural habitats present within the Application Site are assessed to offer a small component of the wider terrestrial habitat resource available to the local GCN meta-population (medium population size class). Given the small extent of suitable habitat being lost, with this providing only a small fraction of the resource available overall, impacts are assessed to be of low significance. For clarity, only a very small proportion of the wider meta-population is considered likely to be present within the Application Site.

5.5.47. **Habitat Impacts.** Plans detailing the extent and distribution of GCN habitat within the Site are detailed at Appendix 6. These include a plan detailing predicted impacts, as well as plans identifying expected habitat provision. Table 5.3 below quantifies the extent of habitat change, including reference to core, intermediate and distant GCN habitat zones.

Habitat Type	Suitability to Support GCN	Total Habitat Area (Ha)	Losses Within Core Zone (0-50m)	Losses Within Intermediate Zone (50-250m)	Losses Within Distant Zone (250-500m)
Bare ground	Unsuitable	7.06	0.79	3.85	2.42
Grassland	Suitable	0.62	0.02	0.58	0.02
Pump compound	Unsuitable	0.10	0.02	0.00	0.00
Marginal vegetation	Sub-optimal	0.17	0.00	0.07	0.10
NSR waterbody	Unsuitable	1.33	0.00	1.33	0.00
Mixed scrub	Suitable	0.11	0.02	0.00	0.00
Woodland	Sub-optimal	0.90	0.00	0.00	0.00

**Table 5.3.** Predicted Habitat Losses During Construction

Habitat Type	Suitability to Support GCN	Total Habitat Area (Ha)	Gains Within Core Zone (0-50m)	Gains Within Intermediate Zone (50-250m)	Gains Within Distant Zone (250-500m)
Meadow Grassland	Suitable	7.18	0.82	4.52	1.84
Bare Ground	Unsuitable	1.85	0.03	1.21	0.61
Stream	Unsuitable	0.19	0.00	0.11	0.08

**Table 5.4.** Predicted Habitat Creation During Construction.

5.5.48. As detailed in Table 5.3, a vast majority of habitat losses pertain to habitats of very low (negligible) suitability for GCN, with this including extensive areas of bare ground, in addition to a non-GCN breeding waterbody of low suitability. Losses to potentially suitable habitat are

limited to the removal of 0.62ha of grassland, alongside incidental scrub.

- 5.5.49. Regarding habitat creation, areas of grassland, wetland, and a naturalistic watercourse will be designed to afford optimal opportunities for GCN post-development.
- 5.5.50. Whilst there will be a net loss of open water in quantity terms, the existing feature is not a GCN breeding pond and, indeed, is of low suitability for GCN. As such, there is no net loss of breeding habitat, and the principle mitigation requirement is assessed as the provision of high quality foraging, dispersal and resting habitats.
- 5.5.51. **Habitat functionality and connectivity.** The Application Site is not assessed to provide a resource of significant functional importance for local GCN populations at present. It does not support any breeding habitats, whilst the terrestrial habitats present are overwhelmingly of low suitability for foraging or resting purposes.
- 5.5.52. Regarding connectivity, the Site does not provide any significant connective function within the wider landscape. For example, there are no known ponds to the north or east of the Site. Moreover, the M4 motorway is present to the east, and existing development further to the north. These urban features would represent barriers to dispersal for GCN. With respect to the geographical context, it is concluded the local GCN population is primarily sustained within off-site habitats to the south and west of the Application Site, with the Application Site effectively representing the north-eastern limit of the meta-populations range.
- 5.5.53. The Proposals would result in the short term removal of the semi-natural habitats within the Application Site, and therefore remove any limited function the Site may afford GCN in the short term. In the unlikely event GCN are present in areas of off-site woodland, to the north and/or east of the NSR, the presence of continuous off-site woodland, connecting towards the wider landscape, would prevent any risk of short term isolation or fragmentation of populations.
- 5.5.54. Post-development, the Site will comprise a natural valley landscape, and therefore will facilitate unrestricted GCN dispersal, as well as the provision of optimal GCN habitats. The semi-natural habitats within the Site will be continuous with habitats in the wider landscape, including areas of future habitat creation (Green Infrastructure [GI]) anticipated to be delivered as part of the wider Coed Darcy OPA.
- 5.5.55. **Duration of Works.** The Proposals seek the reversion of the NSR to its natural state. As such, the Proposals will create a naturalistic setting, with no significant built form or hard infrastructure proposed.
- 5.5.56. Whilst precise timeframes are to be determined, it is anticipated all works will be complete within an 12 month window, from the date construction commences. For clarity, this will include for the completion of all land formation, remediation, engineering, and landscaping works associated with the Proposals.

- 5.5.57. **Direct Harm/Injury.** In the absence of mitigation, construction works have the potential to result in accidental injury or death of GCN, for example through machinery movements.

Avoidance and Mitigation Measures

- 5.5.58. It is expected NRW will seek the following information in relation to the avoidance and mitigation strategy:

- *Details on the proposed capture and translocation methodology, including details on the proposed receptor location. This to include associated plans concerning GCN avoidance and mitigation measures*
- *Further details concerning GCN habitat compensatory proposals including plans, access and timeframes*

- 5.5.59. **Mitigation Approach (Exclusion, Capture and Translocation).** Prior to any construction works commencing, a suitable exclusion, capture and translocation exercise is anticipated to be required. This exercise will include the installation of GCN fencing along the full perimeter of the Application Site (with access points permitted for construction vehicles) which will be maintained until the completion of construction. Additional fencing would also be installed within the main body of the Application Site to facilitate capture, and would be retained until the completion of relevant construction works. A plan showing the proposed extent of fencing is provided at Appendix 7.

- 5.5.60. Given the vast majority of the Application Site is unsuitable to support GCN, it is not anticipated a conventional translocation exercise will be required across the entirety of the Site. Instead, it is anticipated capture effort will be zoned to ensure a targeted and proportionate approach. All capture works would be undertaken within the amphibian active season, in suitable weather conditions. The following is proposed (see also the Fencing and Capture Plan at Appendix 7):

- **NSR Waterbody.** On a precautionary basis, the existing waterbody will be sensitively drained under an ecological watching brief. This is anticipated to take place in September or October 2023 or otherwise over the 2023/4 winter period. The pump will be fitted with an appropriate gauze mesh to prevent accidental uptake of fauna. An ecologist will be present equipped with a net, and will be able to capture and relocate any amphibians recorded. A final search of the drained basin will be undertaken following the completion of drainage.
- **Bare Ground.** Areas of bare ground are proposed to be subject to a night search for a minimum 10 consecutive nights, where safe access permits. This will involve surveyors walking a transect of the bare areas with a high-powered torch. In the event amphibians are recorded, these will be carefully collected within an appropriate container for transport, and translocated to the receptor location. As a further trapping

measure, areas of bare ground will be subject to carpet tile deployment. Carpet tiles will be deployed in a grid, with a minimum of 25 tiles per hectare (20m spacings). Again, tiles will be checked for a minimum 10 night period.

- **Grassland / Incidental Scrub / Marginal.** Areas of grassland, scattered scrub and marginal vegetation will be subject to a conventional translocation exercise, utilising pitfall buckets, temporary amphibian fencing, and carpet tiles. Given the small extent of suitable habitat, much of which is well distanced from GCN ponds, it is considered that, at best, a small population of GCN would be present within the Application Site. With this context in mind, it is proposed for a minimum 20 day translocation exercise to be undertaken (works ceasing after 5 consecutive days of no capture per compartment). Whilst it is acknowledged this is below the typical 30 days normally proposed for small populations, 20 days is considered appropriate in this instance given the small extent of habitat, and moreover the proposals to achieve a high density of traps and fencing. The location of proposed fencing, detailed at Appendix 12, seeks to grid the grassland into multiple small compartments. All fencing will have pitfalls installed at 5m intervals, with carpet tiles laid at staggered 5 intervals between (i.e. one trap/tile every 2.5m). Following the completion of active capture, the grassland will be subject to a soft-strip (destructive search) under an ecological watching brief.

- 5.5.61. **Receptor Location.** Whilst consideration was given to the creation of a dedicated receptor site, it is considered preferable in this instance to adopt an 'over the fence' approach, resulting in GCN being translocated to the closest semi-natural habitat present on the far side of the boundary fencing, along the southern and western Site boundaries (see Appendix 7). This approach is considered preferable as it will ensure translocated individuals are relocated the minimum possible distance, and moreover will be deposited in a location continuous with extensive suitable GCN habitat, and within the range of the same GCN meta-population.
- 5.5.62. The alternative approach, i.e. identifying a dedicated receptor location which would be ring fenced, would risk leaving very small populations of GCN in a location isolated from the wider meta-population. This alternative approach would also have an elevated risk of resulting in localised extinction events.
- 5.5.63. As above, in identifying the 'over the fence' methodology as preferable, consideration has been given to the minor (and temporary) nature of habitat losses. These losses are not assessed to give rise to potential adverse impacts on the wider meta-population and, in any event, would be more than mitigated for through the proposals for new landscaping (see below).
- 5.5.64. **Habitat Creation and Timeframes.** As detailed in the Habitat Section above, the habitats currently present within the Application Site will be lost. However, these losses will be temporary in nature,

with the Proposals seeking restoration of the Application Site to a naturalistic state. At this stage it is anticipated replacement habitat provision will be completed within 12 months of construction works commencing.

- 5.5.65. Table 5.4 above provides a qualitative and quantitative assessment of the proposed habitat provision. Proposed habitat creation is further detailed on the plans at Appendix 8.
- 5.5.66. The net increase in high quality terrestrial and aquatic habitat provision will ensure optimal habitats for GCN, and allow their FCS to be maintained.

#### Post Construction Considerations

- 5.5.67. It is expected NRW will seek the following information in relation to impact assessment:
- *Information on proposed tenure*
  - *Proposed mechanism for ensuring the long-term management and operation of the proposal*
  - *Post construction monitoring and record dissemination*
- 5.5.68. **Proposed Tenure.** The construction of the NSR was permitted under a long-term lease agreement, with St Modwen the current holders of this lease. Throughout this lease (which remains extant), the Application Site has remained under the ownership of Coombe Tennant Estate. The lease includes a legal obligation for the land within the Application Site to be restored to historic condition and subsequently returned to Coombe Tennant Estate.
- 5.5.69. Initial habitat creation and monitoring in the establishment period (Years 1 to 2) will be the responsibility of St Modwen. After this period, land will be handed back to Coombe Tenant Estate as per the existing legal agreement.
- 5.5.70. **Mechanisms for Long-term Management.** With the exception of habitat monitoring and management during establishment (Years 1 to 2), no long-term management is proposed. As above, there is a legal obligation for the land to be returned to Coombe Tenant Estate.
- 5.5.71. **Post Construction Monitoring.** No dedicated GCN breeding ponds are proposed (nor are any required for mitigation). Noting the absence of mitigation ponds, and the limited impacts associated with the Proposals in any event, no post-construction monitoring is proposed.

#### Summary and Conclusion

- 5.5.72. In summary, the Application Site currently comprises a resource of low importance for the local GCN population, albeit it is likely a small proportion of the wider meta-population will make use of the habitats present on at least an occasional basis.

- 5.5.73. The potential for GCN to be present is noted and an appropriate, proportionate translocation methodology is identified to avoid potential for harm during construction.
- 5.5.74. The Proposals will result in a short term reduction in (generally sub-optimal) GCN habitat which is not considered to be of significance, nor undermine the FCS of the local meta-population. Given the minor nature of these impacts, no upfront habitat creation is considered necessary. Moreover, the provision of suitable habitat as part of the Proposals (delivering qualitative and quantitative gains) will ensure enhancement is ensured for GCN post-development.
- 5.5.75. As such, subject to the implementation of a conservation strategy which accords with the above principles, potential for significant adverse impacts on GCN would be avoided during both the construction and operational phases of the development. Accordingly, there would be no potential for the FCS of the local meta-population to be adversely impacted. Indeed, the Proposals can be expected to secure enhanced opportunities for GCN in future years.
- 5.5.76. Importantly, the Proposals have given due regard to other planned projects in the locality, i.e. the proposals for redevelopment of the wider Coed Darcy landholding. The habitat provision proposed under the current Proposals would be designed to ensure future connectivity to GI and wildlife corridors delivered as part of the wider site proposals.

#### Breeding Birds

- 5.5.77. **Legislation.** Section 1 of the Wildlife & Countryside Act is concerned with the protection of wild birds. With certain exceptions, all wild birds and their eggs are protected from intentional killing, injuring, and taking, and their nests, whilst being built or in use, cannot be taken, damaged or destroyed.
- 5.5.78. Schedule 1 of the Wildlife & Countryside Act 1981 is a list of the nationally rarer and uncommon breeding birds for which all offences carry special (i.e. greater) penalties. These species also enjoy additional protection whilst breeding, as it is also an offence to disturb adults or their dependant young when at the nest.
- 5.5.79. **Site Usage.** The Site is not assessed to be of raised potential interest for breeding bird assemblages, with reference to the predominantly bare ground and turbid unvegetated waterbody as detailed above.
- 5.5.80. Moreover, on the basis of the habitats present, and with reference to the previous surveys of the wider Coed Darcy site, there is nothing to indicate the Site would be of potential breeding value for any of the qualifying bird species/assemblages within the Crymlyn Bog designated sites complex, namely the breeding populations of Reed and Sedge Warblers.
- 5.5.81. With regards to foraging, on the basis of the limited habitats present, and with the Site overwhelmingly comprising unvegetated bare

ground, there is no reason to consider the Site would be of any significant value as a foraging resource in the wider area.

- 5.5.82. Even where open water is present, the poor water quality and absence of vegetation will greatly limit invertebrate populations (a potential prey source). There is no evidence of fish being recorded within the NSR.
- 5.5.83. **Mitigation and Enhancements.** As all species of birds receive general protection whilst nesting, to avoid a possible offence it is recommended any clearance of suitable nesting habitat (including grassland) is undertaken outside the breeding season (March to August inclusive) or, alternatively, checks for nesting birds be made by an ecologist immediately prior to any vegetation removal.
- 5.5.84. As detailed previously, the bare ground habitats within the Application Site are not considered to offer a suitable resource for breeding birds. Nonetheless, and on a highly precautionary basis noting the presence of multiple ground nesting bird species within the wider Coed Darcy site, it is proposed for a pre-commencement check survey to be undertaken, prior to works commencing. Moreover, all construction personnel will receive a tool-box talk which, amongst other matters, will identify the potential for ground nesting birds to be present, even within habitats typically assessed to be of very low suitability.
- 5.5.85. In the unlikely event there is a temporary cessation in construction works during the main bird breeding season (March to August), a monitoring check survey will be undertaken by an ecologist prior to works recommencing. As an additional safeguard, it would be appropriate for bird prevention techniques to be implemented, as have previously been undertaken at the wider Coed Darcy site. This may include vegetation management, regular walked transects of the Site, or the use of visual deterrents. Any such measures would be directly agreed with the Ecological Clerk of Works (ECow).
- 5.5.86. The implementation of appropriate construction safeguards to avoid temporary impacts (including monitoring checks of habitats and pre-commencement nesting bird checks as required) will be sufficient to ensure potential impacts are avoided during construction. These measures may be appropriately secured within a Construction Environmental Management Plan (CEMP) for the scheme.
- 5.5.87. Post-development, the Proposals for habitat creation will enhance the value of the Site for assemblages reliant on wetland and open habitats. Indeed, the restoration of a naturalistic, grassed valley, can be expected to be of particular value to a wide range of notable bird species recorded locally, not least ground nesting species such as Lapwing. Wetland seeding would also offer a complementary habitat resource to that present within the nearby Crymlyn Bog, and therefore has the potential to benefit breeding and wintering bird populations primarily sustained within that site.

#### Wintering Birds

- 5.5.88. **Site Evaluation.** A suite of wintering bird surveys was carried out on Site and on the wider areas between 2021 and 2022, with the results shown on Plan ECO7. The surveys found a small number of species utilising the Site, including Pochard, Tufted Duck, Mallard and Teal. Overall, it was concluded the Site was not a resource of raised interest for wintering bird assemblages.
- 5.5.89. Following the partial draining of the NSR, which preceded the above surveys, the Site is assessed to remain of low potential value for wintering bird populations.
- 5.5.90. **Enhancements.** As above, given the low suitability of the Site to support wintering assemblages, no specific mitigation would be required.
- 5.5.91. As detailed for breeding birds above, habitat creation will enhance the value of the Site for assemblages reliant on wetland and open habitats, offering an enhancement for wintering birds post-development. Importantly, the landscape regime will include replacement wetland planting and marginal planting, allowing for an optimal open water resource and shelter habitat for a range of waterfowl. The creation of grassland habitat will realise suitable loafing habitat for birds, a resource not currently present within the Site.
- 5.5.92. In summary, the Proposals can therefore be expected to avoid any adverse impacts on wintering birds and indeed secure enhancements post-development.

#### Reptiles

- 5.5.93. **Legislation.** All six British reptile species receive a degree of legislative protection that varies depending on their conservation importance.
- 5.5.94. Rare, endangered, or declining species receive 'full protection' under the Wildlife and Countryside Act 1981, as well as protection under The Conservation of Habitats and Species Regulations 2010, which transposed into UK law the European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora, more commonly known as the Habitats Directive. Species that are fully protected include Smooth Snake *Coronella austriaca* and Sand Lizard *Lacerta agilis*. These receive protection from:
- killing, injuring, taking;
  - possession or control (of live or dead animals, their parts or derivatives);
  - damage to, destruction of, obstruction of access to any structure or place used for shelter or protection;
  - disturbance of any animal occupying such a structure or place; and
  - selling, offering for sale, possession or transport for purposes of sale (live or dead animal, part or derivative).

- 5.5.95. Due to their abundance in Britain, Common Lizard, Slow Worm, Grass Snake and Adder are only 'partially protected' under the Wildlife and Countryside Act 1981 (as Amended) and as such only receive protection from:
- deliberate killing and injuring;
  - being sold or other forms of trading.
- 5.5.96. **Site Evaluation.** Whilst no specific surveys for reptiles have been undertaken within the Site, it is noted the western grassland embankment is suitable to support reptiles. In addition, reptiles were recorded to the south of the Site boundary in 2021 (as shown in Plan ECO8).
- 5.5.97. Given the presence of reptiles within the immediate surroundings of the Application Site, their presence is assumed, on a precautionary basis, within the grassland bund on Site.
- 5.5.98. The Proposals seek to remove the grassland habitat in the west of the Site. However, it is considered areas of heightened suitability for reptiles are present in the wider area.
- 5.5.99. **Mitigation/Enhancements.** Where losses to suitable reptile habitat are required to facilitate the Proposals, it will be necessary to adopt an appropriate avoidance and mitigation strategy to avoid impacts on common reptiles.
- 5.5.100. With regard to the comparatively small and linear extent of suitable habitats to be impacted, and that areas to be impacted will be adjacent to retained semi-natural habitats, it would be appropriate in principle to commence a sensitive habitat manipulation as the primary displacement method (i.e. as opposed to a translocation).
- 5.5.101. However, noting a GCN translocation is proposed within all suitable reptile habitat, it is expected any reptile relocation in this instance will also involve a degree of active trapping. In this regard, it is proposed for trapping for reptiles to last the full duration of the GCN translocation, as detailed above. Trapping would be facilitated by the installation of fencing (as per any GCN licence agreements) and the deployment of a high density of 'tins' across the capture area. Captured individuals would be relocated to the closest suitable terrestrial habitat along the Site's western boundary, a location which will ensure continued access to the wider landscape, and which will avoid any potential for habitat fragmentation.
- 5.5.102. Subject to the precise GCN capture measures agreed with NRW, habitat manipulation will remain a component of the reptile mitigation strategy. Such a manipulation process could be designed to encourage reptiles to disperse into the wider site (retained and/or enhanced habitats) of their own accord.
- 5.5.103. Any habitat manipulation would be undertaken in suitable weather conditions (>10C, dry) within the main reptile active season (typically late March to October). Cutting would be two stage, first to 10cm and

then to ground level (following a period to allow reptiles to disperse). Cutting would be directional, starting from the furthest point and moving towards retained/off-site habitats. This would ensure reptiles are encouraged to disperse away from the Site.

- 5.5.104. Noting the minor extent of reptile habitat to be removed relative to the abundance of suitable habitat in the wider area, the temporary reduction in habitat availability is not considered significant. Moreover, and as detailed above, habitat creation is proposed and will achieve a net gain in suitable reptile habitat. This will ensure enhanced opportunities for reptiles are available post-development.

#### Other Species

- 5.5.105. The survey works of the Site and wider Coed Darcy site have not identified the presence of any other notable or protected species within the Site. As such, and with reference to historic ecological survey work across the Coed Darcy site, the Site is not considered likely to provide any significant opportunities for any other protected or notable species.
- 5.5.106. Given the Proposals for the Site, and predominantly unsuitable habitat, no impacts are envisaged to arise to any other species such as European Hedgehog.

## 6. PLANNING POLICY CONTEXT

- 6.1. Planning policy for development in Coed Darcy, Llandarcy, Neath is administrated at two principal levels; nationally through the National Planning Policy Framework (NPPF), and locally through Neath Port Talbot Borough County Council Development Plan documents.
- 6.2. Any proposed development will be judged in relation to the policies contained within these documents.

### **National Planning Policy Framework**

- 6.2.1. Planning Policy Wales (Edition 11, February 2021) (PPW) sets out guidance with regard to nature conservation in Chapter 6; 'Distinctive and Natural Place'. It provides guidance for local planning authorities, and relates to biodiversity and safeguarding statutory designated sites, non-statutory designated sites, and protected species and their habitats. It also recognises the importance of trees, woodlands, and hedgerows.
- 6.2.2. PPW requires local authorities to fully consider the effect of planning decisions on natural heritage, inclusive of biodiversity and geological conservation in Wales, ensuring development 'contributes to meeting international responsibilities and obligations for biodiversity and habitats', and that appropriate weight is attached to statutory nature conservation designations, protected species, and biodiversity within the wider environment.
- 6.2.3. PPW also considers the potential biodiversity and geological conservation gains which can be secured within developments, including the use of planning obligations.
- 6.2.4. National policy therefore implicitly recognises the importance of biodiversity and that, with sensitive planning and design, development and conservation of the natural heritage can co-exist, and benefits can, in certain circumstances, be obtained.

### **Technical Advice Note 5: Nature Conservation and Planning**

- 6.2.5. The Technical Advice Note (Wales) 5: Nature Conservation and Planning was produced to supplement the information provided in PPW, insofar as it relates to nature conservation.
- 6.2.6. Technical Advice Note (Wales) 5 (Tan 5) reiterates biodiversity as a material consideration in the planning process, and advocates a step-wise approach to avoiding, mitigating, and compensating for biodiversity impacts.
- 6.2.7. It requires local planning authorities (LPAs) to fully consider the effect of planning decisions on biodiversity, and ensure appropriate weight is attached to statutory and non-statutory nature conservation designations, protected and notable (Priority) species, as well as biodiversity and geological interests within the wider environment. It also considers the potential biodiversity and geological conservation

gains which can be secured within developments, including through the use of planning conditions or obligations.

#### Future Wales (National Plan 2040)

- 6.2.8. Future Wales (National Plan 2040) is a framework which seeks to guide development in Wales up until 2040. Building upon the Well Being of Future Generations (Wales) Act 2015, sustainable development forms a guiding principle of the Plan, with Future Wales striving 'to find solutions which maximise our contribution to the goals of well-being objectives' whilst recognising that, in achieving sustainable development, 'a balance often has to be found between competing priorities'.
- 6.2.9. Regarding biodiversity and nature conservation, the Plan seeks to ensure development promotes ecological connectivity and resilience and reverses biodiversity declines.
- 6.2.10. A key policy aspiration (Policy 9) expands on these nature conservation ambitions and targets. Policy 9 requires 'action towards securing the maintenance and enhancement of biodiversity (to provide a net benefit), the resilience of ecosystems and green infrastructure assets must be demonstrated as part of proposed development through innovative, nature-based approaches to site planning and the design of the built environment'.
- 6.2.11. In particular, the Plan identifies the importance for 'large-scale resilient and functional ecological networks and green infrastructure' to be secured such that landscape scale networks exist 'to enable species and habitats to adapt to disturbance and change'. The Plan emphasises potentially important components of ecological networks should be safeguarded such that their ecological functionality is not compromised. The Plan emphasises 'safeguarding does not prohibit development, but sets out a requirement to consider both the long-term land needs of the habitats and species it is intended to protect and improve...'.
- 6.2.12. Future Wales further makes reference to ecological mapping resources produced by NRW, as well as Area Statements.
- 6.2.13. In summary, the Plan seeks opportunities to create, enhance and strengthen ecological networks on a national scale such that ecological functionality can be maximised, ecosystem services retained, and net benefits for biodiversity secured.

#### Local Policy

##### Neath Port Talbot County Borough Council Local Development Plan (2011-2026) (Adopted 2016)

- 6.2.14. Planning policy at the local level is detailed within the Neath Port Talbot County Borough Council Local Development Plan [NPTCBC LDP] (2011 to 2026). The LDP was adopted on 27 January 2016,

and includes for a number of policies of relevance to ecology and nature conservation.

- 6.2.15. Strategic Policy SP14: The Countryside and the Undeveloped Coast is an overarching policy which seeks to protect open countryside and undeveloped coast through the control of inappropriate development. Amongst other matters it also relates to the designation and protection of Special Landscape areas and Green Wedges.
- 6.2.16. This strategic policy is underpinned by a series of detailed policies. Of relevance to biodiversity and nature conservation at the Site, Policy EN3 identifies designated Green Wedges, some of which (i.e. at Crymlyn Bog and Llandarcy) border the wider Coed Darcy site. Whilst primarily landscape designations, the opportunities for Green Wedges to support biodiversity are noted.
- 6.2.17. Strategic Policy SP15: Biodiversity and Geodiversity is the primary overarching policy of relevance to biodiversity and nature conservation. It identifies the need to protect, conserve, enhance, and manage important habitats, species, and sites of geological interest through the identification of international, national, and county designated sites including SACs, Ramsar, SSSIs and NNRs. Also, through the identification and protection of sites of regional and local importance, and the protection of important natural heritage features.
- 6.2.18. This strategic policy is again underpinned by a series of more detailed policies. Those of relevance to biodiversity and nature conservation at the Site are considered below.
- 6.2.19. Policy EN6: Important Biodiversity and Geodiversity Sites relates to Proposed Development that would affect Regionally Important Geodiversity Sites (RIGS), LNR's, SINC's, sites meeting SINC criteria, or sites supporting Local Biodiversity Action Plans (LBAP), and S42 habitats or species, and will only be permitted where they conserve and, where possible, enhance the natural heritage importance of the site. In addition, proposed development will only be permitted where the development could not reasonably be located elsewhere, and the benefits of the development outweigh the natural heritage importance of the site. It also states that mitigation and/or compensation measures will need to be agreed where adverse effects are unavoidable. It is noted, Policy EN6 relates to 'both identified SINC's and sites that meet SINC criteria' but which are not currently designated.
- 6.2.20. Policy EN7: Important Natural Features relates to proposed development that would adversely affect ecologically or visually important natural features such as trees, woodlands, hedgerows/field boundaries, watercourses, or ponds, and which will only be permitted where full account has been taken of the relevant features in the design of the development, with measures put in place to ensure they are retained and protected wherever possible, or where the biodiversity value and role (function) of the relevant feature

has been taken into account and, where removal is unavoidable, mitigation measures are agreed.

- 6.2.21. Policy EN8: Pollution and Land Stability concerns pollution and land instability. Amongst other matters, it identifies proposals likely to have an adverse impact on biodiversity, as a result of pollution or land instability, will not be permitted.
- 6.2.22. Policy BE1: Design identifies development schemes should be designed to a high quality, including with reference to retaining and enhancing biodiversity features and ecological connectivity.
- 6.2.23. Policy SRA1 specifically relates to the wider Coed Darcy site, identifying it as a Strategic Regeneration Area within which a sustainable urban village is proposed.

Biodiversity and Geodiversity Supplementary Planning Guidance  
(May 2018)

- 6.2.24. The LDP is additionally supported by a suite of supplementary planning guidance (SP) which provide further clarity on the intentions of local policy. In particular, the Biodiversity and Geodiversity SPG (May 2018) is of relevance to biodiversity and nature conservation.
- 6.2.25. The SPG provides information and guidance setting out the expectations on all proposed development to protect, conserve, enhance, and manage important habitats, species, and sites of geological interest. The document focuses on the full range of biodiversity and geodiversity features and interests within Neath Port Talbot, and sets out the measures that will be taken through the planning system to meet the relevant objectives set out in the LDP; namely the Strategic Policy SP15, and policies EN6 and EN7 as described above.

### 6.3. Discussion

- 6.3.1. Recommendations have been put forward in this report which would allow the Development Proposals to fully safeguard the existing ecological interest of the Application Site. Where possible measures to enhance biodiversity value have been clearly indicated, with these giving regard to the setting of the Application Site, not least the proximity of the nearby Crymlyn Bog.
- 6.3.2. Based on the surveys undertaken, and the assessment for the presence and potential presence of protected species, due regard to the necessary measures to enhance the Application Site for such species have been put forward in this report.
- 6.3.3. Noting the small scale losses, and that in any event new landscaping and/or habitat management is proposed to off-set these impacts, and secure enhancements for the Application Site, no net losses of significance to biodiversity are predicted as part of the Proposals.

- 6.3.4. In conclusion, implementation of the measures set out in this report enable the Proposals to fully accord with existing and emerging planning policy for ecology and nature conservation at all administrative levels.

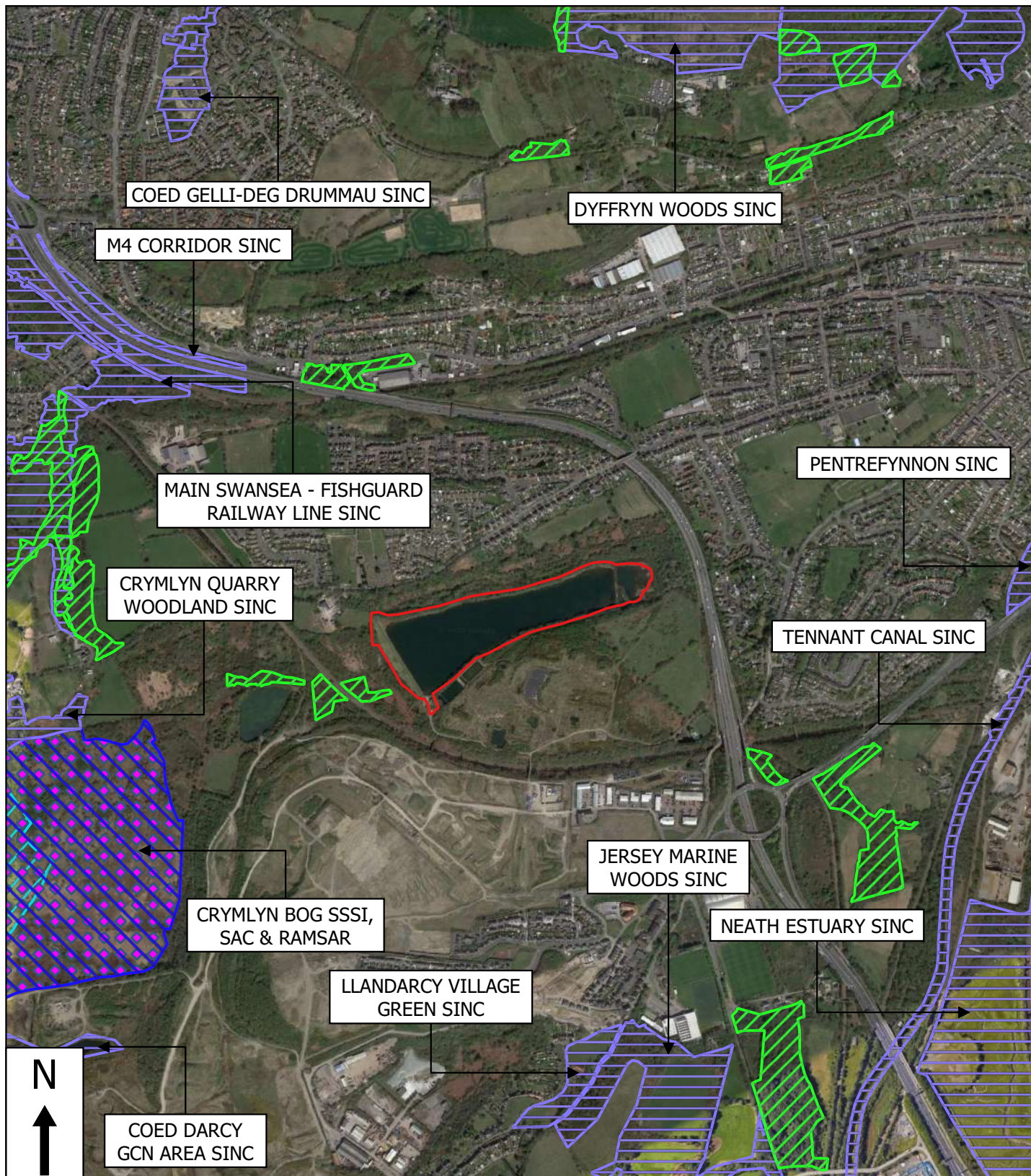
## **7. SUMMARY AND CONCLUSIONS**

- 7.1. Ecology Solutions (Manchester) Limited was commissioned on behalf of St. Modwen Developments Limited to undertake an Ecological Assessment of the NSR, Coed Darcy, Llandarcy, Neath (the Site).
- 7.2. The aim of this Ecological Assessment was to determine any potential ecological constraints associated with the Site, and to identify a suite of appropriate avoidance, mitigation, and enhancements such that an ecologically positive, policy compliant scheme can come forward.
- 7.3. The Site is not identified to support habitats of raised ecological significance, whilst opportunities for protected and notable faunal species are also limited. On the basis of the emerging technical studies and assessment, it is considered potential adverse impacts on the nearby Crymlyn Bog designated sites complex can be avoided.
- 7.4. As such, it is concluded the emerging Proposals would not be likely to result in impacts of raised ecological significance in the local area. Where there is potential for ecological impacts to arise, appropriate mitigation and enhancement measures can be readily secured.
- 7.5. Noting the above, and subject to the adoption of measures set out in this report, it is considered emerging Proposals may come forward in accordance with adopted legislation and planning policy insofar as this concerns matters of nature conservation.

## PLANS

## **PLAN ECO1**

Site Location and Ecological Designations



Key:

- Application Site
- Ancient Semi-Natural Woodland
- Site of Special Scientific Interest (SSSI)
- Special Area of Conservation (SAC)
- Ramsar Site
- Site of Importance for Nature Conservation (SINC)



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**PLAN ECO1: SITE LOCATION  
AND ECOLOGICAL DESIGNATIONS**


Rev: A

Apr 23

## **PLAN ECO2**

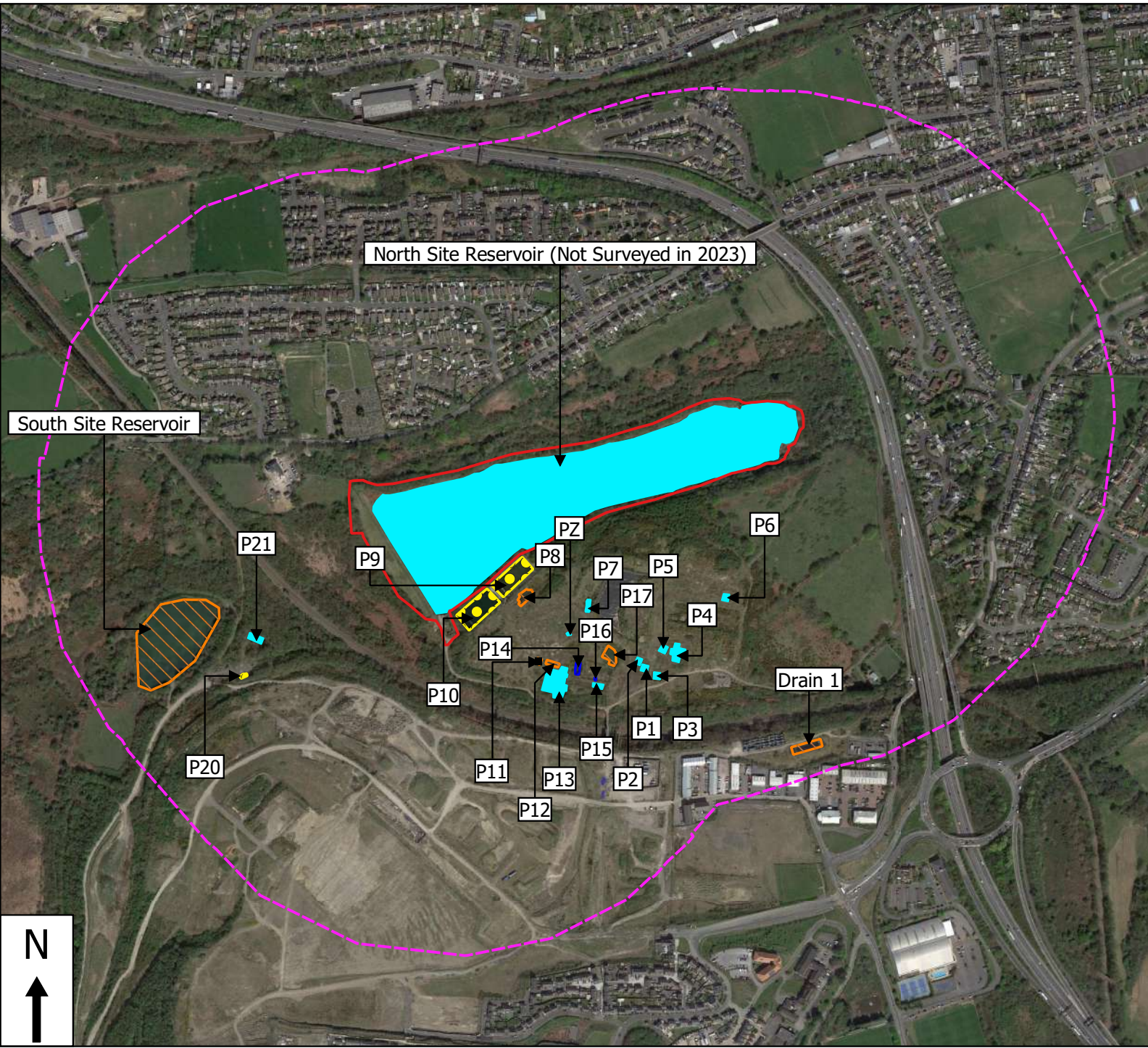
Ecological Features



<b>Key:</b> <ul style="list-style-type: none"><li>Application Site</li><li>Japanese Knotweed</li><li>Water Level Prior to Drawdown</li><li>Bare Ground</li><li>Grassland</li><li>Marginal Vegetation</li><li>Current Water Level</li><li>Pump Compound</li><li>Recolonising Vegetation</li><li>Scrub</li><li>Access Track</li><li>Woodland</li></ul>	
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9011M: COED DARCY, LLANDARCY, NEATH	
PLAN ECO2: ECOLOGICAL FEATURES	Rev: A May 23

## **PLAN ECO3**

Waterbody Locations and GCN Survey Results



### Key:

- Application Site
- 500m Buffer
- GCN Recorded 2021
- GCN Recorded 2021 & 2023
- GCN Recorded 2023
- No GCN Recorded



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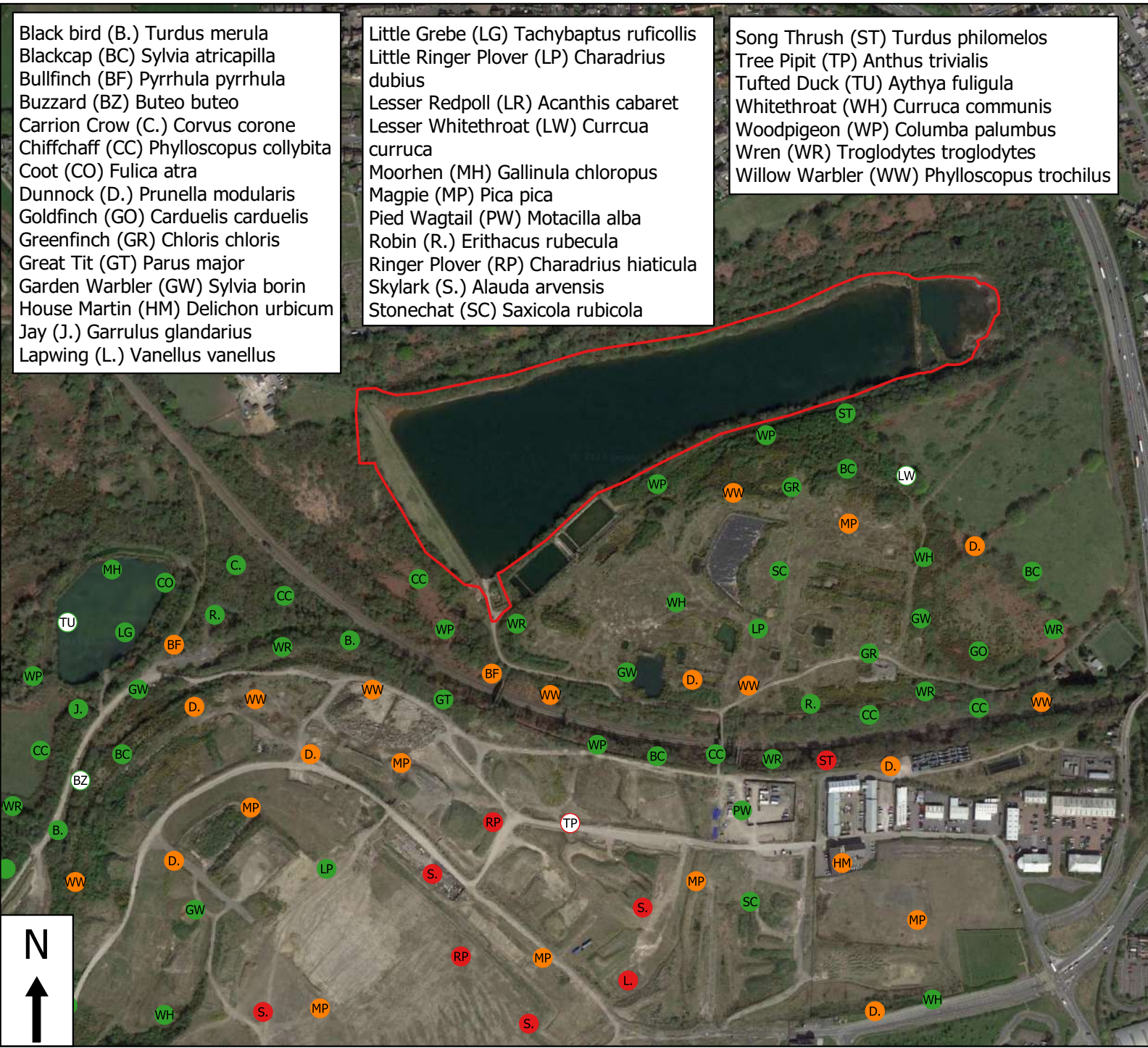
9011M: COED DARCY,  
LLANDARCY, NEATH

PLAN ECO3: WATERBODY  
LOCATIONS AND GCN SURVEY  
RESULTS

Rev: A  
Apr 23

## **PLAN ECO4**

### Breeding Bird Survey Results



Black bird (B.) *Turdus merula*  
Blackcap (BC) *Sylvia atricapilla*  
Bullfinch (BF) *Pyrrhula pyrrhula*  
Buzzard (BZ) *Buteo buteo*  
Carrion Crow (C.) *Corvus corone*  
Chiffchaff (CC) *Phylloscopus collybita*  
Coot (CO) *Fulica atra*  
Dunnock (D.) *Prunella modularis*  
Goldfinch (GO) *Carduelis carduelis*  
Greenfinch (GR) *Chloris chloris*  
Great Tit (GT) *Parus major*  
Garden Warbler (GW) *Sylvia borin*  
House Martin (HM) *Delichon urbicum*  
Jay (J.) *Garrulus glandarius*  
Lapwing (L.) *Vanellus vanellus*

Little Grebe (LG) *Tachybaptus ruficollis*  
Little Ringer Plover (LP) *Charadrius dubius*  
Lesser Redpoll (LR) *Acanthis cabaret*  
Lesser Whitethroat (LW) *Curruca curruca*  
Moorhen (MH) *Gallinula chloropus*  
Magpie (MP) *Pica pica*  
Pied Wagtail (PW) *Motacilla alba*  
Robin (R.) *Erithacus rubecula*  
Ringer Plover (RP) *Charadrius hiaticula*  
Skylark (S.) *Alauda arvensis*  
Stonechat (SC) *Saxicola rubicola*

Song Thrush (ST) *Turdus philomelos*  
Tree Pipit (TP) *Anthus trivialis*  
Tufted Duck (TU) *Aythya fuligula*  
Whitethroat (WH) *Curruca communis*  
Woodpigeon (WP) *Columba palumbus*  
Wren (WR) *Troglodytes troglodytes*  
Willow Warbler (WW) *Phylloscopus trochilus*

**Key:**

Application Site

Red Listed Species:  
Confirmed or Probably Breeding

Amber Listed Species:  
Confirmed or Probably Breeding

Green Listed Species:  
Confirmed or Probably Breeding

Green Listed Species:  
Possible Breeding

Red Listed Species:  
Possible Breeding



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9011M: COED DARCY,  
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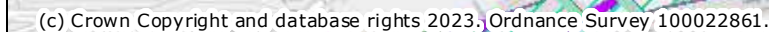
PLAN ECO4: BREEDING BIRD  
SURVEY RESULTS (2021)

Rev: A  
Apr 23

## **APPENDICES**


## **APPENDIX 1**

Information Downloaded from Magic



-  National Nature Reserves (Wales)
-  Ramsar Sites (Wales)
-  Sites of Special Scientific Interest (Wales)
-  Special Areas of Conservation (Wales)
-  Special Protection Areas (Wales)

Projection = OSGB36  
xmin = 265200  
ymin = 193300  
xmax = 277900  
ymax = 199400



0 0.5 1  
km

Map produced by MAGIC on 20 April, 2023.  
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## **APPENDIX 2**

Relevant Extracts from Submitted ES Chapter 2021

ecological value of the land contained within the boundaries of the Site, and to identify the main habitats and associated plant species, with notes on fauna utilising the Site.

10.2.9. Extended Phase 1 Habitat Survey. The Site was initially surveyed in June 2020, with the survey effort adopted based on an extended Phase 1 survey methodology<sup>3</sup>, as recommended by the Joint Nature Conservation Committee (JNCC), whereby the habitat types present were identified and mapped, together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential which require further survey. Any such areas identified can then be examined in more detail.

10.2.10. Using the above method, the Site was classified into areas of similar botanical community types, with a representative sample of those species present at the time of the surveys being described.

10.2.11. Further habitat survey work was also undertaken at the Site in July 2021 in order to ascertain any significant baseline changes since 2020 surveys, and again followed the extended Phase 1 methodology set out above. These update surveys focused primarily on the recolonising vegetation and ephemeral/short perennial habitats within the Site, noting the potential for early successional habitats to develop or succeed in relatively short periods of time. Ad-hoc habitat survey work was further undertaken during the course of faunal surveys.

10.2.12. As detailed previously, a series of historic habitat surveys of the Site (as part of a wider study area), have been undertaken between 1998 and 2018. Notwithstanding that extensive remediation and re-profiling works have resulted in considerable changes to the baseline habitats documented in previous reporting, with the vast majority of the Site subject to extensive vegetation clearance between 2008 and 2016, this pre-existing data provides useful contextual information.

10.2.13. Of the previous work undertaken, the documentation obtained and reviewed by Ecology Solutions has included for the following, which are of particular pertinence:

10.2.14. Coed Darcy ES Chapter 16, February 2005 (extracts) as prepared by Parsons Brinckerhoff Limited. This document included the results of ecological survey work undertaken between 2001 and 2005, whilst also giving regard to earlier survey work undertaken by Cresswell Associates in 1998. This document is provided at Appendix 10.3 of this ES.

10.2.15. Ecological Management Plan (April 2012 – Rev 8) as prepared by Atkins, with this including a summary of ecological findings and constraints from previous assessment work, details on mitigation works completed to date, and further detail on mitigation approaches to be adopted during on-going construction. This document is again provided at Appendix 10.3 of this ES.

### Faunal Survey Methodology

10.2.16. General faunal activity, such as birds or mammals observed visually or by call during the course of the surveys, was recorded. Specific attention was paid to any potential use of the study area by protected

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<sup>3</sup> Joint Nature Conservation Committee (2010). Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit. JNCC, Peterborough

species, Priority Species (also known as Biodiversity Action Plan (BAP) species), or other notable or rare species. In addition, specific surveys were undertaken for:

- Badgers (in June 2020 and July 2021);
- Hazel Dormice *Muscardinus avellanarius* (August 2020 to July 2021)
- Bats (between April 2020 and August 2021);
- Reptiles (between June and September 2021);
- Breeding birds (between April 2020 and July 2021);
- GCN (April to June 2021); and
- Invertebrates (between May and September 2020).

10.2.17. Surveys were undertaken by experienced and, where necessary, licensed ecologists, following established best practice and guidance. As detailed above, the scope of the above surveys was discussed and agreed with NPT Council Officers.

10.2.18. It is pertinent to note the majority of faunal survey work undertaken extended beyond the Site boundary, including land within the wider Coed Darcy Site, as was consistent with the previous OPP for the wider site. In all instances, the survey work allowed for a comprehensive assessment of faunal assemblages within the Site itself.

### Badgers

10.2.19. Specific surveys were undertaken to search for evidence of Badgers within the Site in June 2020 and July 2021.

10.2.20. The surveys comprise two main elements. The first of these is a thorough search for evidence of Badger setts. If any setts are encountered each sett entrance is noted and plotted, even if the entrance appears disused. The following information is recorded:

- The number and location of any well used or very active entrances; these are clear of any debris or vegetation, and are obviously in regular use and may, or may not, have been excavated recently.
- The number and location of any inactive entrances; these are not in regular use, and have debris, such as leaves and twigs, in the entrance, or plants growing in or around the edge of the entrance.
- The number of any disused entrances; these have not been in use for some time, are partly or completely blocked, and cannot be used without considerable clearance. If the entrance has been disused for some time all that may be visible is a depression in the ground where the hole once was, and the remains of the spoil heap.

10.2.21. Secondly, Badger activity such as well-worn paths and run-throughs, snagged hair, footprints, latrines, and foraging signs is recorded so as to build a picture of the use of the Site by Badgers.

10.2.22. Due regard was also had to Badgers during the completion of nocturnal survey work at the Site, with any additional evidence/activity recorded.

### Hazel Dormice

10.2.23. The wider Coed Darcy survey area, including the Site, was subject to a suite of presence/absence (nest tube) surveys and footprint surveys. The methodology of these surveys accords with the guidance provided by the Mammal Society and Natural England (NE), and is as recommended in the Dormouse Conservation Handbook. A total of 315 tubes and 101 footprint tunnels were placed within suitable habitat (such as scrub and woodland), at 10m intervals, as shown in Figure 10-6. The nest tubes and footprint tunnels were attached with wire ties under suitably sturdy horizontal branches, and positioned, on average, approximately 1.5m above ground level.

10.2.24. Dormouse nesting tubes were initially deployed in late July 2020, and were subject to monthly checks in August, September, October and November 2020, as well as May, June, July and August 2021. Dormouse footprint tunnels were deployed in August 2020 and were subject to checks on the following dates:

- 21 August 2020
- 3 September 2020
- 29 September 2020
- 5 October 2020
- 15 October 2020
- 21 October 2020

10.2.25. The nest tube survey has been scored for effort according to the method developed by the South West Dormouse Project (Chanin and Woods 2003). The system used provides an overall score that reflects the chances of Dormice being discovered if present, and thus provides an indicator of the 'thoroughness' of a survey. This score is calculated based on the number of tubes used and the number of months the tubes were in place.

10.2.26. The months of the year are weighted according to the likelihood of recording dormice as set out below in Table 10.1.

**Table 10.1 – Monthly Score Weighting (Chanin & Woods 2003)**

Month	Weighting
April	1
May	4
June	2

Month	Weighting
July	2
August	5
September	7
October	2
November	2

10.2.27. A score of 20 (or above) is deemed a thorough survey, and a score of 15 to 19 may be regarded as adequate where circumstances do not permit more time or more tubes (particularly if other survey methods have also proved negative).

10.2.28. The survey effort allowed for checks to be undertaken within each calendar month of the survey season, with the exception of April, allowing an overall score of 25 to be achieved.

### Bats

10.2.29. Field surveys were undertaken with regard to best practice guidelines issued by NE<sup>4</sup>, the JNCC<sup>5</sup> and the Bat Conservation Trust<sup>6</sup>.

### Tree Assessment

10.2.30. Trees within and immediately adjacent to the Site were appraised in June 2020, and again in August 2021, for their likely potential to support bat roosts.

10.2.31. For a tree to be identified as having potential to support roosting bats it needs to exhibit one or more of the following characteristics:

- Frost cracks;
- Trunk and branch splits;
- Woodpecker *Picidae* sp. holes;
- Rot holes where branches have been removed;
- Hollow sections of trunk, branches, and roots;
- Loose bark;
- Cavities beneath old root buttresses and coppice stools;

<sup>4</sup> Mitchell-Jones, A. J. (2004). Bat Mitigation Guidelines. English Nature, Peterborough

<sup>5</sup> Mitchell-Jones, A.J. & McLeish, A.P. (Eds.) (2004). Bat Workers' Manual. 3rd edition. Joint Nature Conservation Committee, Peterborough

<sup>6</sup> Bat Conservation Trust (2016). Bat Surveys – Good Practice Guidelines. Bat Conservation Trust, London

- Dense epicormic growth (growth originating from the centre of branches);
- Dense covering of Ivy *Hedera*; and
- Presence of bat or bird boxes.

10.2.32. In addition, noting the presence of potential roosting features, and its context within an area of Proposed Development, two trees (T1 and T2 – see Figure 10-3) within the Site were subject to a tree climbing survey in September 2021. The survey involved trained climbers accessing the tree with ropes, and using endoscopes and torches to search potential roosting features for past or present use by roosting bats.

10.2.33. No past or present evidence of roosting was recorded as part of this work, and the trees are not deemed to represent bat roosts.

## External Building Surveys

10.2.34. All buildings within the Site were subject to external surveys between June 2020 and September 2021. The surveys utilised ladders, mirrors, endoscopes, torches, and binoculars where necessary. In addition, B1 (as shown in Figure 10-2) was subject to internal inspections in both August and September 2021.

10.2.35. Evidence of the presence of bats was searched for, with particular attention paid to the loft voids and gaps between rafters and beams. Specific searches were made for bat droppings, which can indicate present or past use, and extent of use, as well as other signs to indicate the possible presence of bats e.g. feeding remains, presence of stained areas, or areas that are cobweb free.

10.2.36. The probability of a building being used by bats as a summer roost site increases if it:

- Is largely undisturbed;
- Dates from pre-20<sup>th</sup> century;
- Has a large roof void with unobstructed flying spaces;
- Has access points for bats (though is not too draughty);
- Has wooden cladding or hanging tiles; and/or
- Is in a rural setting and close to woodland or water.

10.2.37. Conversely, the probability decreases if a building is of a modern or pre-fabricated design/construction, is in an urban setting, has small or cluttered roof voids, has few gaps at the eaves, or is a heavily disturbed premises.

10.2.38. The main requirements for a winter/hibernation roost site are it maintains a stable (cool) temperature and humidity. Sites commonly utilised by bats as winter roosts include cavities/holes in trees,

underground sites, and parts of buildings. Whilst different species may show a preference for one of these types of roost site, none are solely dependent on a single type.

## Bat Emergence/Re-entry Surveys

10.2.39. The vast majority of buildings within the Site were deemed unsuitable to support roosting bats, or otherwise are to be retained unimpacted as a result of the Proposed Development.

10.2.40. However, four buildings within the Site (B3, B4, B5 and B6 as shown in Figure 10-2), identified to have at least low bat roosting potential, with the potential to be subject to adverse impacts as a result of the Proposed Development.

10.2.41. These buildings were each subject to emergence and re-entry surveys in August and September 2021. Surveyors were positioned at strategic vantage points to enable full building coverage. Emergence surveys commenced approximately 30 minutes before sunset, until 2 hours after sunset. Re-entry surveys commenced 90 minutes before sunrise, and extended for 15 minutes after sunrise. Surveyors were equipped with Echometer Touch 2 (EM2) bat detectors to record the data, which was subsequently analysed using Kaleidoscope software.

10.2.42. The timing and weather conditions of the survey is detailed in Table 10.2 below.

**Table 10.2 – Dates, Timings and Weather Conditions for Bat Emergence/Re-entry Surveys at the Site**

Survey Date	Building Number	Survey Start/Finish	Temperature and Weather Conditions
4 August 2021	B3	20:30 / 23:00	18C, dry, calm
19 August 2021	B4	20:15 / 22:30	17C, light drizzle between 20:55 to 21:50
20 August 2021	B5, B6	04:04 / 5:50	16C, drizzle for majority of survey
14 September 2021	B5, B6	19.24 / 21.00	16C, light breeze, light cloud cover
15 September 2021	B4	04.50 / 6.50	12C, light breeze and light cloud cover

## Bat Activity Surveys

10.2.43. In addition to roost assessments, surveyors also undertook dusk and/or dawn transect surveys across the Site, on a monthly basis between April and September 2020. Surveyors were equipped with Echometer Touch 2 (EM2) bat detectors to record the data, which was subsequently analysed using Kaleidoscope software. Evening bat transect surveys commenced approximately 15 minutes before sunset and continued for a minimum of 2 hours after sunset. Dawn activity surveys commenced approximately 2 hours before sunrise and continued until sunrise.

10.2.44. This survey method aimed to identify the level of foraging, and the species present foraging and commuting within the Site and, moreover, to identify any habitats/features of comparatively higher value to bats within the Site.

10.2.45. The dates, timing and weather conditions of surveys is detailed in Table 10.3 below.

**Table 10.3 – Dates, Timings and Weather Conditions for Bat Activity Transect Surveys at the Site.**

Survey Number	Survey Date	Survey Start/Finish	Temperature and Weather Conditions
1	24 June 2020 and 25 June 2020 (two transects per night)	21:24 / 23:47 21:23 / 23:25	25C, 0% cloud 22C, 40% cloud, heavy rain from 23.10
2	29 July 2020	20:53 / 23:08	16C, 85% cloud, dry, light breeze
3	21 August 2020	20:10 / 22:25	17C, 100% cloud, brief heavy rain, moderate wind
4	29 September 2020	18:53 / 20:57	13C, 30% cloud, dry, light breeze
5	15 October 2020	18:06 / 20:21	12C, 5% cloud, dry, light breeze

10.2.46. In addition to the completion of activity transects across the Site, static detectors (Song Meter 4 and Song Meter Mini detectors) were deployed at strategic locations across the Site for extended periods (minimum 5 nights). The locations of the detectors can be seen on Figure 10-3. The dates of deployment, as well as the prevailing weather conditions, are detailed in Table 10.4 below.

**Table 10.4 – Detector Numbers, Deployment Periods and Prevailing Weather Conditions for Static Detector Surveys**

Survey No	Number of Detectors Deployed	Deployment Period	Prevailing Weather Conditions
1	6	23 June 2020 to 1 July 2020	Dry, some cloud, light wind
2	6	29 July 2020 to 11 August 2020	Dry, light wind
3	8	20 August 2020 to 26 August 20	Dry, moderate wind
4	8	29 September 2020 to 6 October 20	Dry, light wind
5	8	14 October 2020 to 22 October 2020	Dry, light wind

## Reptiles

10.2.47. Specific surveys to identify the presence or absence of reptiles were undertaken at the Site between June and September 2021. The methodology utilised principally derived from guidance given in the Herpetofauna Workers Manual<sup>7</sup>.

10.2.48. Following an initial assessment to identify areas of suitable reptile habitat within the wider site, refugia surveys were undertaken. It was considered, given the size of the site, that a complete tinning exercise would be impractical, on this basis a sampling survey was utilised, as was discussed and agreed in principle with NPTC Biodiversity Officers. A total of 375 ‘tins’ (0.5 x 0.5 metre squares of heavy roofing felt which are often used as refuges by reptiles) were distributed within specific areas of suitable reptile habitat within the site, in order to provide a representative sample of the use of these habitats by reptiles. (see Figure 10-4).

10.2.49. The tins provide shelter, and heat up quicker than the surroundings in the morning, and can remain warmer than the surroundings in the late afternoon. Being ectothermic (cold blooded), reptiles use them to bask under and so raise their body temperature, which allows them to forage earlier and later in the day.

<sup>7</sup> Herpetofauna Groups of Britain and Ireland. 1998. Evaluating Local Mitigation / Translocation Programmes: Maintaining Best Practice and Lawful Standards. HGBI Advisory Notes for Amphibian and Reptile Groups (ARGs)

10.2.50. The dates, timing, weather conditions and findings of the surveys are detailed in Table 10.11 (see Section 10-3 below). A total of seven surveys were undertaken at the Site. All surveys were undertaken in optimal survey conditions. Tin locations are shown at Figure 10-4.

### Breeding Birds

10.2.51. Surveys were carried out with due regard to the Common Bird Census (CBC) technique. The CBC involves walking transect routes through the area being studied, and recording and plotting all bird species observed or heard, and their behaviour.

10.2.52. The transect route is chosen so the entire site is covered and all features likely to support breeding birds are surveyed. Routes and directions are varied between visits so there is no tendency to visit a particular part of the plot later or earlier in the day.

10.2.53. To ascertain the breeding status of birds using the Site, the following criteria was applied, following the methodology used in the 'Atlas' surveys of 1988 to 1991 (Gibbons et al, 1993). This accepts the following activities as denoting breeding (including those probably breeding, but without definite proof):

- Birds apparently holding territory, including courtship and display.
- Nest building (including excavating a nest hole).
- Distraction display or feigning injury.
- Adult entering or leaving apparently occupied nest site.
- Adult carrying faecal sac or food.
- Nest with eggs or eggshells found, or bird sitting but not disturbed.
- Nest with young; or recently fledged young, including downy young of ducks, game-birds, waders and other nidifugous species.

10.2.54. A full suite of three visits were carried out in April, May and June 2020, with these covering the Site as part of the wider Coed Darcy Site. Moreover, update check surveys, targeted at key ground nesting bird species (such as Little Ringed Plover *Charadrius dubius*, Ringed Plover *Charadrius hiaticula* and Lapwing *Vanellus vanellus*), were undertaken within the Site in April 2020 and July 2021. The dates and weather conditions of these surveys are detailed in Table 10.5 below.

**Table 10.5 – Dates and Weather Conditions for Breeding Bird Surveys Undertaken at the Site**

Survey Visit	Date	Weather Conditions
1	30 April 2020	8/8 cloud, wind SW2-3, 7°C, showers
2	17 May 2020	7/8 cloud, still, 10°C
3	14 June 2020	6-7/8 cloud, wind E1, 12°C
4	28 April 2021*	8/8 cloud, wind NE4, 9°C, drizzly
5	4 July 2021*	8/8 cloud, still, 9°C

\*These represent targeted surveys for Lapwing, Ringed Plover and Little Ringed Plover.

## Nightjar

10.2.55. A churring Nightjar *Caprimulgidae* was recorded during the course of a GCN survey on 8 June 2021, and seen in flight in the north-east corner of the Site. Nightjars are well known to wander during the summer and can turn up at random locations. The Coed Darcy Site does not appear to be particularly suitable for Nightjars, and none was recorded during previous surveys in May and June 2020, both of which started pre-dawn. Moreover, no other evidence of Nightjar was recorded during any other night time work undertaken by or on behalf of Ecology Solutions between 2020 and 2021.

10.2.56. Notwithstanding the above, and on a precautionary basis, a further specific Nightjar survey was undertaken in June 2021. This survey comprised a dusk and dawn transect of the Site. The dusk survey took place on the 22 June 2021, commencing at sunset (21:36) and ending at 22:50. The dawn survey on the 23 June 2021 commenced 90 minutes before sunrise and extended until sunrise (04:57). No further evidence of Nightjar was recorded and, as such, it was concluded the observation related to a random visit from a wandering male.

## Great Crested Newts

10.2.57. The Site supports a large number of waterbodies, ranging from large areas of open water (such as South Site Reservoir) to small ponds created as a bi-product of previous Site remediation works. Whilst historic survey work indicated an absence of GCN from the vast majority of the Site, given the large numbers of GCN known in the wider area (with approximately 10,000 individuals previously translocated from the wider Coed Darcy Site), it was agreed, through liaison with NPTC Biodiversity Officers and NRW, that updated assessment work would be prudent. Initially it was agreed this survey work would take the form of Edna surveys of all accessible waterbodies, followed by the completion of partial population size class assessment work (two visits per waterbody).

10.2.58. However, following the observation of GCN in some waterbodies, it was subsequently agreed as appropriate to undertake a full suite of population size class assessment surveys (six visits) for all accessible waterbodies within the Site.

10.2.59. Site wide environmental DNA (eDNA) surveys were conducted on the 27 April 2021. Pond water sampling kits supplied by SureScreen Scientifics were utilised for the eDNA survey work, with the sampling methodology undertaken fully according with that recommended by the supplier. Water samples were subsequently sent to SureScreen Scientifics for laboratory analysis.

10.2.60. The locations of waterbodies subject to eDNA surveys are detailed on Figure 10-5.

10.2.61. Population Size Class Assessment surveys were undertaken between April and June 2021. All surveys were undertaken in suitable weather conditions in accordance with the best practice guidelines, primarily as set out in English Nature's (now NE) GCN Mitigation Guidelines and as agreed with both NPT Council and NRW. The dates and weather conditions for surveys are detailed in Table 10.6a to Table 10.6c below.

**Table 10.6A – Dates and Weather Conditions of GCN Surveys Undertaken Within the North of the Site**

Survey number	Date	Weather Conditions
1	27 April 2021	16c, Clear, sunny and still
2	5 May 2021	9c, Intermittent rain, overcast
3	11 May 2021	8c, Warm and dry
5	3 June 2021	14c, Light breeze, dry
6	7 June 2021	15c, dry and warm, light breeze

**Table 10.6B – GCN survey Dates and Weather Conditions Undertaken within Coed Darcy GCN SINC Area**

Survey number	Date	Weather Conditions
1	26 April 2021	23c, clear, still and sunny
2	6 May 2021	12c, Warm, clear and light breeze
3	10 May 2021	13c, warm sunny and light breeze
4	19 May 2021	14c, Warm, sunny and light cloud cover
5	2 June 2021	21c, warm, dry and overcast
6	6 June 2021	15c, still, warm and light cloud

**Table 10.6C – GCN Survey Dates and Weather Conditions Undertaken in the Tip Area**

Survey number	Date	Weather Conditions
1	10 May 2021	13c, warm sunny and light breeze
2	19 May 2021	14c, Warm, sunny and light cloud cover
3	20 May 2021	10c, Heavy rain and windy
4	2 June 2021	21c, warm, dry and overcast
5	3 June 2021	14c, Light breeze, dry
6	6 June 2021	15c, still, warm and light cloud

10.2.62. Surveys undertaken by Ecology Solutions utilised three methods per visit (torch survey, bottle-trapping, and egg searches), where possible. Given the nature of many waterbodies (many of which comprise near vertical excavations or flooded tanks remaining from the Site's refinery past), full access to each waterbody was not possible in some instances for reasons of health and safety. The locations of waterbodies and the types of survey method employed are detailed in Table 10.7 below.

**Table 10.7 – Survey methods employed on waterbodies within the Site**

Pond Number/Name	Survey Methods Employed	Limitations/Rational for Approach
P1, P4, P8, P13 & P17.	Egg search, torching, bottle trapping, refuge search	No limitations (minimum three survey methods adopted)
P3, P7, P9, P10, P11, P12, P14, P15, P16, P20, South Site Reservoir, PB, PC, PD, PE, West Bay, South Bay,	Egg search, torching, refuge search	Bottle trapping not undertaken was not feasible on the grounds of

Pond Number/Name	Survey Methods Employed	Limitations/Rational for Approach
Crymlyn Lagoon West & Crymlyn Lagoon East		accessibility/health and safety.
P2, P5, P6, P18, P19	N/A (ponds dry)	Dry throughout survey season
P21	N/A	No safe access for surveying

10.2.63. Suitable survey weather conditions are deemed to be those nights when the night air temperature is more than 5°C, with little or no wind, and no rain. Surveys are to be conducted during such conditions.

10.2.64. Torch counting involves the use of high powered torches to find and, if possible, count the number of adults of each amphibian species. As recommended in English Nature's guidance, the entire margin of each waterbody is to be walked once, slowly checking for GCNs.

10.2.65. Bottle-trapping involves setting traps, made from two litre plastic bottles, around the margin of each waterbody, and leaving the traps set overnight before checking them the following morning. A density of at least one trap per 2m of shoreline was utilised, where possible, as recommended in the guidance.

10.2.66. In addition, egg searches are undertaken of any aquatic vegetation, to search for any evidence of breeding GCN.

10.2.67. GCN surveys were undertaken with regard to appropriate biosecurity measures, as recommended by NRW.

## Invertebrates

10.2.68. Specific invertebrate surveys were undertaken at the Site by Richard Wilson Ecology Limited, to assess the importance of the Site for a range of invertebrates. A total of nine surveys were undertaken in 2020, with this allowing for a majority seasonal coverage of the Site and wider study area. The dates of these surveys are shown in Table 10.8.

10.2.69. During the period April to early May 2020 surveys did not take place due to COVID19 restrictions. Whilst surveys in this period would inevitably identify additional species, and possibly more Key Species, it is not considered such findings would result in the overall value of the Site being altered (up or down) in regard its nature conservation interest.

**Table 10.8 – Dates and Weather Conditions for Invertebrate Surveys**

Date	Weather Conditions	Notes
19 May 2020	Cloud: 8/8; temperature: 15°C; wind speed: 1 (2) SW.	Scoping site
20 May 2020	Cloud: 0/8; temperature: 18°C to 28°C; wind speed: calm.	Very dry everywhere with ephemeral wetlands or shallow waterbodies dried out
21 May 2020	Cloud: 8/8; temperature: 16°C to 22°C; wind speed: 1.	
17 June 2020	Cloud: 7/8; temperature: 17.5°C; wind speed: 1.	Rain from 11:45 hrs. Installed pitfall traps
2 July 2020	Cloud: 8/8 clearing to 6/8; temperature: 14°C to 20°C; wind speed: 2 W to 1 SW	Light drizzle and intermittent showers until 13:00 hrs
21 July 2020	Cloud: 2/8 (high cloud); temperature: 22°C; wind speed: calm to 1 S.	
22 July 2020	Cloud: 4/8; temperature: 18°C to 23°C; wind speed: 1 (2) W to 2 (3) SW.	
29 July 2020	Cloud: 6/8; temperature: 18°C; wind speed: calm.	
10 September 2020	Cloud: 8/8 to 7/8; temperature: 13°C to 17°C; wind speed: 1.	

10.2.70. The sampling methodology for invertebrate surveys is detailed at Appendix 10-2. In summary, a variety of techniques were used to sample invertebrates following Drake et al. (2007), including sweeping of vegetation and aerial netting, using a light-weight butterfly net and heavy duty sweep-net, for flying invertebrates. Vacuum sampling was undertaken by use of a modified, commercially available garden blow-van. Sieving of leaf-litter, searching under refugia, direct observations, and limited pitfall trapping was also undertaken.

10.2.71. Specific aquatic surveys were not deemed necessary to inform the planning proposals for the Site. In reaching this conclusion it is noted the only large waterbody likely to be impacted is South Site Reservoir. Given the size of this waterbody, its construction and likely profile (steep sides below water, lack of emergent vegetation), any aquatic fauna is probably of relatively limited interest. In any event, the South Site Reservoir is being proposed for enhancement and there could be the opportunity to reduce the embankment's inclines and create some shallow(er) areas. All of this would have benefits for aquatic

invertebrates. The waterbodies associated with the 'model village' in the south-west are being retained, so surveys would not be informative for the purposes of a planning application.

### Consultation

10.2.72. Ecology Solutions have sought to engage a range of ecology consultees during the master planning process, with this engagement including for emails, virtual meetings, and Site based meetings. In addition, a formal request for Scoping Opinion was issued in July 2021.

10.2.73. A summary of the dialogue and responses from ecology consultees is provided in Table 10.9 below. This includes for discussions with NRW, Buglife, Neath Port Talbot County Borough Council, The Amphibian and Reptile Conservation and the Wildlife Trust (WT) of South and West Wales.

10.2.74. These responses noted a number of considerations which relate to ecology, with these summarised individually in Table 10.9 below.

**Table 10.9 – Summary of Responses to the Scoping Opinion for the Emerging Proposed Development**

Consultee	Summary of Main Points Of Response	Confirmation of Where Matters are Addressed
Natural Resources Wales (NRW)	Agreement on scope of GCN surveys (alongside NPTC Biodiversity officers), with these to include eDNA surveys and population size class assessment of all accessible waterbodies within the Site. Ponds to the south of the red line boundary were not surveyed, and it was agreed, on a precautionary basis, these should be assumed to support GCN.	Further details on the methodology deployed are identified in the 'Faunal Methodology' section of this Chapter (see 10.2.57 onwards).
	NRW stated the importance of dedicated biodiversity management being secured in the long-term, not least for GCN, and recommended opportunities for this management be led by an experienced conservation body such as the Amphibian & Reptile Conservation Trust (ARC).	Further consideration is given to mitigation and enhancement opportunities in section 10.6 of this Chapter.

10.3.160. Other non-native species recorded within the Site include for extensive Buddleia, localised Cotoneaster, Rhododendron, and Canadian Fleabane.

### Desk Study

10.3.161. The desk study information collected from SEWBRc returned a total of 2,913 records for plants within a 2km radius of the Site boundary. A significant portion of these species are associated with Crymlyn Bog SSSI, situated adjacent to the west of the Site. Many LBAP species are recorded, such as Slender Cottongrass and Tufted Sedge *Carex elata* both recorded in Crymlyn Bog, approximately 730m from the Site boundary, in 2020.

10.3.162. Other species of note are Bee Orchids *Ophrys apifera*, the closest of which was recorded on Site in 2001, and most recently 1.4km away, in 2020. There are 7 records of notable species (LBAP or WCA Schedule 8) recorded on Site including Bluebell and Blunt-flowered Rush *Juncus subnodulosus*, all recorded in 2001.

10.3.163. Information received from SEWBRc returned 477 records of invasive species, including seven records within the Site. Three of these records relate to Rhododendron, and date from 2001. In addition, two records of Japanese Knotweed were returned, with the most recent dating from 2019, located in the south-east of the Site within the Contractors Yard industrial estate. A single Himalayan Honeysuckle record was also returned from this location and date.

10.3.164. A single record of New Zealand Willowherb *Epilobium brunnescens* was returned and relates to a location in the north of the Site, and dates from 2006.

### Wildlife Use of the Site

10.3.165. General observations were made during the surveys of any faunal use of the Site, with attention paid to the potential presence of protected faunal species. Ecology Solutions also undertook specific surveys with regard to Badgers, bats, reptiles, breeding birds, invertebrates, Dormouse and GCN.

### Badger

10.3.166. Specific surveys for Badgers were undertaken as part of the habitat survey work by Ecology Solutions between 2020 and 2021.

10.3.167. No evidence of Badgers has been recorded during the extensive survey work undertaken at the Site between 2020 and 2021. However, suitable foraging and sett building habitat is present in the form of areas of woodland, scrub, and more established areas of grassland. It is noted that some areas of dense woodland and/or scrub which have colonised on steep gradients were inaccessible and could feasibly support unrecorded setts. Nonetheless, noting the lack of any Badger activity recorded during nocturnal survey work, as well as an absence of mammal paths, latrines, or foraging signs, it is deemed unlikely the Site is of potential significance to this faunal group.

10.3.168. Evidence of active Badger setts was recorded in the wider Coed Darcy Site, albeit at locations significantly distanced from the site boundary (>500m south) by both Ecology Solutions and Atkins.

10.3.169. Information received from SEWBRc returned 26 records of Badger dating from 1977 to 2016. A single record was returned for the Site, located in the north of the Site, close to North Site Reservoir, dating from 2002. A further five records of Badger were returned within the wider study area, predominantly within the Jersey Marine SINC woodland to the south-east, and date from 2002. A single record was returned relating to a location within the wider study area, located to the west of South Site Reservoir, dating from 2002. Two records were also returned for an area within the wider study area, they relate to a location in the far south of the wider study area, and date from 2004 and 2005. The most recent record relates to a location approximately 1.1km south-east of the Site at its closest point, and dates from 2017.

## Bats

10.3.170. Roosting (Buildings). None of the buildings within the Site, which are likely to be subject to direct or in-direct impacts, support roosting bats. Indeed, with the exception of B3 to B6 as well as the mitigation bat house (B22), the buildings within the Site are unsuitable to support roosting bats on account of their construction.

10.3.171. Regarding B1, the partial collapse of the roof has resulted in just a single enclosed internal space remaining. Moreover this 'room' supports an open (rotted) doorway resulting in significant exposure to the elements and fluctuating internal conditions. Moreover, internally the building supports smooth concrete walls and ceiling surfaces, with no potential cracks or crevices which would offer potential roosting opportunities. On this basis, the building is assessed as being of very low value to roosting bats. Moreover, a full inspection of this building recorded no past or present evidence of roosting bats.

10.3.172. Building B3 is deemed to be of low roosting suitability, with no obvious cracks, gaps, or crevices noted, and the tile roof is in good condition. B4 to B6 are each considered to be of low to moderate suitability, primarily on account of supporting occasional slipped/damaged roof tiles. In addition, B5 was noted to support several externally fitted bat boxes, offering further roosting opportunities.

10.3.173. Noting their potential suitability, buildings B3 and B4 to B6 were subject to a suite of bat surveys in accordance with best practice methodologies. These surveys included for the completion of a single emergence survey of B3, in addition to two surveys (one dusk and one dawn) of buildings B4 to B6 (as detailed in Table 10.2 above).

10.3.174. No evidence of roosting bats was recorded during the course of these surveys and, as such, the buildings are not considered to support roosting bats.

10.3.175. For clarity, no evidence of roosting was recorded as associated with the bat boxes installed on B5. Given the height of these features, it was not possible to undertake additional bat box inspections.

10.3.176. Roosting (Trees). In addition, a vast majority of trees/woodland, with potential to be impacted by the emerging proposals, comprise generally semi-mature and early specimens which have not developed features of potential suitability for roosting bats. However, a small number of trees proposed for removal in the north-east of the Site are deemed to be suitable to support roosting bats. With the exception of T1 and T2, these trees were assessed (via a ground based inspection) as of low bat roosting potential on account of the presence of features such as exposed, open cracks in branched deadwood. Initial ground

based assessment of these trees did not record any evidence of use by bats (such as staining, droppings or scratch marks).

10.3.177. Noting the presence of potentially higher value features, T1 and T2 were subject to further survey effort in the form of a tree climbing survey in September 2021.

10.3.178. T1 was identified to support a large open cavity in its trunk, with this significantly exposed and deemed of very low suitability for roosting bats. In addition, it supports two woodpecker *Picidae*/squirrel *Sciuridae* holes on its southern aspect, in addition to a small rot hole (callus roll). Whilst these latter three features were deemed suitable to support bats, no evidence of past or present roosting was identified.

10.3.179. Regarding T2, a single feature assessed of potential value at ground level (callus roll leading to potential cavity) was identified to be blunt ended and unsuitable for roosting through the internal inspection.

10.3.180. It is noted some areas of the woodland with the potential to be impacted, namely W1, are partially inaccessible on account of dense vegetation cover and steep banks/gradients. As above, these woodland areas support trees that are generally semi-mature or early mature in nature, with the woodland habitat overall deemed to be of low potential value for roosting. Moreover, no evidence of suitable bat roost features was confirmed during the completion of ground based inspections of accessible habitat areas between 2020 and 2021.

10.3.181. Notwithstanding this, it is proposed, on a precautionary basis, that where detailed design necessitates localised impacts to woodland, further inspections would be undertaken prior to their removal. If deemed appropriate, this would include for the completion of tree climbing surveys and/or emergence/re-entry surveys. This is considered in more detail in later Sections of this Chapter.

10.3.182. Suitable areas for foraging and commuting bats were identified within the Site and the wider study area during habitat survey works undertaken by Ecology Solutions in 2020. To ascertain the use of the Site by foraging and dispersing bats the Site was subject to activity transects and static automated surveys in accordance with survey guidelines (see Section 10-2 of this Chapter). These monthly surveys commenced in June 2020 and concluded in October 2020, the results of which are summarised below.

10.3.183. Transect surveys. The results of the transect surveys are summarised below. Although the exact route of each transect varied between surveys, it was ensured the entirety of the Site was covered during the course of the survey work, with this including all linear features. A representative route covered by the transect surveys is shown on Figure 10-3. It is noted, in accordance with the instruction at that time, these surveys assessed the wider Coed Darcy Site (including the Site), as opposed to the Site specifically. Given the comparable habitats present within the wider Coed Darcy Site, and their close proximity to the Site, this data is considered to provide useful context and so is included within this Assessment.

10.3.184. The transect surveys undertaken on 24 and 25 June 2020 recorded a low number of registrations, with the majority of registrations associated to Common Pipistrelle *Pipistrellus pipistrellus* (306 registrations) and Soprano Pipistrelle *Pipistrellus pygmaeus* (161 registrations), and the main activity focused along the north-east of the Site associated with the hedgerows and the treeline north of the railway. In addition, increased activity was associated with north-west and west boundaries in the wider study area. Heightened activity is primarily associated with linear features and substantial waterbodies such as the

North and South Site Reservoirs. Bat activity was considerably lower in areas of bare ground. Other species recorded include Nathusius' Pipistrelle *Pipistrellus nathusii* (11 registrations), Noctule *Nyctalus noctula* species (56 registrations) and Myotis species (28 registrations), albeit at much lower numbers.

10.3.185. The transect surveys undertaken on 29 July 2020 recorded a low number of registrations, with the majority of registrations associated with Common Pipistrelle (290 registrations) and Soprano Pipistrelle (153 registrations), again with the main activity focused along the north-east of the Site associated with the hedgerows and treeline north of the railway. Increased activity was found within the wider study area, particularly to the south of the South Site Reservoir, and in the south-east of the wider study area associated with South Bay waterbody. Bat activity was again considerably lower in areas of bare ground. Other species recorded include Nathusius' Pipistrelle (1 registration), Noctule species (3 registrations), Myotis species (20 registrations), Brown Long-eared Bat *Plecotus auritus* (4 registrations), and Lesser Horseshoe Bat *Rhinolophus hipposideros* (1 registration).

10.3.186. The transect surveys undertaken on 21 August 2020 recorded a very low number of registrations, with a majority of registrations again associated with Common Pipistrelle (102 registrations) and Soprano Pipistrelle (88 registrations), and the majority of the activity focused in the north-west of the Site associated with the hedgerows to the north of the railway. A higher level of activity was also recorded along the main access route to the west of the wider study area. Bat activity was again considerably lower in areas of bare ground. Other species recorded include Nathusius' Pipistrelle (1 registration), Serotine (1 registration), Noctule species (4 registrations) and Myotis species (8 registrations).

10.3.187. The transect surveys undertaken on 29 September 2020 recorded a low number of registrations, with a majority of registrations again associated with Common Pipistrelle (375 registrations) and Soprano Pipistrelle (144 registrations). Bat activity was focused in the north-west of the Site, associated with the linear vegetation to the north of the railway. A higher level of activity was also recorded around W2 in the south-west of the Site, and in the far south of the wider study area associated with hedgerows and woodland. Bat activity was again considerably lower in areas of bare ground. Other species recorded include Nathusius' Pipistrelle (1 registration), Noctule species (30 registrations), Myotis species (23 registrations) and Brown Long-eared Bat (2 registrations).

10.3.188. The final transect survey undertaken on 15 October 2020 recorded a very low number of registrations, with a majority of the registrations again associated with Common Pipistrelle (82 registrations) and Soprano Pipistrelle (80 registrations), and a majority of the activity focused in the north of the Site associated with scrub features to the south of the site reservoir, balancing ponds, and the railway bridge. A higher level of activity was also recorded around W2. Bat activity was again considerably lower in areas of bare ground. Other species recorded include Noctule species (1 registration), Myotis species (2 registrations) and Lesser Horseshoe Bat (1 registration).

10.3.189. Static surveys. As stated above, static detectors were deployed at strategic locations across the Site (as well as across the wider Coed Darcy Site) to supplement the results from the transect work, and to collect bat data over extended periods on an approximately monthly basis. Table 10.4 identifies weather conditions for the static surveys. The locations of static detectors are provided on Figure 10-3. A written summary of the findings is provided below.

10.3.190. Static survey: 24 June 2020 to 30 June 2020. Static detector SD1, located in the north-east of the Site, north of the railway, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (75 registrations) and Soprano Pipistrelle (18 registrations). Noctule species (9 registrations), and Myotis species (2 registrations) were all recorded in low numbers.

10.3.191. Static detector SD2 located in the north-west of the Site, just south of the railway, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (134 registrations) and Soprano Pipistrelle (29 registrations). Nathusius' Pipistrelle (1 registration), Noctule species (8 registrations), Myotis species (8 registrations) and Brown Long-eared Bat (6 registrations) were all recorded in low numbers.

10.3.192. Static detector SD3 located in the south-east of the Site, north of the Contractors Yard industrial estate, recorded a moderate level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread bat species. The highest levels of activity pertained to Common Pipistrelle (4639 registrations) and Soprano Pipistrelle (665 registrations). Nathusius' Pipistrelle (39 registrations), Noctule species (27 registrations), Myotis species (186 registrations), Brown Long-eared Bat (4 registrations), Lesser Horseshoe Bat (1 registration) and Serotine *Eptesicus serotinus* (1 registration) were all recorded in low numbers.

10.3.193. Static detector SD4 located in the south-west of the wider study area, to the west of South Bay, recorded a low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (303 registrations) and Soprano Pipistrelle (218 registrations). Nathusius' Pipistrelle (1 registration), Noctule species (85 registrations), Myotis species (16 registrations), and Brown Long-eared Bat (2 registrations) were all recorded in low numbers.

10.3.194. Static detector SD5 located in the far south of the wider study area recorded a moderate level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (712 registrations) and Soprano Pipistrelle (483 registrations). Nathusius' Pipistrelle (11 registration), Noctule species (17 registrations), Myotis species (68 registrations), Brown Long-eared Bat (39 registrations) and Serotine (1 registration) were all recorded in low numbers.

10.3.195. Static detector SD6 located south of the Site, within the wider study area, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (125 registrations) and Soprano Pipistrelle (58 registrations). Noctule species (16 registrations), Myotis species (4 registrations) and Brown Long-eared Bat (5 registrations) and Lesser Horseshoe Bat (1 registration) were all recorded in low numbers.

10.3.196. Static Survey 30 July 2020 to 6 August 2020. Static detector SD7, located in the north-east of the Site, just south of North Site Reservoir, recorded a moderate level of bat activity over the 9 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (854 registrations) and Soprano Pipistrelle (591

registrations). Noctule species (43 registrations), Myotis species (50 registrations) and Brown Long-eared Bat (1 registration) were all recorded in low numbers.

10.3.197. Due to a mechanical fault, static detector SD8 failed to record any data. This was deployed in the east of the Site, close to the railway.

10.3.198. Static detector SD9, located in the north-west of the Site, just south of the railway, recorded a very low level of bat activity over the 9 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (73 registrations) and Soprano Pipistrelle (63 registrations). Noctule species (18 registrations), Myotis species (1 registration) and Lesser Horseshoe Bat (2 registrations) were all recorded in low numbers.

10.3.199. Static detector SD10, located in the south-west of the Site, to the east of the Crescent Woodland, recorded a moderate level of bat activity over the 9 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (4225 registrations) and Soprano Pipistrelle (942 registrations) as well as Myotis species (302 registrations). Nathusius' Pipistrelle (63 registrations), Noctule species (8 registrations) and Brown Long-eared Bat (5 registrations) were all recorded in low numbers.

10.3.200. Due to a mechanical fault, static detector SD11 failed to record any data. This was deployed in the west of the Site.

10.3.201. Static detector SD12, located in the south-west of the wider study area, recorded a low level of bat activity over the 9 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (421 registrations) and Myotis species (491 registrations). Soprano Pipistrelle (70 registrations), Nathusius' Pipistrelle (2 registrations), Noctule species (24 registrations) and Brown Long-eared Bat (6 registrations) were all recorded in low numbers.

10.3.202. Static detector SD13, located in the east of the wider study area, just south of the off-site industrial estate, recorded a low level of bat activity over the 9 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Myotis species (469 registrations), Common Pipistrelle (375 registrations) and Soprano Pipistrelle (325 registrations). Nathusius' Pipistrelle (10 registrations), Noctule species (4 registrations) and Brown Long-eared Bat (27 registrations) were all recorded in low numbers.

10.3.203. Static detector SD14, located in the south-east of the wider study area, recorded a moderate level of bat activity over the 9 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (829 registrations), Myotis species (433 registrations) and Soprano Pipistrelle (290 registrations). Nathusius' Pipistrelle (1 registration), Noctule species (14 registrations) and Brown Long-eared Bat (38 registrations) were all recorded in low numbers.

10.3.204. Static Survey August 2020 to 26 August 2020. Static detector SD15, located in the north of the Site, just south of the North Site Reservoir recorded a low level of bat activity over the 6 day period. As per

the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (122 registrations) and Soprano Pipistrelle (353 registrations). Noctule species (58 registrations) and Myotis species (7 registrations) were all recorded in low numbers.

10.3.205. Static detector SD16, located in the north of the Site, just north of the railway, recorded a low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (75 registrations) and Soprano Pipistrelle (56 registrations). Noctule species (5 registrations), Myotis species (19 registrations) and Lesser Horseshoe Bat (5 registrations) were all recorded in low numbers.

10.3.206. Static detector SD17, located in the west of the wider study area, adjacent to the main western access route, recorded a high level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (4261 registrations) and Soprano Pipistrelle (4590 registrations) and Myotis species (3244 registrations). Nathusius' Pipistrelle (33 registrations), Noctule species (27 registrations), Brown Long-eared Bat (23 registrations) and Lesser Horseshoe Bat (1 registration) were all recorded in low numbers.

10.3.207. Static detector SD18 located in the south-west of the Site just north of Contractors Yard Industrial Estate, recorded a low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (146 registrations) and Soprano Pipistrelle (228 registrations). Noctule species (5 registrations), Myotis species (5 registrations) and Brown Long-eared Bat (1 registration) were all recorded in low numbers.

10.3.208. Static detector SD19, located in the south-west of the wider study area, just south of the model village, recorded a moderate level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (1568 registrations) and Soprano Pipistrelle (445 registrations). Noctule species (11 registrations), Myotis species (90 registrations), Brown Long-eared Bat (6 registrations) and Serotine (1 registration) were all recorded in low numbers.

10.3.209. Static detector SD20, located in the south-west of the wider study area, recorded a very low level of bat activity over the 6 day period. All species were recorded at low numbers, consisting Common Pipistrelle (8 registrations), Soprano Pipistrelle (9 registrations), Noctule species (5 registrations) and Myotis species (1 registration).

10.3.210. Static detector SD21, located in the south-east of the wider study area, just south of the off-site industrial estate on the woodland fringe, recorded a moderate level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (1216 registrations) and Soprano Pipistrelle (156 registrations). Nathusius' Pipistrelle (1 registration), Noctule species (9 registrations), Myotis species (41 registrations), and Brown Long-eared Bat (5 registrations) were all recorded in low numbers.

10.3.211. Static detector SD22, located in the south of the wider study area close to the north to south access route, recorded a very low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (23 registrations) and Brown Long-eared Bat (37 registrations). Soprano Pipistrelle (9 registrations), Noctule species (6 registrations) and Myotis species (8 registrations) were all recorded in low numbers.

10.3.212. Static Survey 29 September 2020 to 4 October 2020. Static detector SD23, located in the north of the Site, just south of P9 and P10, recorded a very low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All the species were recorded at low numbers, consisting of Common Pipistrelle (11 registrations), Soprano Pipistrelle (9 registrations), Noctule species (2 registrations) and Myotis species (5 registration).

10.3.213. Static detector SD24, located in the north-east of the Site, within a hedgerow, recorded a very low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (59 registrations) and Soprano Pipistrelle (75 registrations). Brown Long-eared Bat (1 registration), Noctule species (1 registration) and Myotis species (20 registrations) were all recorded in low numbers.

10.3.214. Static detector SD25, located in the north-west of the Site, south-east of the South Site Reservoir, recorded a very low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All species were recorded at low numbers, and consisted Soprano Pipistrelle (2 registrations), Noctule species (1 registration) and Myotis species (2 registration).

10.3.215. Static detector SD26, located in the west of the wider study area, north-east of 'The Tip' area, recorded a moderate level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (1002 registrations), Soprano Pipistrelle (1323 registrations and Myotis species (503 registrations). Noctule species (2 registrations) was recorded in low numbers.

10.3.216. Static detector SD27, located at the southern edge of the Site, to the south-west of W2, recorded a very low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (79 registrations) and Soprano Pipistrelle (75 registrations). Nathusius' Pipistrelle (2 registration), Noctule species (2 registrations) and Myotis species (5 registrations) were all recorded in low numbers.

10.3.217. Static detector SD28, located in the south of the wider study area, recorded a very low level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All the species were recorded at low numbers, consisting of Common Pipistrelle (17 registrations), Soprano Pipistrelle (26 registrations), Noctule species (1 registration), Myotis species (11 registration) and Brown Long-eared Bat (1 registration).

10.3.218. Static detector SD29, located in the south-east of the Site, within a tree belt/woodland recorded a moderate level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common

Pipistrelle (693 registrations) and Soprano Pipistrelle (520 registrations). Nathusius' Pipistrelle (1 registration), Noctule species (4 registrations), Myotis species (133 registrations), Brown Long-eared Bat (9 registrations) and Lesser Horseshoe Bat (1 registration) were all recorded in low numbers.

10.3.219. Static detector SD30, located in the far south of the wider study area, recorded a moderate level of bat activity over the 6 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (745 registrations), Soprano Pipistrelle (934 registrations) and Myotis species (302 registrations). Nathusius' Pipistrelle (2 registrations), Noctule species (3 registrations), Lesser Horseshoe Bat (6 registrations) were all recorded in low numbers.

10.3.220. Static Survey 15 October 2020 to 21 October 2020. Static detector SD31, located in the north of the Site, close to the balancing lakes, south of North Site Reservoir, recorded a low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (106 registrations) and Soprano Pipistrelle (115 registrations). Brown Long-eared Bat (1 registration), Noctule species (21 registrations) and Myotis species (17 registrations) were all recorded in low numbers.

10.3.221. Static detector SD32, located in the east of the Site, just north of the railway, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (69 registrations) and Soprano Pipistrelle (23 registrations). Myotis species (7 registrations) was recorded in low numbers

10.3.222. Static detector SD33, located in the west of the wider study area, close to the main access route, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (83 registrations) and Soprano Pipistrelle (72 registrations). Brown Long-eared Bat (2 registrations), Noctule species (17 registrations) and Myotis species (15 registrations) were all recorded in low numbers.

10.3.223. Static detector SD34, located in the south-west of the Site, close to W2, recorded a low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. The highest level of bat activity pertained to Common Pipistrelle (133 registrations) and Soprano Pipistrelle (123 registrations). Myotis species (30 registrations) was recorded in low numbers.

10.3.224. Static detector SD35, located in the west of the wider study area, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All species were recorded in low numbers, consisting of Common Pipistrelle (6 registrations), Soprano Pipistrelle (7 registrations), Brown Long-eared Bat (2 registrations), Noctule species (6 registrations) and Myotis species (10 registrations).

10.3.225. Static detector SD36, located in the south-west of the wider study area, also recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All species were recorded in low numbers, consisting of Common

Pipistrelle (1 registration), Brown Long-eared Bat (1 registration), Noctule species (4 registrations) and Myotis species (4 registrations).

10.3.226. Static detector SD37, located in the south-east of the wider study area, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All species were recorded in low numbers, consisting of Common Pipistrelle (9 registrations), Soprano Pipistrelle (14 registrations), Brown Long-eared Bat (2 registrations), Noctule species (1 registration) and Myotis species (39 registrations).

10.3.227. Static detector SD38, located to the south of the wider study area, within a line of scrub, recorded a very low level of bat activity over the 7 day period. As per the transect surveys, bat activity was largely dominated by common and widespread species. All species were recorded in low numbers, consisting of Common Pipistrelle (2 registrations), Soprano Pipistrelle (2 registrations), Brown Long-eared Bat (1 registration), Noctule species (1 registration) and Myotis species (6 registrations).

10.3.228. Summary. No bat roosts were identified within the Site during the course of the survey work undertaken.

10.3.229. Bat activity surveys have confirmed the Site to be subject to a low level of activity, with this overwhelmingly pertaining to widespread and common bat species such as Common Pipistrelle and Soprano Pipistrelle.

10.3.230. Unsurprisingly relatively higher levels of bat activity are associated with linear features and woodland, including the Crescent Woodland, as well as within the larger waterbodies. Relatively higher levels of activity were also recorded along some of the wider study area's vegetated boundaries, particularly the southern edge of the Site. Typically, low levels of bat activity were recorded within the sparser, open habitats elsewhere within the Site.

10.3.231. Information received from SEWBRc returned several records of bat species within the Site. This includes a single record of a Long-eared bat species, an unknown bat species, and a Common Pipistrelle, relating to an area in the south of the Site, and dating between 2008 and 2009. In addition, a single record of Lesser Horseshoe Bat was returned, it relates to a location in the south of the Site, and dates from 2001. A record of a Common Pipistrelle was also returned from an area south of the North Site Reservoir, and dates from 2009. Within the wider study area a number of records were returned including Common Pipistrelle, Soprano Pipistrelle, an unknown bat species, Long-eared bat species, Noctule, Lesser Horseshoe, Daubenton's bat, Myotis species, and Brown Long-eared Bat, and date from 2001 to 2017. Notable is the record of a Lesser Horseshoe Bat roost located in the south-west of the wider study area, dating from 2001. These roosting features have since been demolished/mitigated for during previous works.

## Reptiles

10.3.232. Extensive previous clearance works across the wider Coed Darcy Site (including the Site) resulted in the removal of a vast majority of suitable reptile habitat between 2008 and 2015. This clearance work (undertaken in support of the consented OPP) was supplemented by a considerable capture and translocation effort in regards reptiles (amongst other species). Noting this previous work, and whilst the

Coed Darcy Site was previously known to support populations of all four common reptile species, it can be concluded the vast majority (if not all), of the Site was clear of reptiles as recently as 2015.

10.3.233. Subsequent to these works, suitable reptile habitat has gradually recolonised within the Site, namely within the south-western edge, in eastern areas, and to the north of the railway. This suitable habitat is considered recent in origin (with most habitats only attaining suitability within the last 3 to 4 years).

10.3.234. Given the on-going re-establishment of suitable habitat, and noting the potential for reptiles to re-colonise the Site from off-site habitats, (such as the railway embankment), or alternatively for potentially remnant (un-trapped) populations to re-establish, Ecology Solutions undertook reptile surveys from June 2021 to September 2021, in various locations (see Figure 10-4) within the Site and the wider study area, into the west of the Crescent Woodland. The results of the surveys can be seen in Table 10.11 below.

**Table 10.11 – Dates, weather conditions and results for reptile surveys at the Site**

Survey Number	Date	Temperature °C	Weather Conditions	Results*
1	22 June 2021	16	Clear	2UCL, 2MCL, 1FCL
2	30 June 2021	20**	50% Cloud	3UCL, 1FCL, 2JGS, 1UGS
3	13 July 2021	18	20% Cloud	2UCL, 4UGS
4	16 July 21	18	Clear	1UCL
5	12 August 21	14	75% Cloud	4UCL, 1JCL, 5UGS, 1JGS
6	31 August 2021	17	70% Cloud	7UCL, 8UGS, 3JGS
7	3 September 2021	16	10% Cloud	1UCL, 8UGS
8	15 September 2021	18	30% Cloud	8UCL, 1UGS
<p>* MCL/FCL/JCL/UCL: Male/Female/Juvenile/Unsexed Common Lizard <i>Zootoca vivipara</i>.</p> <p>* MGS/FGS/JGS/UGS – Male / Female / Juvenile / Unsexed Grass Snake.</p> <p>** Survey conditions sub-optimal</p>				

10.3.235. As detailed in Table 10.11, the surveys undertaken have identified a peak count of 11 Grass Snakes and eight Common Lizard. No other reptile species have been recorded. It is noted, given the survey methodology utilised, these findings are reflective of a sample of the supported reptile populations associated with the habitats in question.

10.3.236. In order to ascertain the relative importance of common reptile populations recorded within the Site, the tinning density has been taken into account, alongside guidance and population size estimates set out by the Herpetofauna Groups of Britain and Ireland (HGBI). On this basis it can be concluded from the surveys that the population size for all reptiles found on Site is low.

10.3.237. The majority of Common Lizard observations were made adjacent the Crescent Woodland (W2) located in the south of the Site, and in close proximity to the north of the railway embankment (as shown on Figure 10-4) and adjacent to established scrub in the north of the Site. A majority of the Grass Snakes relate predominantly to the Crescent Woodland (W2), and the south of the railway embankment, located in the north-east of the Site. Three additional records of Grass Snake relate to north of the Site, west of the horse paddocks (G1). The results indicate populations may be re-establishing from pockets of retained (previously un-impacted) habitats within the Site, or otherwise from off-site habitats.

10.3.238. Information received from SEWBRc returned no records of reptiles within the Site. Eight records of Grass Snake were returned from the far south of the wider study area, and date from 2004. The most recent record of a Grass Snake relates to a location approximately 2.3km south of the Site boundary at its closest point, and dates from 2018.

10.3.239. Three records of Common Lizard were returned within the far south of the wider study area, dating from 2004. The most recent record relates to a location approximately 1.3km south of the Site boundary, and dates from 2020.

10.3.240. A single record of an Adder *Vipera berus* was returned, relates to a location approximately 2.9km north of the Site boundary at its closest point, and dates from 2003. Three records of Slow Worm *Anguis fragilis* were returned. The closest record relates to a location approximately 0.6km north of the Site boundary at its closest point, and dates from 2009. The most recent record relates to a location approximately 1.8km south-east of the Site boundary at its closest point, and dates from 2020.

10.3.241. It is noted that previous assessment work undertaken across the wider Coed Darcy landholding (including the Site) identified the presence of all four common reptile species.

### Wintering Birds

10.3.242. Notwithstanding its size, the habitats present across a majority of the Site are deemed to be of low importance for wintering birds, and are considered unlikely to support populations of raised conservation significance. In addition, where areas of more suitable habitat are present (such as the South Site Reservoir, South Bay, and the larger waterbodies within the Coed Darcy GCN SINC), these are to be retained or (in the case of South Site Reservoir) modified to enhance their suitability for wintering assemblages.

10.3.243. In noting the Sites reduced suitability, regard is given to the high levels of disturbance experienced at the Site over a number of years, a lack of optimal foraging habitat and, moreover, the proximity of habitats of greater suitability in the immediate area. Reflecting the Site's low suitability, it was not deemed necessary for a suite of winter bird surveys to be undertaken.

10.3.244. Nonetheless, and at the request of NPTC Biodiversity Officers, a detailed desk based review has been undertaken in order supplement the above conclusion. Information was gathered from the following sources:

- Previous surveys undertaken by Parsons Brinckerhoff Limited at the Site in 2002;
- Information collected from SEWBRc.

10.3.245. In addition, efforts were made to obtain information from Barry Stewart (local WeBS recorder). However, no data was made available.

10.3.246. Previous specific wintering bird surveys were undertaken at the Site in 2002 by Parsons Brinckerhoff. During these surveys it was concluded there was potential for birds within the Site during the wintering period to be indirectly affected by the Proposed Development. It concluded the species recorded within the Site during these surveys spent the majority of their time outside the Site, within the adjacent Crymlyn Bog SAC/Ramsar/SSSI. The surveys concluded that, during the wintering period, species primarily utilised the Site for supplementary foraging areas. The surveys further concluded “*the refinery site is not of particular value as winter foraging habitat for important bird species from the cSAC [the Crymlyn Bog SAC]*”. Where habitats were deemed of potentially heightened wintering interest, these were limited to wetland habitats. It is noted the larger existing waterbodies (i.e. of potentially heightened value for wintering birds) are to be retained or otherwise enhanced as part of the Proposed Development.

10.3.247. During the time these previous surveys were undertaken in 2002, the Site supported notably more established vegetation, not least extensive scrub, providing more substantial areas of suitable foraging habitat, particularly during the winter months. The extensive habitat clearance within intervening years resulted in the loss of a vast majority of semi-natural habitats and, whilst these are beginning to re-establish, these historic works have nonetheless tempered the Site's value for foraging birds during winter periods. Noting the comparatively reduced value of the Site relative to historic surveys, and that those historic surveys in any event identified the Site to be of supplementary foraging value only, it is considered highly unlikely the Site is of any significant importance for wintering assemblages throughout the wintering months.

10.3.248. The desk study information collected from SEWBrEC returned a total of 1805 records of birds within a 2km radius of the site. Occasional records returned multiple numbers of birds attributed to the same record, therefore the total number of records returned does not necessarily indicate the full extent of the birds observed whilst collecting this data. This high number of records is no doubt a reflection of the considerable interest generated by the Coed Darcy Site over a number of years, with extensive on Site survey work undertaken. The number of records is further elevated by the Site's proximity to Crymlyn Bog designated sites complex.

10.3.249. Of the overall birds records, 409 of these were attributed to the winter months (November to February), with 154 of these recorded after 2010. Of these more recent records, four records were attained to the site, these included three records of Kestrel *Falco tinnunculus* and one Lapwing, recorded in the northern section of the site.

10.3.250. A number of the 154 records post 2010 were associated with the Crymlyn Bog SAC, including one record each of Mistle Thrush *Turdus viscivorus*, Marsh Harrier *Circus aeruginosus*, Bittern *Botaurus lentiginosus* and Hen Harrier. With regards to these species, it is considered that the Site only supports suitable primary foraging and nesting habitat for Mistle Thrush. It is considered unlikely that the Site would be utilised by Marsh Harrier and Hen Harrier *Circus cyaneus* for anything other than occasional supplementary foraging, as the habitats within Crymlyn Bog are more suitable for these species primary foraging needs. With regards to Bittern, the habitats are sub-optimal for foraging and loafing and it is considered unlikely that this species utilises the Site.

10.3.251. Directly adjacent to the Site on the southern and eastern boundary exist single records of Cetti's Warbler, Green Woodpecker *Picus viridis* and Starling *Sturnus vulgaris* respectively. It is considered that the Site would offer a degree of suitable wintering habitat for these species, as it would for a range of scrub and woodland birds.

10.3.252. A range of additional species records were returned in the nearby area, including species which would likely make at least opportunistic use of the habitats within the Site. However, a review of these findings does not indicate the presence of assemblages or populations of note that would be reliant upon the Site, relative to other habitats in the local area.

### Breeding Birds

10.3.253. Given the size of the Site and the presence of a range of habitats, a series of three breeding bird surveys were undertaken to assess the value of the Site. At the time of these surveys in 2020, Ecology Solutions was instructed to survey the wider Coed Darcy Site, as opposed to the Site specifically. As such, whilst specific consideration is given to the Site itself, the survey results for the wider area are provided for completeness. These surveys were undertaken in April, May and June 2020.

10.3.254. A total of 73 species of birds was recorded within the wider Coed Darcy Site during the three surveys, of which 53 were considered to be breeding or probably breeding (i.e. suitable habitat to support the species is present). The remaining 14 species were either breeding in adjacent habitats, recorded as migrants, flying over the Site, or were represented only by non-breeding individuals. Of the above species, 42 were considered to be breeding or probably breeding within the Site itself.

10.3.255. A summary of observations for each species is included in the systematic list in Table 10.12 below, whilst the distribution of breeding birds is shown in Figure 10-7.

10.3.256. These surveys confirmed both the Site and the wider Coed Darcy Site support a diverse breeding bird assemblage, primarily on account of their size and the range of habitats present.

10.3.257. The greatest interest was found across the open habitats where breeding species include good numbers of Lapwing, Ringed Plover, Little Ringed Plover, Skylark and Meadow Pipit *Anthus pratensis*, plus small numbers of Cuckoo *Cuculidae*, Tree Pipit *Anthus trivialis* and Linnet. With the exception of Little Ringed Plover (which is included in Schedule 1 of the 1981 Wildlife and Countryside Act) and the Amber listed Meadow Pipit, all these species are included on the RSPB Red List, having undergone major declines in their UK populations.

10.3.258. Most of these species occurred in the open grassland habitats in the south of the Coed Darcy area (predominantly beyond the Site boundary), with the noticeable exception of Ringed Plover which was nesting exclusively in the bare ground habitat of the cleared area of the Site. By its nature such habitat is ephemeral, and hence this species is taking advantage of conditions which are going to be relatively short-lived.

10.3.259. The woodland and scrub habitats across the wider Coed Darcy Site support a range of species typical of such habitat, including Red-listed Song Thrush, Mistle Thrush and Lesser Redpoll *Acanthis*

*cabaret*, and Amber-listed Dunnock, Bullfinch and Willow Warbler, the latter occurring in notable abundance (and Garden Warbler *Sylvia borin* also relatively numerous). All these species remain generally common and widespread in both a local and national context.

10.3.260. The wetland habitats, located in the south-western edge of the Site (i.e. within Coed Darcy GCN SINC) also support an interesting assemblage, including Mallard *Anas platyrhynchos*, Tufted Duck *Aythya fuligula*, Little Grebe *Tachybaptus ruficollis*, Reed Bunting *Emberiza schoeniclus*, Cetti's Warbler, Sedge Warbler *Acrocephalus schoenobaenus* and Reed Warblers (with the Red-listed Grasshopper Warbler *Locustella naevia* just off-site). Mallard and Reed Bunting are Amber listed having undergone moderate declines, whilst Cetti's Warbler is a Schedule 1 species.

10.3.261. Species associated with buildings include Herring Gull *Larus argentatus*, Lesser Black-backed Gull *Larus fuscus*, House Martin *Delichon urbicum* and House Sparrow *Passer domesticus*, all of which are Red or Amber listed. Particularly pleasing was the thriving colony of House Martins on Llan Coed House, as so many breeding colonies have been lost.



Table 10.12 – Bird Species Recorded During Breeding Bird Surveys at Coed Darcy

Species and BTO species code	RSPB listed	Minimum No. pairs*	Notes
red-legged Partridge (RL) <i>Alectoris rufa</i>	Feral	3	In open habitats in the south.
Pheasant (PH) <i>Phasianus colchicus</i>	Feral	3	In the southern half.
Canada Goose (CG) <i>Branta canadensis</i>	Feral	1	On a pond in the south.
Greylag Goose (GJ) <i>Anser anser</i>	Feral	0	Flying over.
Mallard (MA) <i>Anas platyrhynchos</i>	Amber	0 to 2	On various waterbodies.
Tufted Duck (TU) <i>Aythya fuligula</i>		0 to 2	On the lake/pits.
Swift (SI) <i>Apus apus</i>	Amber	0	Flying over.
Cuckoo (CK) <i>Cuculus canorus</i>	Red	2	In the south.
Stock Dove (SD) <i>Columba oenas</i>	Amber	0	Recorded feeding in open areas.
Wood Pigeon (WP) <i>C. palumbus</i>		12	In woodland/scrub.
Collared Dove (CD) <i>Streptopelia decaocto</i>		2	Associated with buildings.
Moorhen (MH) <i>Gallinula chloropus</i>		1	On the lake.

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Species and BTO species code	RSPB listed	Minimum No. pairs*	Notes
Coot (CO) <i>Fulica atra</i>		2	On the lake/pits.
Little Grebe (LG) <i>Tachybaptus ruficollis</i>		2	On the lake/pits.
Lapwing (L.) <i>Vanellus vanellus</i>	Red	5	In open habitats.
Ringed Plover (RP) <i>Charadrius hiaticula</i>	Red	6	All on bare ground in the northern half.
Little Ringed Plover (LP) <i>C. dubius</i>	Sch.1	4	In open habitats.
Herring Gull (HG) <i>Larus argentatus</i>	Red	1	On industrial buildings.
Lesser Black-backed Gull (LB)	Amber	6	On industrial buildings.
Cormorant (CA) <i>Phalacrocorax carbo</i>		0	Flying over.
Grey Heron (H.) <i>Ardea cinerea</i>		0	Flying over.
Buzzard (BZ) <i>Buteo buteo</i>		0-1	
Great Spotted Woodpecker (GS) <i>Dendrocopos major</i>		1	
Green Woodpecker (G.) <i>Picus viridis</i>		0-1	

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Species and BTO species code	RSPB listed	Minimum No. pairs*	Notes
Peregrine Falcon (PE)		0	One flew over in June.
Jay (J.) <i>Garrulus glandarius</i>		1	
Magpie (MG) <i>Pica pica</i>		2	
Jackdaw (JD) <i>Corvus monedula</i>		0 to 1	In the industrial estate.
Carrion Crow (C.) <i>Corvus corone</i>		2	
Raven (RN) <i>Corvus corax</i>		0	Regularly flying over the southern area.
Coal Tit (CT) <i>Periparus ater</i>		0	Presumed dispersing bird, in June.
Blue Tit (BT) <i>Cyanistes caeruleus</i>		5	
Great Tit (GT) <i>Parus major</i>		2	
Skylark (S.)	Red	11	In open habitats.
Sand Martin (SM) <i>Riparia riparia</i>		0	Post-breeding birds, present in June.
Swallow (SL) <i>Hirundo rustica</i>		2	Associated with out-buildings.
House Martin (HM)	Amber	32	On Llan Coed House in the north-east.

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Species and BTO species code	RSPB listed	Minimum No. pairs*	Notes
Cetti's Warbler (CW)	Sch.1	6	Especially around the western wetland.
Long-tailed Tit (LT) <i>Aegithalos caudatus</i>		3	
Willow Warbler (WW)	Amber	44	Abundant.
Chiffchaff (CC) <i>Phylloscopus collybita</i>		15	
Sedge Warbler (SW)		1	In the western wetland.
Reed Warbler (RW) A.		6	In the western wetland.
Grasshopper Warbler (GH)	Red	0	In the adjacent Crymlyn Bog.
Blackcap (BC) <i>Sylvia atricapilla</i>		15	In wooded areas.
Garden Warbler (GW) S.		10	In scrub throughout.
Lesser Whitethroat (LW) <i>Sylvia curruca</i>		0 to 3	Possibly migrants.
Whitethroat (WH) <i>Sylvia communis</i>		12	In scattered scrub.
Goldcrest (GC) <i>Regulus regulus</i>		3	
Wren (WR) <i>Troglodytes troglodytes</i>		23	In all vegetated areas.

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Species and BTO species code	RSPB listed	Minimum No. pairs*	Notes
Nuthatch (NH) <i>Sitta europaea</i>		1	In woodland.
Treecreeper (TC) <i>Certhia familiaris</i>		1	In woodland.
Starling (SG)	Red	0	Only recorded flying over.
Blackbird (B.) <i>Turdus merula</i>		11	
Song Thrush (ST)	Red	11	
Mistle Thrush (M.)	Red	1	In the far south-east.
Robin (R.) <i>Erithacus rubecula</i>		11	
Stonechat (SC) <i>Saxicola rubicola</i>		4	In open or 'heathy' areas.
Wheatear (W.) <i>Oenanthe oenanthe</i>		0	Three migrants on the first visit.
House Sparrow (HS)	Red	2+	Associated with buildings.
Dunnock (D.)	Amber	17	
Pied Wagtail (PW) <i>Motacilla alba</i>		2	
Meadow Pipit (MP)	Amber	12	Numerous in open habitats.
Tree Pipit (TP) <i>A. trivialis</i>	Red	1 to 2	

Species and BTO species code	RSPB listed	Minimum No. pairs*	Notes
Chaffinch (CH) <i>Fringilla coelebs</i>		3	All in peripheral woodland.
Bullfinch (BF) <i>Pyrrhula pyrrhula</i>	Amber	5	In scrub.
Greenfinch (GR) <i>Carduelis chloris</i>		4	
Linnet (LI)	Red	3	In open habitats in the south.
Lesser Redpoll (LR)	Red	2	In western scrub/woodland.
Crossbill (CR) <i>Loxia curvirostra</i>	Sch.1	0	A party of eight flew over in June.
Goldfinch (GO) <i>Carduelis carduelis</i>		6	
Siskin (SK) <i>Spinus spinus</i>		0	A post-breeding bird in June.
Reed Bunting (RB) <i>Emberiza schoeniclus</i>	Amber	2	In wetland areas.

Sch.1 indicates a species included in Schedule 1 of the 1981 Wildlife and Countryside Act (as Amended).

\* Estimated pairs relate to the wider Coed Darcy landholding

10.3.262. In addition to the surveys undertaken in 2020, during the course of survey work in 2021 due regard was given to ground nesting birds, with this including for the completion of two dawn transects within the Site, which served to specifically assess the continued use of the Site by ground nesting species. These updated surveys identified an additional Lapwing pair which were considered to be holding territory within the Site (two pairs in total). However, a reduced level of nesting activity was recorded for Ringed Plover, with only a single confirmed pair recorded. The breeding territories of ground nesting birds recorded in 2021 are detailed at Figure 10-8.

10.3.263. Of further note, a single Nightjar was recorded during the completion of the final GCN survey in June 2021. The bird was heard briefly 'churring' and seen in flight in the north-east of the Site. Noting the

reduced suitability of the habitats present for this species, and that no Nightjar were recorded during previous surveys in May and June 2020, both of which started pre-dawn, (nor indeed during other nocturnal work), the observation was deemed likely to represent a roaming male as opposed to evidence of a breeding territory. Notwithstanding this initial conclusion, a further dedicated Nightjar visit was undertaken in the form of a dusk and dawn survey on the 22 and 23 June 2021. No further evidence of Nightjar was recorded and, as such, it was concluded the observation related to a random visit from a wandering male.

10.3.264. Information received from SEWBrEC returned 76 records of protected or notable birds from within the Site, including Swallow, Kestrel, Lapwing, Linnet, Dunnock, Garden Warbler, Lesser Redpoll, Snipe *Gallinago gallinago*, Mistle Thrush, Ringed Plover, Skylark and Wheatear, dating from 2001 to 2020. Of these records, a confirmed nesting and/or breeding Swallow dating from 2001, and Lapwing dating from 2006 and 2020, relating to a location in the north-east of Site, south of the railway line. The record of the Lapwing dates from 2020 and relates to a location in the south-west of the Site, close to the Crescent Woodland. The most recent record returned is of a Red Kite *Milvus milvus*, and relates to a location approximately 1.8km south-west of the Site boundary at its closest point, and dates from June 2020.

## Invertebrates

10.3.265. Noting the diverse range of habitats present within the Site, much of which would qualify as OMH, Ecology Solutions commissioned Richard Wilson Ecology Limited to complete a suite of invertebrate surveys. As for other species, the instruction at the time of surveys was for the wider Coed Darcy Site to be surveyed. Noting the broad similarity of habitats present, and their continuity within the Site, analysis has included for an assessment of the wider assemblage within Coed Darcy, as opposed to the Site specifically.

10.3.266. The full survey report prepared by Richard Wilson is provided at Appendix 10-2, with a summary of the findings provided below.

10.3.267. A total of nine surveys for terrestrial invertebrates were undertaken during optimal weather conditions from mid-May to mid-September 2020. The surveys involved walking a series of transects within the specific habitat type, focusing on the collection of Diptera (flies) and aculeate Hymenoptera (primarily bees and wasps), also noting Coleoptera (beetles). Other identifiable taxa such as butterflies were also recorded. In addition, sampling surveys were undertaken in representative habitats across the study area, for ground-dwelling and arboreal fauna, by vacuum sampling the field layer and beating lower branches of trees and shrubs. Static pitfall trapping was also employed to supplement the active surveying methods.

10.3.268. The surveys recorded a total of 505 terrestrial species across the wider study area, with 380 species associated with the Site. This confirmed a good range of invertebrate species utilise the Site, including a number of notable species (i.e. species of conservation significance). A full list of the species recorded is detailed at Appendix 10-2. The key findings of the surveys are detailed below.

10.3.269. No invertebrate species which are afforded direct legal protection under any UK or European legislation were recorded during the surveys.



10.3.270. A total of 505 species were recorded throughout the study site, of which 30 (6% of the assemblage) are Key Species; those with a nature conservation status. These key species are detailed in Table 10.13 below.

Table 10.13 – List and Details of Key Invertebrate Species Recorded During Surveys in 2020

Species	Status	Sector Recorded	Ecology
<i>Pardosa tenuipes</i> <i>Araneae,</i> <i>Lycosidae</i>	Nationally scarce	Northern Southern	<p>A wolf-spider associated with sparsely vegetated but humid (damp) environments such as dune slacks, floodplain meadows, and riparian vegetation. It is a southern species in Britain, with very scattered records within Wales.</p> <p>Recorded within damper hollows and edge of waterbodies where there are exposed substrates.</p>
<i>Xerolycosa miniata</i> <i>Araneae,</i> <i>Lycosidae</i>	Nationally scarce	Southern	<p>A contrastingly marked large wolf-spider of coastal environments, particularly fixed sand dunes. It is recorded throughout Britain but nowhere is it common; in Wales it is recorded along the Glamorgan and Pembrokeshire coast.</p> <p>A single individual recorded from the OMH just off Parc Amazon, at the extreme southern tip of the proposed Southern Access Route.</p>
<i>Argenna subnigra</i> <i>Araneae,</i> <i>Dictynidae</i>	Nationally scarce	Northern	<p>A ground-dwelling spider associated with sparsely vegetated open grasslands, including those characteristic of brownfield sites.</p> <p>A rare species in Wales with only a dozen known locations. It is more frequent in south-eastern England.</p>

Species	Status	Sector Recorded	Ecology
<i>Cheiracanthium virescens</i>  <i>Araneae,</i> <i>Cheiracanthiidae</i>	Nationally Scarce	Northern  Southern	<p>A ground-dwelling species associated with open habitat biotopes, including coastal grasslands, dunes, heathland, and OMH on brownfield sites.</p> <p>Away from south-east England, there are scattered records in the Midlands, becoming rare north of an imaginary line linking the Humber and the Mersey.</p> <p>Within Wales, it is a predominantly coastal species.</p>
<i>Zodarion fuscum</i>  <i>Araneae,</i> <i>Zodariidae</i>	Vulnerable; Nationally rare	Northern	<p>A very rare species known from six locations (five hectads) in Britain, with only one previous record from Wales (Porthkerry Country Park, near Barry).</p> <p>It requires open habitats where the vegetation is either short or patchy, thus exposed to sunshine, creating a locally warmer microclimate, where it specialises in hunting ants (Hymenoptera, Formicidae).</p> <p>A single male was collected in a pitfall trap located on the west-facing slope near the centre of the Oil Refinery.</p>

Species	Status	Sector Recorded	Ecology
<i>Marpissa nivoyi</i> <i>Araneae,</i> <i>Salticidae</i>	Nationally scarce	Northern	<p>A characteristic jumping-spider associated with coastal semi-fixed dunes with Marram <i>Ammophila arenaria</i>.</p> <p>The single individual was collected in tall dry grassland, which presumably has a similar structure and environment.</p> <p>The species is restricted to coastal England, with only five other modern Welsh records, though it was previously recorded at Crymlyn Burrows SSSI in May 1991.</p>
<i>Synageles venator</i> <i>Araneae,</i> <i>Salticidae</i>	Nationally scarce	Northern	<p>An ant-mimicking jumping spider associated with coastal dunes and other dry habitats, including inland.</p> <p>Within Wales, it is only known from the coast around Swansea and Port Talbot, where it has previously been recorded at Crymlyn Burrows SSSI.</p>
<i>Haliphus mucronatus</i> <i>Coleoptera,</i> <i>Haliplidae</i>	Nationally scarce	Northern Southern	<p>A small brown 'crawling water beetle', distinctive within the genus due to its bulky appearance.</p> <p>It has a rather disjunct distribution, with its core across the east and south-east regions of England, but another centre of distribution occurs in south Wales clockwise into Somerset.</p> <p>Its habitat is typically on clay, including natural subsidence ponds, but also in man-made stagnant water bodies.</p> <p>The species probably feeds on plant and/or algal matter.</p>

Species	Status	Sector Recorded	Ecology
<i>Elaphrus parvulus</i> <i>Coleoptera</i> , <i>Carabidae</i>	Nationally scarce	Southern	<p>This is a miniscule ground beetle, found on sandy and gravelly soils, but also in old walls and cracked paths, often in association with buildings. However, it can also occur next to water in gravel and sand pits, and other post-industrial habitats.</p> <p>The species is widely distributed throughout the south of England, the Midlands and Wales, and has recently been expanding its range. It has to date been found as far north as Cumbria.</p>
<i>Paederus fuscipes</i> <i>Coleoptera</i> , <i>Staphylinidae</i>	Nationally scarce (Nb)	Northern Southern	<p>This is a remarkably colourful species, as are all the members of the genus. It has striking metallic blue elytra, the remainder of the beetle being black and red.</p> <p>It is a predator, found in marshes and bogs, on the margins of ponds and dykes, and in permanently wet mires. It is also recorded in saltmarsh habitats. Its distribution is patchy throughout England and Wales, with most records from the coastal fringes. Adults have been recorded in most months of the year.</p>

Species	Status	Sector Recorded	Ecology
<i>Meligethes fulvipes</i> and <i>Meligethes rotundicollis</i> <i>Coleoptera,</i> <i>Nitidulidae</i>	Nationally scarce	M.f. (Northern)  M.r. (Southern)	<p><i>M. fulvipes</i> is a nondescript, brown pollen beetle, is very locally distributed in England and Wales, with a predominantly coastal stronghold (South Wales and south-east England), but also inland in several areas, including East Anglian Breckland.</p> <p>It feeds on brassicas, within which plant group it is certainly associated with Charlock <i>Sinapis arvensis</i>.</p> <p><i>M. rotundicollis</i> is a small black, nondescript pollen beetle, primarily found in south-east England, but also known from Wales.</p> <p>It can be located in waste and disturbed ground habitats, including brownfield sites, and road verges. Its foodplant associations are with Charlock, Hedge Mustard <i>Sisymbrium officinale</i>, and possibly other plants in this family.</p> <p>Adults have been recorded in the field, mainly between April and August.</p>

Species	Status	Sector Recorded	Ecology
<i>Sitona waterhousei</i>  <i>Coleoptera,</i> <i>Curculionidae</i>	Nationally scarce (Nb)	Southern	<p>This is a small weevil, with characteristic convex protruding eyes.</p> <p>It is found in England and Wales, although its distribution is predominantly coastal, with occurrences almost exclusively between Anglesey anticlockwise to the Thames Gateway in West Kent.</p> <p>There are a very few inland records, from post-industrial sites. Otherwise, habitats such as coastal undercliffs, coastal shingle, and coastal quarries are examples of its typical haunts. The species feeds on Common Bird's-foot Trefoil as both a larva and adult. Adults have been recorded between February and September.</p>
<i>Bombylius canescens</i>  <i>Diptera,</i> <i>Bombyliidae</i>	Nationally Scarce	Northern Southern	<p>This small bee-fly is restricted to south-west England and southern Wales, where it is associated with sparsely vegetated sandy or base-rich substrates in grasslands, woodland edge or coastal soft-cliffs (Stubbs and Drake, 2014; Harvey, 2018).</p> <p>It is a parasite of smaller mining bees in the genus <i>Lasioglossum</i> which are frequent within the study site.</p>

Species	Status	Sector Recorded	Ecology
<i>Drymus pilicornis</i> <i>Hemiptera</i> , <i>Lygaeidae</i>	Nationally scarce	Southern	<p>A small brown ground-bug.</p> <p>Sparsely distributed in southern England and Wales, where it is associated with short turf habitats, including chalk downland.</p> <p>Adults overwinter, mating in spring to give a new generation of adults by August. There is one generation a year. It most probably feeds on mosses at ground level, and possibly also fungi.</p>
<i>Andrena congruens</i> <i>Hymenoptera</i> , <i>Andrenidae</i>	Nationally scarce (Na)	Northern	<p>This mining bee is associated with exposures of soils, sand, or chalk on sloping ground in southern England, with outlier populations associated with the region around the Forest of Dean and the Gower Peninsula in south Wales</p> <p>(Else &amp; Edwards, 2018).</p> <p>It is identified as a threatened species in Wales (Olds et al., 2018).</p> <p>Several specimens were recorded within the former Oil Refinery, and it seems likely they are exploiting the various spoil heaps as nesting habitat.</p>

Species	Status	Sector Recorded	Ecology
<i>Bombus humilis</i> (brown-banded carder bee)  <i>Hymenoptera</i> , <i>Apidae</i>	SoPI	Northern  Southern	<p>The brown-banded carder bee is a species of warm, dry sites with extensive flower-rich calcareous or coastal grasslands. Within Britain, it is largely restricted to coastal south-east, southern and south-west England, and in Wales to the coastal fringes of Gwynedd, Glamorgan and Pembrokeshire (Else &amp; Edwards, 2018).</p> <p>It is identified as a threatened species in Wales (Olds et al., 2018).</p>
<i>Sphecodes reticulatus</i>  <i>Hymenoptera</i> , <i>Halictidae</i>	[Nationally scarce (Nb)]	Northern	<p>This blood-bee (so called, because of its partially red abdomen) is more-or-less restricted to south-east England where it is associated with sandy sites in open woodland or grassland: the extensive dry grasslands and scrub mosaics likely providing suitable habitat for the species in the study site.</p> <p>There are only three Welsh locations; one being in VC 41 near Merthyr Tydfil (Else &amp; Edwards, 2018).</p> <p>Consequently, it is identified as a threatened species in Wales (Olds et al., 2018).</p> <p>It is a cuckoo of a few mining bees though its host range is poorly understood.</p> <p>A female was recorded in May 2020 at the western end of the study site.</p>

Species	Status	Sector Recorded	Ecology
<i>Erynnis tages</i> (Dingy skipper)  <i>Lepidoptera</i> , <i>Hesperiidae</i>	Vulnerable; SoPI	Northern  Southern	A declining butterfly which is generally associated with brownfield sites, colliery spoil heaps, and similar places where habitats support short swards where its food plant, Bird's-foot Trefoil occurs.  Several individuals were recorded in late May 2020 at various locations within the OMH.
<i>Coenonympha pamphilus</i> (small heath)  <i>Lepidoptera</i> , <i>Nymphalidae</i>	Near threatened; SoPI	Northern  Southern	Although a widespread species in the UK, this otherwise common species has experienced a substantial decline in both abundance and occurrence (Fox et al., 2015), hence its classification as Near Threatened.
<i>Hipparchia semele</i> (Grayling [butterfly])  <i>Lepidoptera</i> , <i>Nymphalidae</i>	Vulnerable, SoPI	Northern  Southern	A butterfly of patchy grasslands, which has suffered a substantial decline in Britain such that it is now more or less restricted to coastal habitats such as sand dunes and grasslands; or in Wales, colliery spoil heaps.  Individuals were observed in late June and mid-July across the dunes.

10.3.271. Of the 30 Key Species, three are Rare Key Species (a spider – *Zodarion fuscum*; and two butterflies: Dingy Skipper *Erynnis tages* and Grayling *Hipparchia semele*); all of which are associated with dry grasslands and bare ground. Three Welsh threatened bees *Andrena congruens*, *Sphecodes reticulatus* and Brown-banded Carder Bee *Bombus humilis* were recorded, in addition to several other species that are scarce or rare in the county/Wales. The Carder Bee and both butterflies are also included in the Welsh Biodiversity List as Species of Principal Importance.

10.3.272. Within the study site, 76 species are reliant on the vegetation communities present to complete their lifecycle, of which 57 species are present within the northern sector. Most are intrinsically linked with the OMH which represents a substantial resource in the context of the Swansea Bay National Landscape Character Area and South Wales.

10.3.273. The physical characteristics of the OMH share similar properties to nearby coastal dune systems such as at Crymlyn Burrows SSSI and Kenfig SSSI. The OMH supports an assemblage of invertebrates characteristic of dry, flower-rich grasslands on highly heterogeneous topography, of which coastal sand dune systems are interpreted as the natural equivalent. The study site is located within an ecological coastal landscape where there are several high quality protected sites such as at Crymlyn Burrows and Kenfig SSSIs, which are known to support important populations of individual Key Species.

10.3.274. The invertebrate assemblages associated with the Site have been evaluated to be of regional nature conservation value when considered as a component of the wider Coed Darcy Site. This is based on the relative quality and extent of the habitat resource present for invertebrates within the wider region, number of Key Species, and the proportion of stenotopic taxa (species dependent on restricted habitat conditions) recorded in specific assemblages, indicating favourable conservation status.

### Amphibians (Great Crested Newts)

10.3.275. As set out above, historic survey work has recorded (and subsequently translocated) very large numbers of GCN, with approximately 10,000 individuals of all life cycle stages captured and relocated to facilitate previous remediation works across much of the wider Coed Darcy Site, including the Site. Captured amphibians were relocated to a dedicated GCN receptor site within and adjacent the wider Coed Darcy Site under several NRW licenses. This receptor site, which is delineated from the wider Coed Darcy Site by herpetofauna fencing, has since designated as the Coed Darcy GCN SINC.

10.3.276. Following the completion of extensive capture and relocation up until 2016, which facilitated the completion of Site wide habitat clearance, the wider Coed Darcy Site was assumed cleared of GCN. However, subsequent observations made by the ARC during the completion of habitat creation/management works, confirmed continued presence of GCN within the wider Coed Darcy Site (albeit outside the Site). Following further investigation by Atkins, it was concluded these observations reflected the presence of a small remnant GCN population that had evaded capture following previous translocation work. As such, a further NRW licence was granted to facilitate additional amphibian capture. Notwithstanding the grant of this licence, and despite the installation of additional fencing to facilitate an additional capture exercise, no further capture effort was completed. Noting that a localised population of GCN were present in the south of the Coed Darcy Site, partial update survey work was undertaken by Atkins in 2020, in the form of eDNA surveys. This survey effort included the completion of eDNA surveys across the wider Coed Darcy Site, including ponds within the Site. The surveys returned positive eDNA results for several ponds in the south of the Coed Darcy Site (outside the Site), as well as one waterbody (P20) within the Site (the latter observation comprising a visual sighting of an adult GCN within the waterbody). No evidence of GCN was recorded within the waterbodies to the north of the railway, with negative eDNA results obtained for eight ponds (P1, P8, P11, P13, P14, P15, P17, W30). Pond W30 is an Atkins reference, which was dry during the entirety of the 2021 surveys. It is noted eDNA records for two ponds (P3 and P10) were not made available to Ecology Solutions (identified as results pending within an informal interim report).

10.3.277. It is relevant to note the vast majority of GCN recorded (and/or translocated) through previous survey work were located in areas outside the Site, with this reflecting a dearth of waterbodies within the Site. Indeed, whilst the Site now supports a large number of ponds, these are mostly of recent origin, having been 'created' as bi-products following previous remediation works (likely around 2015).

10.3.278. Noting the relatively recent origin of most ponds within the Site, that these were within areas not previously known to support GCN, and that eDNA surveys by Atkins in 2020 did not return any positive results, it was deemed unlikely GCN would have colonised the waterbodies. In reaching this conclusion, consideration was also given to the terrestrial habitats, which remained primarily bare and inhospitable to amphibians as recently as 2018.

10.3.279. With the above in mind, a bespoke survey approach was agreed with both NRW and NPTC Biodiversity Officers in the first instance, whereby update eDNA and partial (two visits) Population Size Class Assessment work would be undertaken. However, following confirmation of GCN in some waterbodies, a full six visits were undertaken of all accessible ponds.

10.3.280. The eDNA surveys of the waterbodies within the Site were undertaken on the 27 April 2021. The returned eDNA results identified only a single waterbody (P14) with positive replicates for GCN. This, however, proved unreliable, as GCN were recorded in two additional waterbodies on the same evening, using traditional surveying techniques.

10.3.281. Due to this, six surveys were undertaken across all waterbodies within the Site on the 27 April 2021, 5 May 2021, 11 May 2021, 20 May 2021, 3 June 2021 and 8 June 2021. A summary of the results is provided Table 10.14 below. A full detailed list of the results is provided in Appendix 10-5. For clarity, with the exception of those ponds summarised in Table 10.14 below, no other waterbodies within the Site were confirmed to support GCN.

**Table 10.14 – Summary of GCN Surveys Undertaken in 2021**

Waterbody	Maximum count of GCN	Date of Maximum Count
P9	6	5 May 2021
P10	9	5 May 2021
P14	3	5 May 2021
P16	1	8 June 2021
P20	1	3 June 2021
POND B	35	19 May 2021

10.3.282. As above, only a sub-set of the ponds in the north of the Site were found to support GCN, collectively comprising a population that would be classed as a 'medium' population size class (low end of size class). Noting the apparent suitability of the ponds and (albeit to a lesser extent) terrestrial habitats in 2021, the smaller size of the population is considered a reflection of the recent origin and establishment of habitats. On the evidence available, and noting the western 'bias' to the findings, it is concluded GCN (and other amphibians) are likely to have only recently colonised this area of the Site, likely from suitable off-site habitat to the west of the Site.

10.3.283. In contrast to the high concentration of ponds north of the railway, a majority of the central areas of the Site are devoid of any permanent or sustained waterbodies and are, for the most part, notably less

established. A majority of the Site is therefore unlikely to support GCN, nor provide any significant terrestrial opportunities for them.

10.3.284. The majority of the GCN were recorded in Pond B located in the south-west of the Site, with a peak count of 35 individuals, which was undertaken on survey visit two (19 May 2021). This observation is consistent with previous survey work (i.e. with the southern areas of Coed Darcy supporting a vast majority of amphibian populations), and moreover reflects the more established nature of habitats in this locality. It is unclear whether these populations of GCN have successfully colonised from off-site habitat or otherwise represent a remnant population re-establishing following previous capture effort.

10.3.285. Given the size of the study area, with ponds broadly located within two separate 'clusters' (north and south), it is deemed likely the Site supports two meta populations between which there is likely to be (at best) only limited dispersal.

10.3.286. Whilst specific update surveys were not undertaken of all ponds in the wider Coed Darcy Site (i.e. to the south of the Site), it is noted the majority of these ponds are reasonably well distanced from the Site, in excess of 200m at their closest points. Noting this, and given positive eDNA results in 2020 (see Figure 10-9), it was deemed appropriate to assume presence within these more distant ponds. Subsequent mitigation/enhancement opportunities, as identified later in this Chapter, are made on this basis.

10.3.287. Of relevance, the receptor ponds located south of the wider study area (within the Coed Darcy GCN SINC) were also surveyed for GCN using traditional methods in 2021, confirming a continued population of GCN within this area.

10.3.288. With the exception of those waterbodies identified above, no other suitable waterbodies are located within a 500m radius of the receptor site when considering barriers to dispersal (with the site being bordered by major roads to the north, south, east and west).

10.3.289. A number of common amphibians were also recorded during the course of the GCN surveys. These included Palmate Newts *Lissotriton helveticus*, Frogs *Anura* and Toads *Bufo bufo*. These are listed below in Table 10.15.

**Table 10.15 – Common amphibian survey results from 2021 surveys**

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Coed Darcy



Waterbody	Palmate Newt maximum counts	Common Toad maximum counts	Common Frog maximum counts
P1	5	0	0
P2	4	1	0
P3	8	1	0
P4	11	1	0
P5	3	0	0
P6	0	0	0
P7	15	0	0
P8	1	0	0
P9	12	0	0
P10	8	0	0
P11	3	2	1
P12	11	1	0
P13	17	0	0
P14	2	0	0
P15	0	0	0
P16	17	0	1
P17	0	0	0
P18	0	0	0
P19	0	0	0
P20	35	0	0
Crymlyn Lagoon East	1	0	0
Crymlyn Lagoon West	0	0	0
West Bay	0	0	0

Waterbody	Palmate Newt maximum counts	Common Toad maximum counts	Common Frog maximum counts
PB	5	0	0
PC	0	0	0
PD	0	0	0
PE	0	0	0
South Site Reservoir	6	3	0

10.3.290. Information received from SEWBrEC returned a total of 11 records of GCN. A single record relates to a location in the north-west of the Site, just east of the South Site Reservoir, and dates from 2020. This is assumed to be the record attained by Atkins. The remaining records of GCN relate to the wider study area, with a majority dating from 2018 to 2019.

10.3.291. In addition, a total of 63 common amphibian records were returned from SEWBrEC and 22 records of Common Frog were returned. The closest records are located within the Site, located in the South Site Reservoir and in the east of the Site, and date from 2001 and 2020 respectively. The most recent record relates to a location approximately 1.8 km west of the Site at its closest point, and dates from 2020.

10.3.292. A total of 16 records of Common Toad were returned. The closest record relates to a location approximately 0.1km south-west of the Site boundary at its closest point, and dates from 2015. The most recent record relates to a location approximately 2.5km south-west of the Site and dates from 2019.

10.3.293. A total of 21 records of Palmate Newt were returned. The closest and most recent record relates to a location approximately 0.1km south-west of the Site and dates from 2018.

10.3.294. A total of four records of Smooth Newt *Lissotriton vulgaris* were returned. The closest record relates to a location approximately 0.4km south-west of the Site and dates from between 1900 and 1989. The most recent record relates to a location approximately 1.8km north-east of the Site and dates from 2019.

10.3.295. Again, previous survey work at the Site, undertaken in support of the previously consented OPP, identified the presence of Common Frog, Common Toad and Palmate Newt within the Site.

## Hazel Dormouse

10.3.296. Notwithstanding an absence of any historic records of Dormice within the wider Coed Darcy Site, noting the age of previous survey work (2009), an updated suite of Dormouse surveys was undertaken between August 2020 and August 2021.

10.3.297. The location of the Dormouse tubes is shown in Figure 10-6. A summary of the findings is detailed below in Table 10.16.

**Table 10.16 – Summary of Dormice Surveys at Coed Darcy**

Survey Number	Date	Temp' °C	Weather Conditions	Results
1	21 August 2020	18	Strong wind	No evidence of Dormouse recorded.
2*	3 September 2020	15	Slight rain for short period at the of start of survey	No evidence of Dormouse recorded.
3	29 September 2020	16	Sunny, clear	No evidence of Dormouse recorded.
4*	5 October 2020	11	Dry, cloudy.	No evidence of Dormouse recorded.
5	15 October 2020	13	Dry	No evidence of Dormouse recorded.
6*	21 October 2020		Dry	No evidence of Dormouse recorded.
7**	26 November 2020	8	Clear, sunny	No evidence of Dormouse recorded.
6**	30 June 2021	17	40% cloud, sunny, dry	No evidence of Dormouse recorded.
7**	16 July 2021	18	Still, sunny, clear	No evidence of Dormouse recorded.
8**	27 August 2021	18	Clear, light breeze	No evidence of Dormouse recorded.
* Footprint Check Only				
** Nest Tube Check Only				

10.3.298. On the basis the surveys followed the methodology as set out in Section 3, the survey effort allowed a score of 25 points, and noting historical surveys, it can be reasonably assumed Dormouse are absent from the Site. As such, no further consideration is given to this species as part of this assessment.

Otter & Water Vole

10.3.299. A vast majority of the Site, with an absence of larger waterbodies or suitable watercourses, is unsuitable to support Otter or Water Vole.

10.3.300. Where more suitable habitat is present, for example within Coed Darcy GCN SINC, these habitats are to be retained as part of the proposals. Regarding South Site Reservoir, whilst this could provide a degree of suitable foraging opportunities for Otter, its value is greatly tempered by its artificial nature, with significantly improved opportunities in the immediate area. The steep and artificial banks of the waterbody are highly sub-optimal to offer potential holt or burrowing opportunities to either species.

10.3.301. Regarding ditches within the Site, these are relatively recent in origin and, again, highly sub-optimal for Water Vole or Otter, for the most part supporting limited aquatic vegetation and ephemeral water, whilst offering no significant connectivity or dispersal opportunities. Whilst both D1 and D2 provide a degree of heightened suitability, no evidence of either Water Vole or Otter was recorded during detailed checks of both features during the completion of habitat survey work in 2020 and 2021. Equally, no evidence of either species was recorded during the completion of extensive GCN survey work across the Site.

10.3.302. Noting the above, it is not considered either species would be in any way reliant on the habitats present within the Site, nor that populations present in the wider area would have the potential to be adversely impacted by emerging Development Proposals.

10.3.303. The SEWBRc returned 41 records of Otter, none of which relate to the Site. The majority of records relate to the Tennant Canal. However, the closest and most recent record relates to a record approximately 0.7km east of the Site at its closest point, and dates from 2012.

10.3.304. The SEWBRc returned seven records of Water Vole, none of which relate to the Site. The majority of the records again relate to the Tennant Canal. However, the closest and most recent record relates to a location approximately 0.4km south-west of the Site, and dates from 2004.

#### Other Protected Species

10.3.305. No other evidence of protected or notable species has been recorded during the course of the extensive survey work undertaken at the Site. Noting this, and with regard to the extensive habitat clearance which has been undertaken across the Site, it is considered unlikely the Site will be of heightened value to any other protected or notable species.

10.3.306. Notwithstanding this conclusion, habitats within the Site are at least locally suitable to support a range of small mammal species such as European Hedgehog. The potential presence of a range of small mammals is given due regard as part of this Assessment.

10.3.307. SEWBRc returned a small number of records for Polecat (three records) and Hedgehog (14 records). Of these, the closest was a record of Hedgehog located approximately 190m to the east of the Site.

#### Summary of Ecological Baseline

10.3.308. Habitats. The Site supports a mosaic of predominantly early successional habitats, with these frequently complemented by areas of diverse structural topography. In addition, localised areas of mature vegetation are present, predominantly in the form of secondary woodland, with dense scrub and established waterbodies also present.

10.3.309. Some areas of recolonising vegetation, not least RV1, are of high ecological value, supporting a diverse floristic community with the topographical diversity contributing to a wide range of microhabitats. Elsewhere, such as RV3, the habitat community is sparse, and localised topographical diversity is largely absent, resulting in a habitat area of low ecological interest when assessed in isolation. Whilst the value of these areas is elevated by the wider 'open mosaic', they provide only a limited qualitative contribution to this mosaic.

10.3.310. Areas of wet grassland and mixed scrub are also deemed of heightened ecological interest, supporting a good range of grasses, sedges, and forbs. The prevalence of scrub, whilst offering localised interest, is generally concluded to detract from the overall interest and, indeed, on-going scrub succession will continue to result in losses to more valuable open habitats within the Site.

10.3.311. Areas of secondary woodland, whilst also considered of heightened value within the Site, predominantly comprise fast growing Willows and Birch, and include frequent non-native vegetation such as Buddleia, with very limited woodland ground flora, somewhat tempering their overall interest. Regarding the designation of an area of on Site woodland as 'Ancient' (W1A), and noting the substantial historic disturbance at this location, with resultant woodland clearance and loss/degradation of soils, it is not considered the Ancient Woodland designation of this area is a correct reflection of the true extent of the resource present.

10.3.312. Also of heightened value are the tree belts in the north-east of the Site, in particular TB1 which supports a good number of mature Oak trees and occasional Hazel coppice.

10.3.313. The Site supports a large number of waterbodies, ranging from small ephemeral ponds to high quality wetlands and artificial reservoirs. Whilst the quality of these wetland habitats varies substantially the overall resource is deemed of value in both the context of the Site and local area.

10.3.314. As above, the Site supports extensive areas of scrub, with these habitats in turn supporting a good range of woody species. However, areas of scrub are frequently dominated by a small number of species, including non-native and/or undesirable specimens such as Buddleia. Moreover, areas of scrub appear to be encroaching on and outcompeting relatively higher value habitats within the Site, such as areas of wet grassland and floristically diverse recolonising vegetation. In this context, scrub is of reduced ecological value within the Site.

10.3.315. Other habitats within the Site typically support a reduced range of species or are otherwise widespread and common habitat types in both a national and local context. These are not deemed of heightened ecological interest in the context of the Site.

10.3.316. Species. In terms of faunal species, the Site is considered to provide opportunities for a range of species groups including invertebrates, amphibians, breeding birds, common reptiles and foraging and commuting bats.

10.3.317. The Site supports notable populations of terrestrial invertebrates, with a total of 505 species recorded throughout the study site, of which 30 (6% of the assemblage) are Key Species; those with a nature conservation status.

10.3.318. A diverse breeding bird assemblage was recorded within the wider Coed Darcy Site, with 76 species recorded across the wider Coed Darcy landholding, including 42 species within the Site. The greatest interest was found across the open habitats, not least on account of breeding Lapwing, Ringed Plover, Little Ringed Plover and Skylark, whilst good assemblages were also recorded in wetland and woodland areas.

10.3.319. GCN surveys confirmed the presence of a 'medium' population of GCN, alongside valuable populations of common amphibians, with these populations sustained within the north of the Site (north of the railway) as well as in the south-west of the Site.

10.3.320. Equally, small populations of two common reptile species; Grass Snake and Common Lizard, were recorded within the Site, with these locations consistent with areas of suitable off-site habitat, or otherwise habitat which avoided removal during previous Site remediation.

10.3.321. No evidence of roosting bats was recorded within the buildings on Site. Whilst significant areas of woodland are present, these are assessed overall as being of low bat roosting potential, being dominated by fast growing Willows and Birches. A small number of trees were identified to have low potential to support roosting bats, whilst two trees (T1 and T2) initially assessed as of moderate bat roost potential were subject to tree climbing. No evidence of past or present roosting was associated with any trees during either aerial or ground based inspections.

10.3.322. Bat activity surveys confirmed the Site to be subject to a generally low level of activity. Unsurprisingly, relatively higher levels of bat activity are associated with the larger waterbodies, in association with areas of woodland and along the Site's vegetated boundaries, particularly the southern edge of the Site. Typically, very low levels of bat activity were recorded across open habitats.

10.3.323. The Site is not considered likely to be of any significant value for other notable or protected species or assemblages.

## 10.4. Inherent Design Mitigation

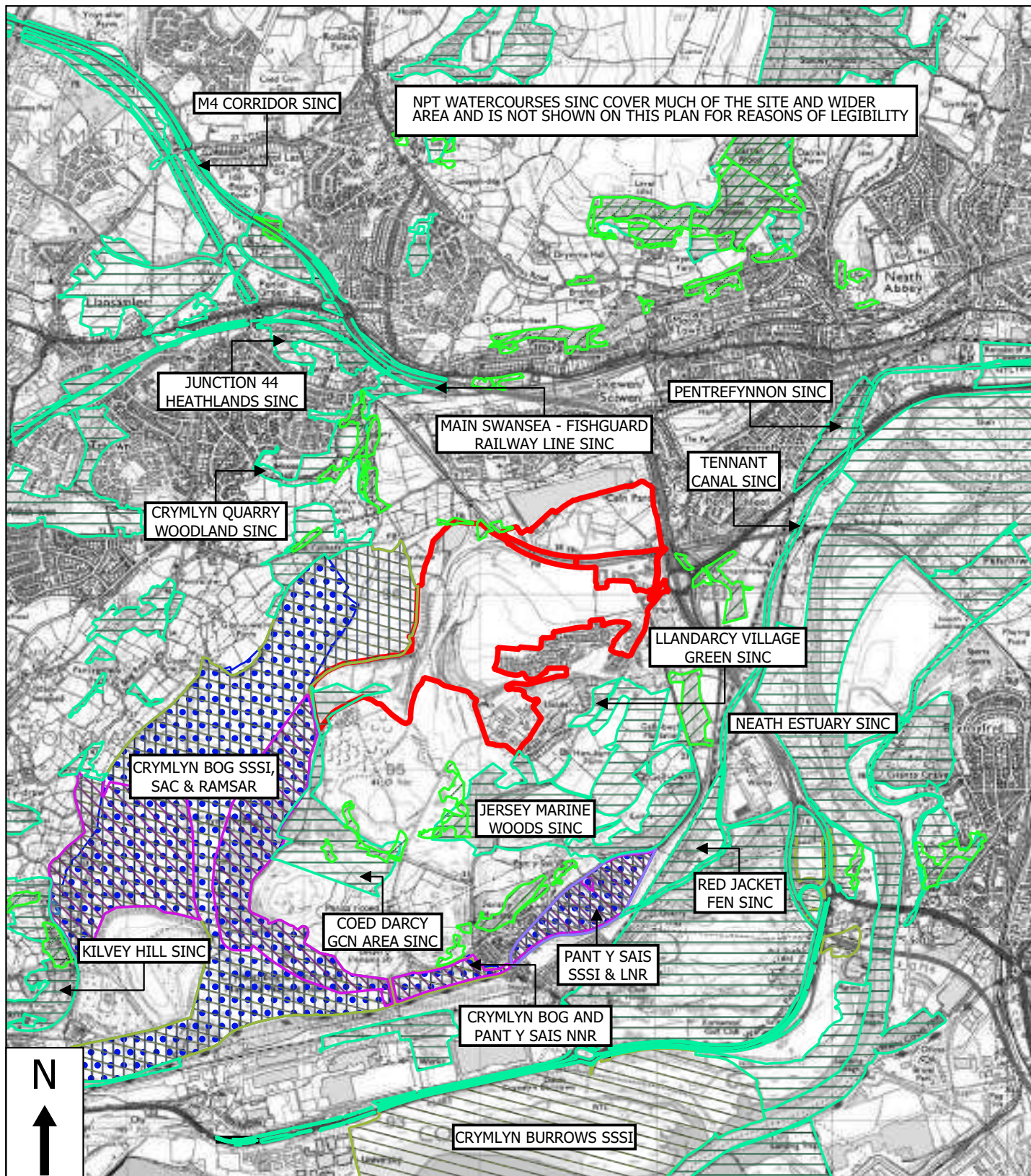
10.4.1. The Proposed Development will deliver extensive areas of greenspace as an inherent design feature, not least to achieve requisite SuDS capacity, as well as open space provision for future residents.

10.4.2. The delivery of these semi-natural habitats would undoubtedly ensure that habitats of ecological value are present post-development. However, in the absence of informed, biodiversity led design, there would be no certainty on the type of habitat delivered, nor reassurance that these habitats would be subject to appropriate management such that any biodiversity value can be retained in the long-term. Equally, the suitability of these habitats to support protected or notable faunal species/assemblages would be uncertain.

10.4.3. On this basis, it is concluded that for the vast majority of ecological receptors, no significant reliance could be placed on appropriate mitigation measures being secured through 'inherent design mitigation'.

**ENVIRONMENTAL STATEMENT**  
**CHAPTER 10 - BIODIVERSITY**  
**FIGURES**

**FIGURE 10-1**  
**Site Location**  
**and Ecological Designations**



- SITE BOUNDARY
- SPECIAL AREA OF CONSERVATION (SAC)
- RAMSAR SITE
- SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)
- NATIONAL NATURE RESERVE (NNR)
- LOCAL NATURE RESERVE (LNR)
- SITE OF IMPORTANCE FOR NATURE CONSERVATION (SINC)
- AREA DESIGNATED AS ANCIENT WOODLAND



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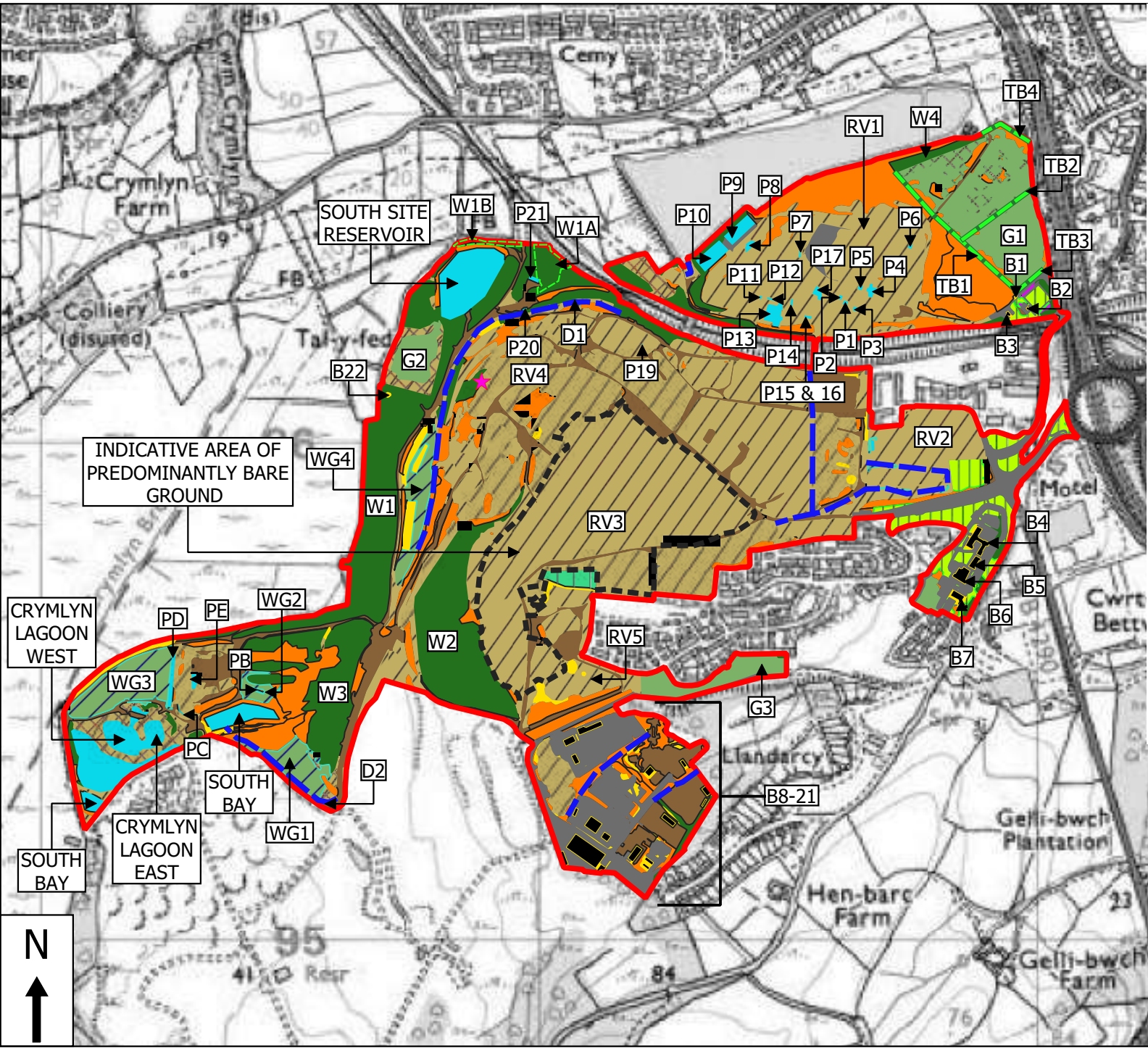
+44(0)161 4703232  
mcr@ecology-solutions.co.uk  
ecology-solutions.co.uk

9011M: COED DARCY,  
LLANDARCY, NEATH

FIGURE 10-1: SITE LOCATION  
AND ECOLOGICAL DESIGNATIONS

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**FIGURE 10-2**  
**Baseline Habitats**



**Key:**

- SITE BOUNDARY
- COMPACTED CLAY SOILS WITH A MOSAIC OF RECOLONISING VEGETATION
- WET GRASSLAND AND MIXED SCRUB
- SPECIES-POOR SEMI-IMPROVED GRASSLAND
- SECONDARY WOODLAND
- DENSE SCRUB
- SCATTERED SCRUB
- WATERBODY / POND
- DITCH
- RUSH PASTURE
- EXPOSED ROCK / CLIFF
- TREE BELTS / LINES
- AMENITY GRASS
- AMENITY PLANTING
- BUILDING
- SEALED (METALLED) HARDSTANDING
- UNSEALED HARDSTANDING
- RUDERAL
- AREA OF PREDOMINANTLY BARE GROUND
- JAPANESE KNOTWEED



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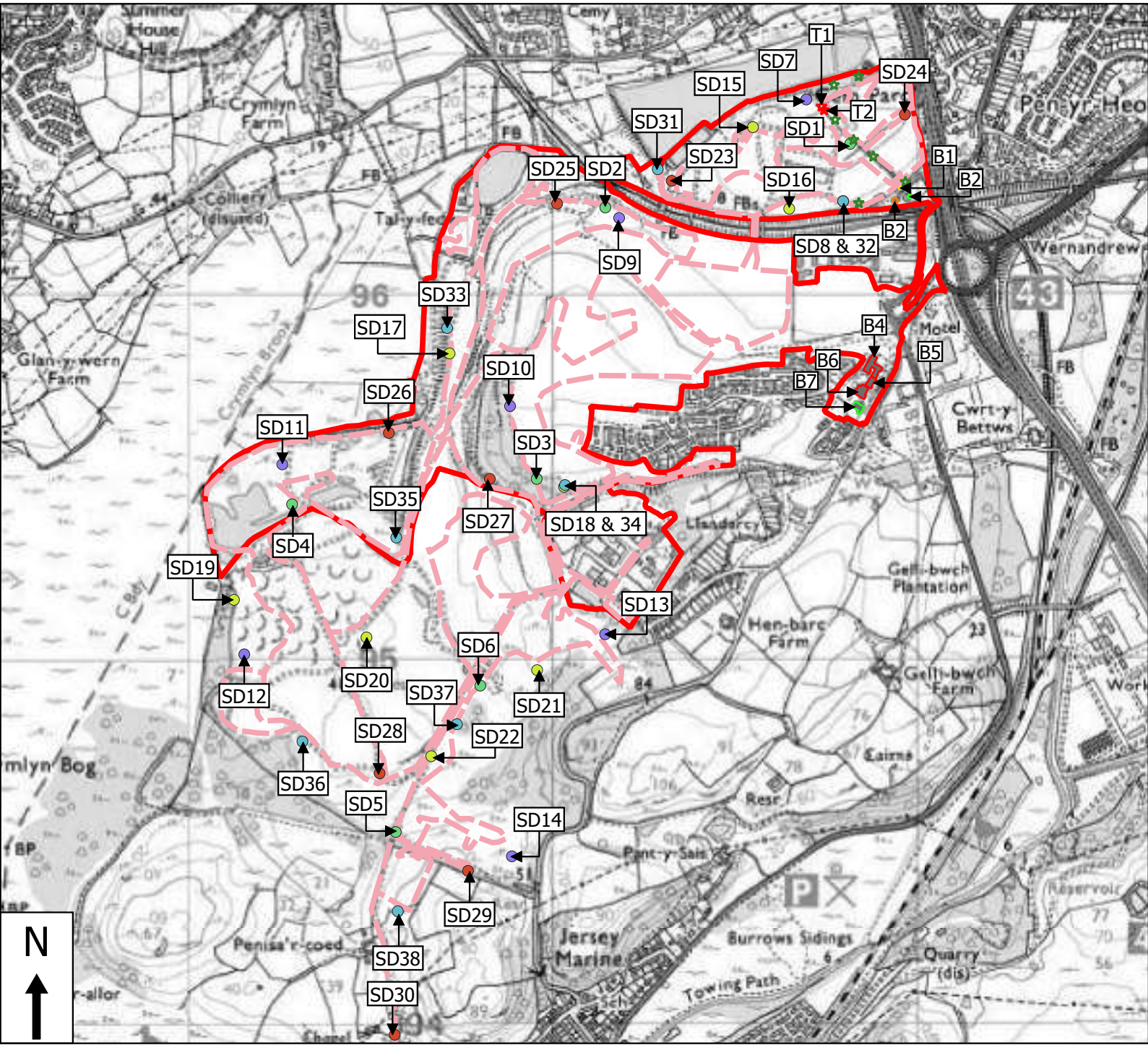
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FIGURE 10-2:  
BASELINE HABITATS

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**FIGURE 10-3**  
**Bat Surveys**



**Key:**

- SITE BOUNDARY
- INDICATIVE TRANSECT ROUTE
- JUNE 2020 STATIC LOCATIONS
- JULY 2020 STATIC LOCATIONS
- AUGUST 2020 STATIC LOCATIONS
- SEPTEMBER 2020 STATIC LOCATIONS
- OCTOBER 2020 STATIC LOCATIONS
- BUILDING SUBJECT TO EMERGENCE AND RE-ENTRY
- BUILDING SUBJECT TO EMERGENCE SURVEY ONLY
- BUILDING SUBJECT TO INTERNAL AND EXTERNAL SURVEY
- BUILDING SUBJECT TO EXTERNAL SURVEY ONLY
- ★ TREE SUBJECT TO AERIAL SURVEY
- ★ TREE DEEMED LOW BAT ROOST POTENTIAL

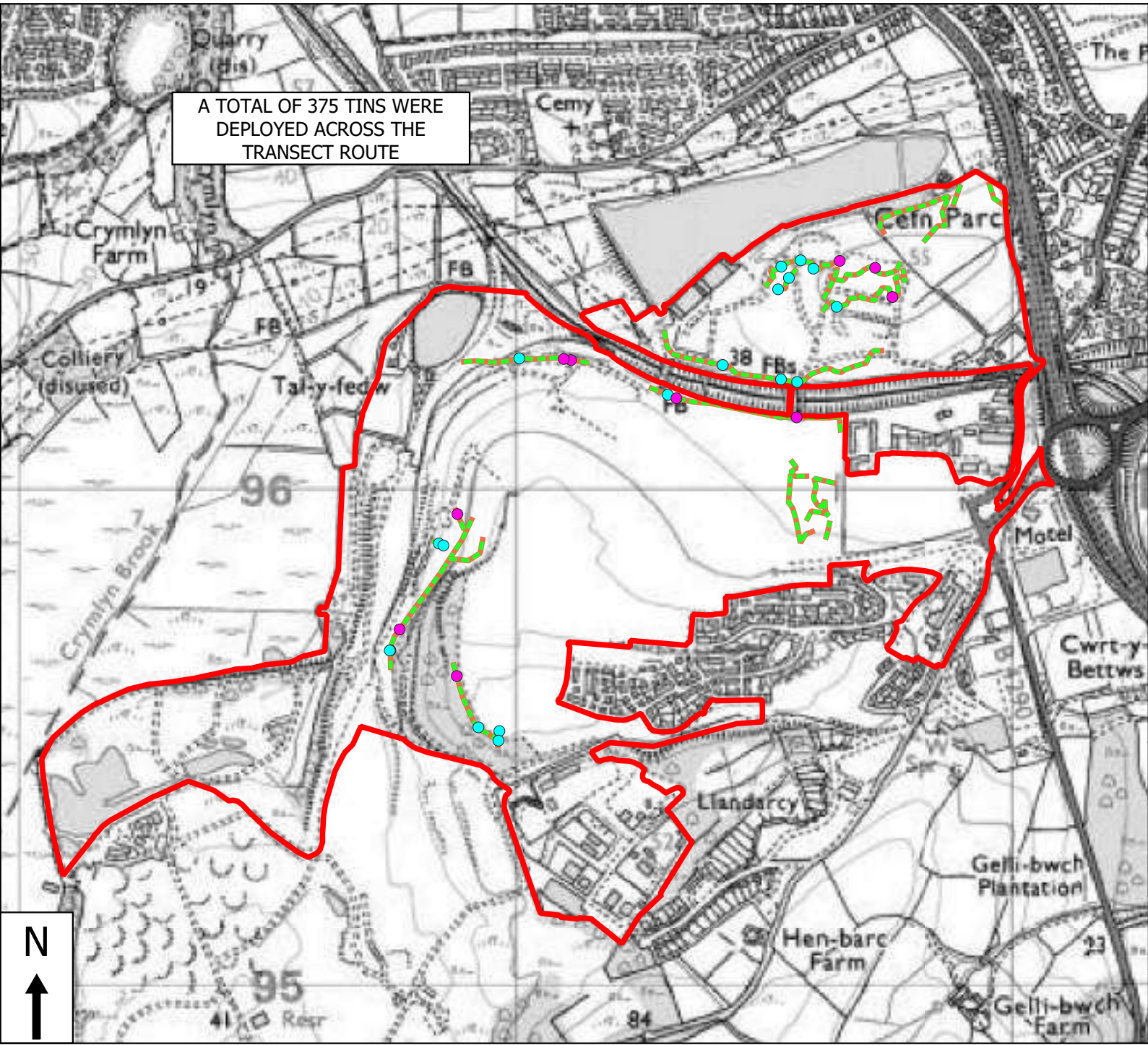


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**FIGURE 10-4**  
**Reptile Surveys**



**Key:**

- SITE BOUNDARY
- INDICATIVE REPTILE TIN LOCATIONS
- COMMON LIZARD
- GRASS SNAKE



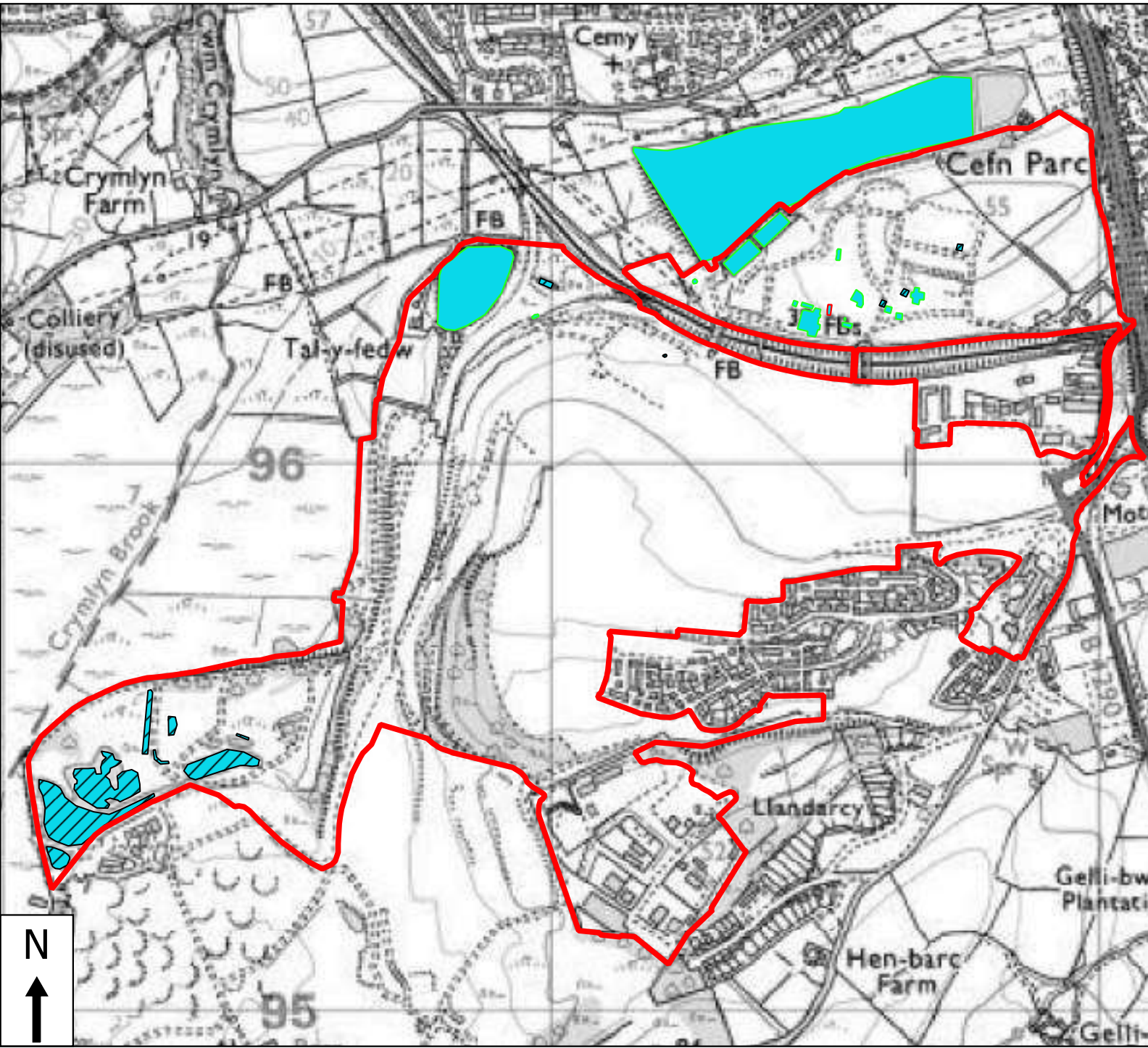
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FIGURE 10-4: REPTILE  
SURVEY RESULTS

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**FIGURE 10-5**  
**eDNA Surveys**



**Key:**

- SITE BOUNDARY
- NOT SURVEYED
- WATERBODY WITH NEGATIVE eDNA RESULT
- WATERBODY WITH POSITIVE eDNA RESULT



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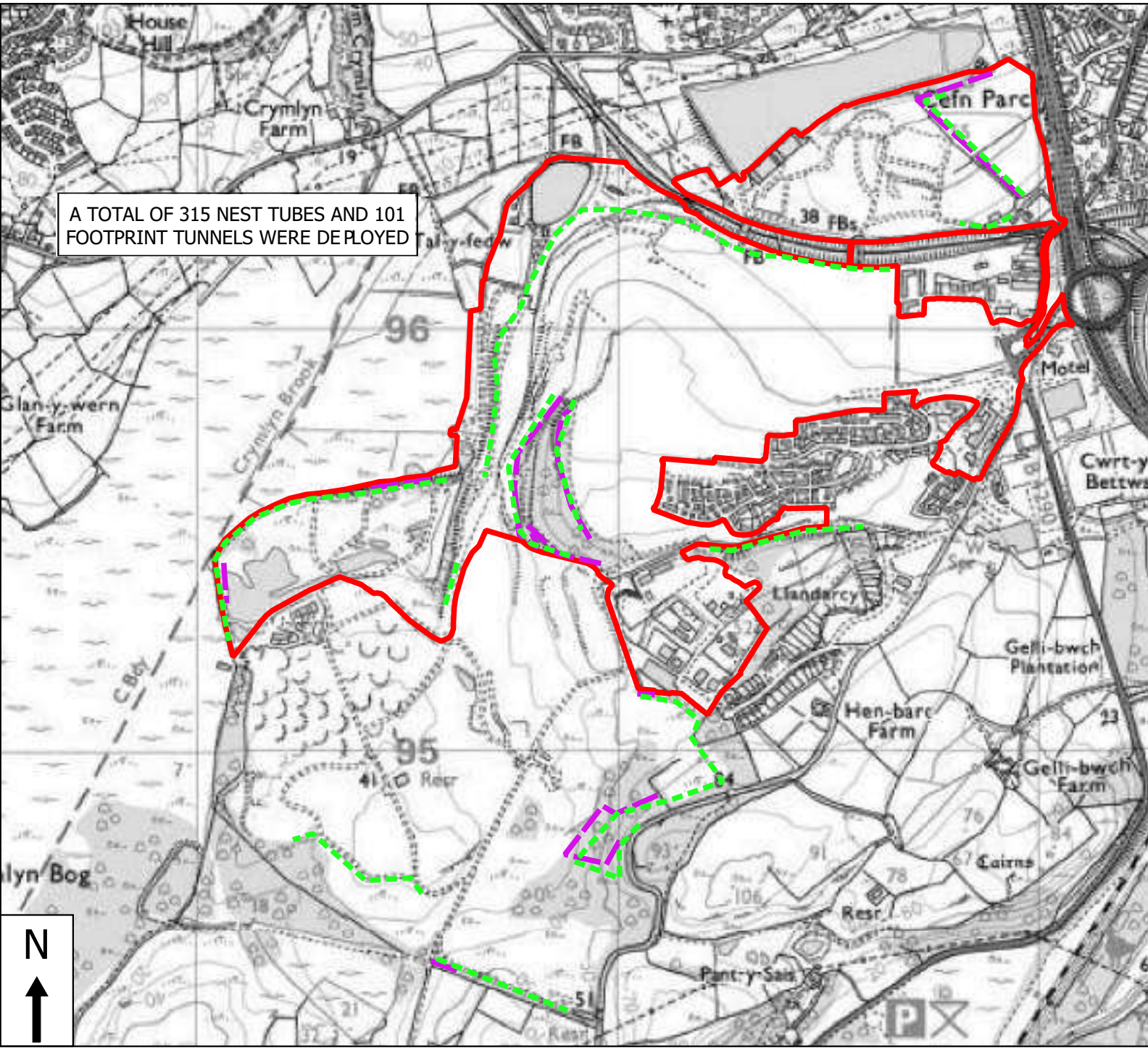
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FIGURE 10-5: EDNA  
SURVEY RESULTS 2021

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**FIGURE 10-6**  
**Dormouse Nest Tubes**  
**and Footprint Tunnel Locations**



Key:

- ▭ SITE BOUNDARY
- - - NEST TUBE LOCATIONS
- - - FOOTPRINT TUNNEL LOCATIONS



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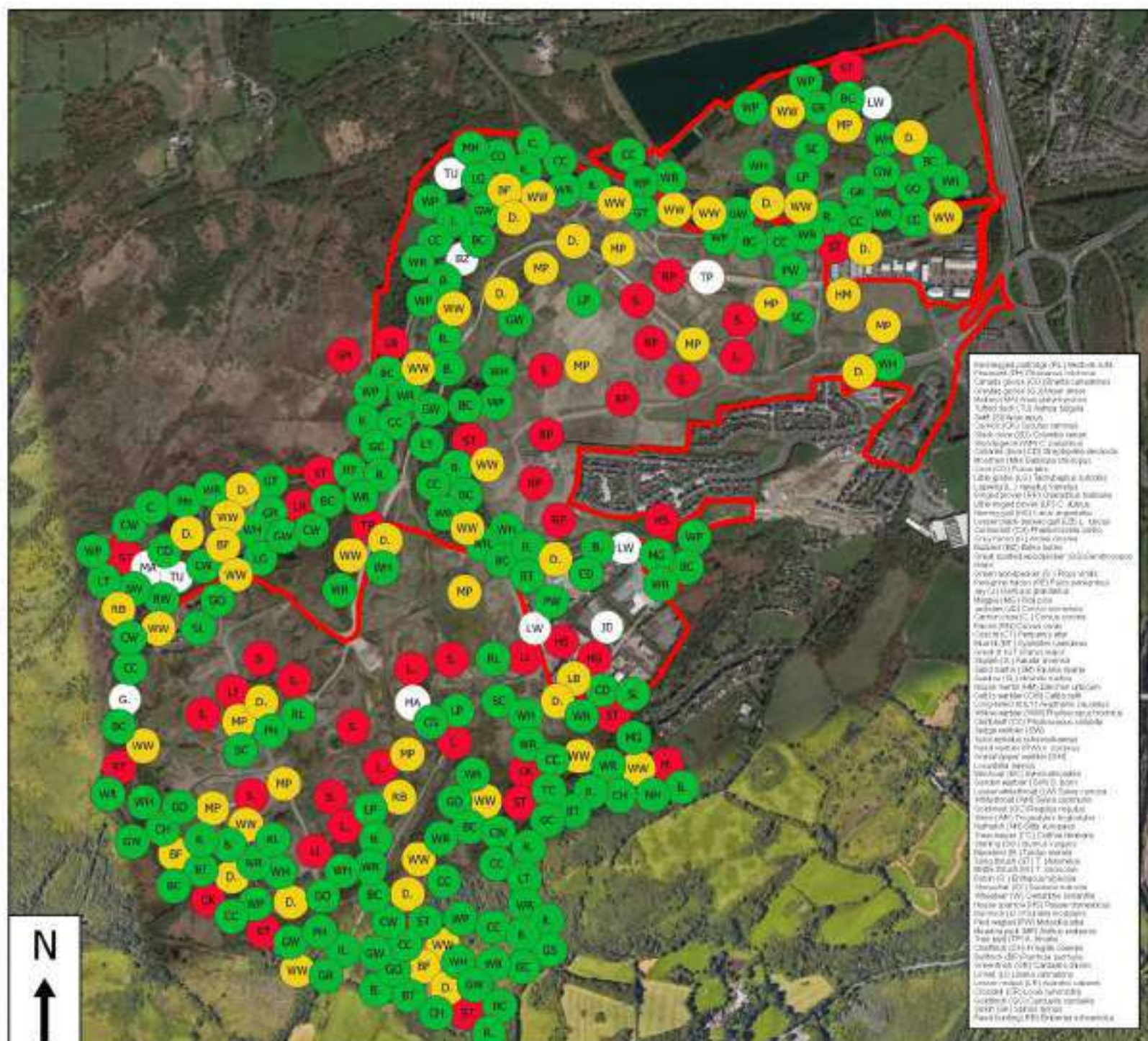
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FIGURE 10-6: DORMOUSE  
NEST TUBES AND FOOTPRINT  
TUNNEL LOCATIONS

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**FIGURE 10-7**  
**Breeding Bird Surveys**



### Key:

- Site Boundary
- Green Listed Species - Confirmed or Probably Breeding
- Amber Listed Species - Confirmed or Probably Breeding
- Red Listed Species - Confirmed or Probably Breeding
- Green Listed Species - Possible Breeding
- Amber Listed Species - Possible Breeding
- Red Listed Species - Possible Breeding

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FIGURE 10-7: BREEDING BIRD SURVEY PLAN 2020


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**FIGURE 10-8**  
**Ground Nesting Bird Surveys**



**Key:**

- SITE BOUNDARY
- NJ NIGHTJAR NOT BREEDING
- L LAPWING BREEDING PAIR
- RP RINGER PLOVER BREEDING PAIR



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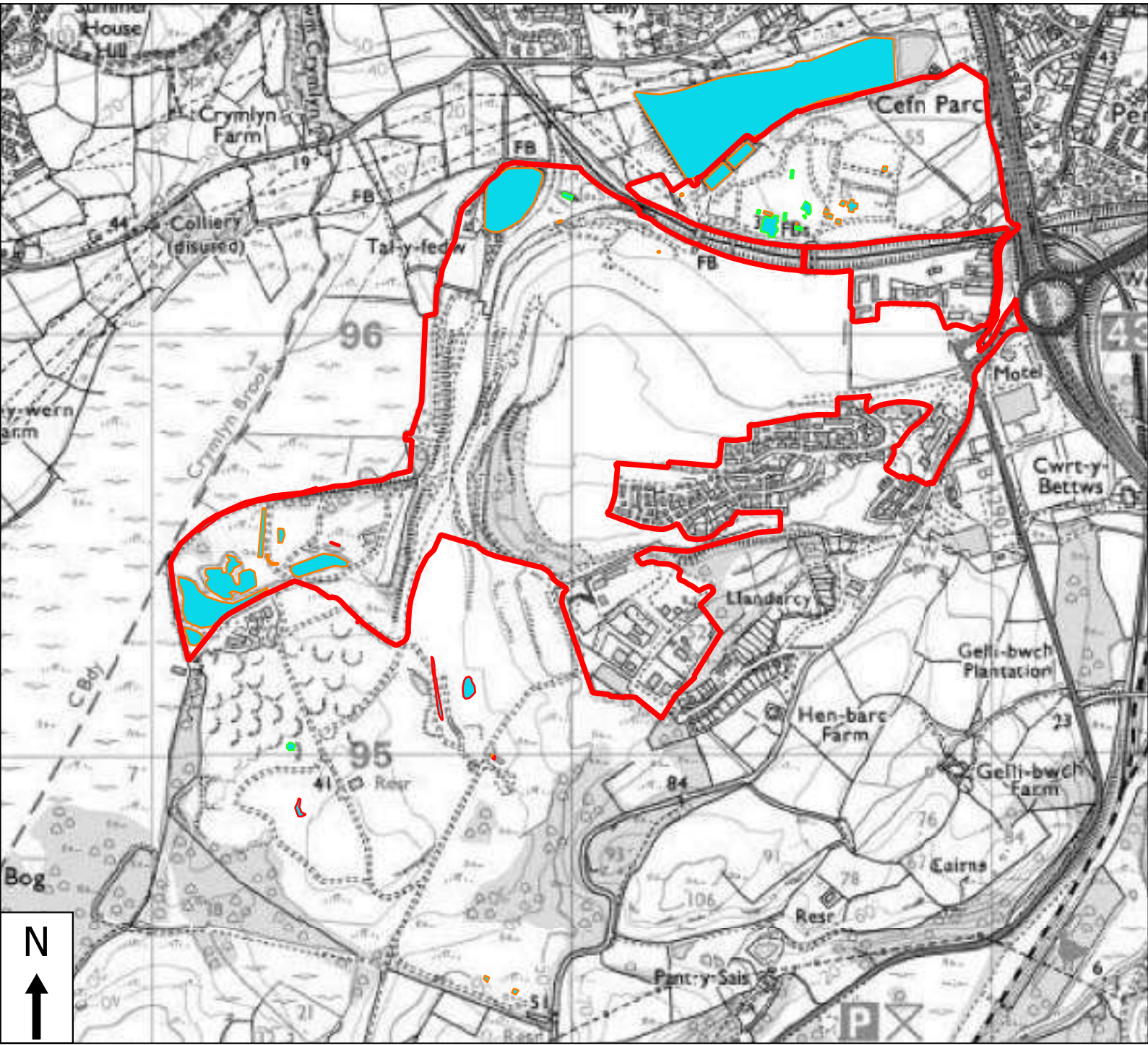
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FIGURE 10-8: GROUND  
NESTING BIRD RESULTS 2021

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Oct 21

**FIGURE 10-9**  
**eDNA Surveys**  
**Atkins, 2020**



Key:

- SITE BOUNDARY
- NO RESULTS OBTAINED
- WATERBODY WITH NEGATIVE eDNA RESULT
- WATERBODY WITH POSITIVE eDNA RESULT



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FIGURE 10-9: ATKINS  
2020 EDNA RESULTS

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Oct 21

## **APPENDIX 3**

### Winter Bird Survey Results ES Addendum

## 1. Wintering Birds

### 1.1. Introduction

1.1.1. Ecology Solutions (Manchester) Limited were initially commissioned by St. Modwen Properties in April 2020 to undertake Ecological Assessment work of land at Coed Darcy, Llandarcy, Skewen, Neath, (See Figure 10-1 of the ES Chapter), hereafter referred to as 'the Site', and to undertake a detailed assessment of the Proposed Development.

1.1.2. Subsequent to the submission of the Environmental Statement (ES) Chapter in November 2021, and noting comments received from statutory consultees as part of the PAC (Pre-Application Consultation) process, Ecology Solutions were commissioned to undertake a series of wintering bird surveys at the Site. The findings of the results are summarised below and form the Wintering Bird ES Addendum.

1.1.3. The Wintering Bird Addendum should be read in conjunction with the Biodiversity Chapter of the ES, as submitted in November 2021. For clarity, the updated information detailed within this Addendum relates specifically to wintering birds.

1.1.4. As detailed in the following sections of this Addendum, the survey findings do not materially alter the conclusions reached within the original ES submission.

#### Characteristics

1.1.5. The Site is located to the north of Llandarcy, Neath, and is approximately 126ha in size. The Site is bounded to the east by the current Coed Darcy built form (Phase 1), with the M4 beyond. The south of the Site is bounded by existing brownfield land (part of the wider Coed Darcy landholding), with localised areas of broad-leaved woodland, and the Coed Darcy Great Crested Newt *Triturus cristatus* (GCN) area Site of Importance for Nature Conservation (SINC) beyond. To the south-east of the Site lies an existing built form (Contractors Yard Industrial Estate), with Jersey Marine Woods SINC beyond. Much of the west of the Site is bounded by Crymlyn Bog Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), and Ramsar, with Crymlyn Bog and Pant-y-Sais National Nature Reserve (NNR) extending from the south-west boundary to the south-east beyond. To the immediate north of the Site boundary is the North Site Reservoir (NSR), and areas of scrubby woodland, with existing residential development beyond.

1.1.6. Further to the west and south of the Site lies open countryside and agricultural fields, with existing built form further afield to the north, west, and east of the Site. To the far south lies existing building with Crymlyn Burrows SSSI still further south, before Swansea Bay.

1.1.7. The Site itself comprises an area of previously developed land, the former site of the Llandarcy Oil Refinery, which has been subject to extensive remediation, re-profiling, and habitat clearance over an extended period. As a result of these works large areas of the Site comprise predominantly bare ground with very limited semi-natural habitats present. Where remediation works were completed less recently, substantial areas of the Site have recolonised with a range of early successional habitats. These early

# Wintering Bird (Addendum to ES Chapter 10: Biodiversity)

Coed Darcy



successional habitats are complemented by the Site's topographical variety as well as the presence of numerous ponds and mature vegetation such as scrub, tree belts, and woodland.

## Study Area

1.1.8. The study area considered as part of this Wintering Bird Addendum is primarily focused on the Site itself. To provide additional context, the winter bird surveys included assessment of the North Site Reservoir (NSR), as shown on Figure 10-10.

## 1.2. Methodology

### Survey Methodology

1.2.1. On each survey an experienced ornithologist slowly walked a circuitous route taking in all parts of the area, recording the locations, numbers, and activity of all bird species present in (and around) the area during this time. It is considered three visits provide a reliable picture of winter bird activity, although some species that may use the Site as part of a larger territory, especially nocturnal species such as owls, may be missed. The dates of the surveys are detailed below in Table 1.1A.

**Table 1.1A – Dates and Weather Conditions for Wintering Bird Surveys**

Date	Weather Conditions
12 December 2021	Cloud: 8/8; temperature: 13°C; wind speed: 2; drizzle
9 January 2022	Cloud: 6/8; temperature: 8°C; wind speed: 3; dry
5 February 2022	Cloud: 7/8; temperature: 8°C; wind speed: 3-4; dry

## 1.3. Baseline Environment

### Wintering Birds

1.3.1. A total of 54 species of bird was recorded during the three surveys. A summary of observations for each species is included in the schematic list in Table 1.2A below, whilst the distribution of wintering birds is shown in Figure 10-10.

1.3.2. These surveys confirmed both the Site and the wider Coed Darcy site supports a relatively wide range of species, reflecting the variety of habitats present, although it is noticeable that even the commonest species occur only in very small numbers.

1.3.3. The most significant record was of a Goshawk *Accipiter gentilis*, present over the main woodland at the Site in January. This Schedule 1 species was not recorded during the breeding bird survey undertaken in 2020 and presumably related to a wandering individual, although the woodland in and around

## Wintering Bird (Addendum to ES Chapter 10: Biodiversity)

Coed Darcy



the Site is suitable to support the species. Likewise, Red Kites *Milvus milvus* were regularly seen during the winter but were not present during the breeding bird survey. Woodcocks *Scolopax rusticola* were also flushed from the edges of the woodland; this Red List species being much more numerous and widespread in winter, when large numbers of continental birds return to the UK.

1.3.4. Also of note is the presence of up to seven Water Pipits *Anthus spinoletta* in a loose flock, ranging widely across the open areas and ephemeral pools, and colonising grasslands across the centre of the Site, as well as north of the railway. Water Pipit is a winter visitor to the UK in relatively small numbers, taking advantage of ephemeral habitats such as those at the Site. Other species present in these habitats include Jack Snipe *Limnocryptes minima*, Snipe *Gallinago gallinago*, Kestrel *Falco tinnunculus*, Skylark *Alauda arvensis*, Mistle Thrush *Turdus viscivorus*, Meadow Pipit *Anthus pratensis*, Grey Wagtail *Motacilla cinerea* and Linnet *Linaria cannabina*, although none of these were recorded in significant numbers, and they are all widespread and common species in winter.

1.3.5. The wetland habitats (western ponds and reedbeds, South Site Reservoir [SSR] and NSR) support very small numbers of very common species, with Teal *Anas crecca*, Mallard *Anas platyrhynchos* and Tufted Duck *Aythya fuligula* the only species to reach double figures. Other species recorded included a single Pochard *Aythya ferina* and Kingfisher *Alcedo atthis*, with Cetti's Warblers *Cettia cetti* and Reed Buntings *Emberiza schoeniclus* in reedbeds and associated vegetation.

1.3.6. Additionally, a few species associated with buildings (industrial estate and adjacent housing) include Herring Gull *Larus argentatus*, Starling *Sturnus vulgaris* and House Sparrow *Passer domesticus*, all of which are Red Listed, but remain abundant species during the winter.

**Table 1.2A – Bird Species Recorded During Wintering Bird Surveys**

Species and BTO Species Code	RSPB Listed	Notes
Blackbird (B.) <i>Turdus merula</i>	Green	Small numbers in vegetated areas
Blue Tit (BT) <i>Cyanistes caeruleus</i>	Green	Small numbers in vegetated areas
Bullfinch (BF) <i>Pyrrhula pyrrhula</i>	Amber	Flocks of up to 10 in vegetated areas
Buzzard (BZ) <i>Buteo buteo</i>	Green	One or two ever present
Canada Goose (CG) <i>Branta canadensis</i>	Feral	Two on western ponds and seven flew over in February
Carrion Crow (C.) <i>Corvus corone</i>	Green	Scattered ones or twos throughout

## Wintering Bird (Addendum to ES Chapter 10: Biodiversity)

Coed Darcy



Species and BTO Species Code	RSPB Listed	Notes
Cetti's Warbler (CW) <i>Cettia cetti</i>	Sch. 1	Up to four in western wetlands
Chaffinch (CH) <i>Fringilla coelebs</i>	Green	One or two in vegetated areas
Coot (CO) <i>Fulica atra</i>	Green	Up to two on western ponds and south site reservoir
Cormorant (CA) <i>Phalacrocorax carbo</i>	Green	One on western ponds in February
Dunnock (D.) <i>Prunella modularis</i>	Amber	One or two in vegetated areas
Goldcrest (GC) <i>Regulus regulus</i>	Green	One or two in vegetated areas
Goldfinch (GO) <i>Carduelis carduelis</i>	Green	Up to 15 in vegetated areas
Goshawk (GI) <i>Accipiter gentilis</i>	Sch. 1	A young female over the main woodland area in January
Great Spotted Woodpecker (GS) <i>Dendrocopos major</i>	Green	Singles in peripheral trees
Great Tit (GT) <i>Parus major</i>	Green	Small numbers in vegetated areas
Green Woodpecker (G.) <i>Picus viridis</i>	Green	Singles in peripheral trees
Greenfinch (GR) <i>Carduelis chloris</i>	Red	One or two in vegetated areas
Grey Heron (H.) <i>Ardea cinerea</i>	Green	Two in western ponds in February
Grey Wagtail (GL) <i>Motacilla cinerea</i>	Amber	Singles mobile around wet areas
Greylag Goose (GJ) <i>Anser anser</i>	Feral	One or two on western ponds or flying over
Herring Gull (HG) <i>Larus argentatus</i>	Red	Up to five at industrial estate, many others flying over
House Sparrow (HS) <i>Passer domesticus</i>	Red	Associated with the industrial estate and housing

## Wintering Bird (Addendum to ES Chapter 10: Biodiversity)

Coed Darcy



Species and BTO Species Code	RSPB Listed	Notes
Jack Snipe (JS) <i>Lymnocyptes minima</i>	Green	One flushed from pools north of the railway line in February
Jackdaw (JD) <i>Corvus monedula</i>	Green	Up to five present
Kestrel (K.) <i>Falco tinnunculus</i>	Amber	One in the area in January
Kingfisher (KF) <i>Alcedo atthis</i>	Sch. 1	One on western ponds in February
Lesser Redpoll (LR) <i>Acanthis cabaret</i>	Red	Up to five in vegetated areas
Linnet (LI) <i>Linaria cannabina</i>	Red	Up to 20 in open areas
Little Grebe (LG) <i>Tachybaptus ruficollis</i>	Green	Up to three on the north site reservoir
Long-tailed Tit (LT) <i>Aegithalos caudatus</i>	Green	Small numbers in vegetated areas
Magpie (MG) <i>Pica pica</i>	Green	Ever present around the industrial estate
Mallard (MA) <i>Anas platyrhynchos</i>	Amber	Up to 10 on each of the western ponds and south site and north site reservoir
Meadow Pipit (MP) <i>Anthus pratensis</i>	Amber	Up to 30 in open areas
Mistle Thrush (M.) <i>Turdus viscivorus</i>	Red	Up to eight in open areas
Mute Swan (MS) <i>Cygnus olor</i>	Green	Three on western ponds in February
Pied Wagtail (PW) <i>Motacilla alba</i>	Green	Scattered singles in open areas
Pochard (PO) <i>Aythya ferina</i>	Red	Singles on north site and south site reservoir
Raven (RN) <i>Corvus corax</i>	Green	One or two regularly in or over The area

## Wintering Bird (Addendum to ES Chapter 10: Biodiversity)

Coed Darcy



Species and BTO Species Code	RSPB Listed	Notes
Red Kite (KT) <i>Milvus milvus</i>	Sch. 1	One or two regularly over the site
Redwing (RE) <i>Turdus iliacus</i>	Amber	Up to five in wetland areas
Reed Bunting (RB) <i>Emberiza schoeniclus</i>	Amber	One or two in wetland areas
Robin (R.) <i>Erithacus rubecula</i>	Green	One or two in vegetated areas
Siskin (SK) <i>Spinus spinus</i>	Green	Up to four in or over vegetated areas
Skylark (S.) <i>Alauda arvensis</i>	Red	At least seven in open grassland In February
Snipe (SN) <i>Gallinago gallinago</i>	Amber	Up to nine flushed from pools, especially north of the railway
Song Thrush (ST) <i>Turdus philomelos</i>	Amber	Scattered singles in vegetated areas
Starling (SG) <i>Sturnus vulgaris</i>	Red	Up to 30 in associated with adjacent built areas.
Teal (T.) <i>Anas crecca</i>	Amber	Up to 18 on each of the western ponds and south site and north site reservoir
Tufted Duck (TU) <i>Aythya fuligula</i>	Green	Up to 11 on western ponds and South site and north site reservoir
Water Pipit (WI) <i>Anthus spinoletta</i>	Amber	Up to seven in open areas
Woodcock (WK) <i>Scolopax rusticola</i>	Red	Two singletons flushed from vegetation in December
Woodpigeon (WP) <i>Columba palumbus</i>	Amber	Small numbers in woodland
Wren (WR) <i>Troglodytes troglodytes</i>	Amber	Small numbers in vegetated areas

Sch.1 indicates a species included in Schedule 1 of the 1981 Wildlife and Countryside Act (as Amended).  
Note: Schedule 1, Red, Amber and Green Lists relate to breeding populations rather than wintering populations for most species but are included for completeness.

## Impacts on Protected Species

### Wintering Birds

1.3.7. The following Section considers impacts with the potential to arise on wintering birds as a result of the Proposed Development.

#### Site Usage

1.3.8. The Biodiversity Chapter of the ES, submitted in November 2021, concluded the Site as being of low importance for wintering birds and unlikely to support populations of raised conservation significance.

1.3.9. The wintering bird surveys completed between December 2021 and February 2022 largely reaffirm the previous conclusions reached in the Biodiversity Chapter, with the assemblage present not considered to be of heightened ecological significance.

1.3.10. Unsurprisingly given its scale and the variety of habitats present, the Site supports a relatively wide range of species during the winter. However, it was noticeable that even the commonest species occur only in very small numbers

1.3.11. The greatest winter interest recorded was associated with the woodland habitats, not least given the presence of a wondering Goshawk, with Woodcock providing additional interest. Of note within the ephemeral habitats in central areas was a group of up to 7 Water Pipit. Wetland habitats supported only small numbers of generally common species, as did areas of open habitat and scrub.

1.3.12. Where habitats of heightened value are present (for example the areas of woodland, as well as the larger waterbodies associated with Coed Darcy GCN SINC), these are to be retained and unimpacted. Moreover, whilst temporary impacts will be realised to SSR, this resource will be retained (and indeed enhanced) as a large wetland habitat.

#### Impacts

1.3.13. Prior to mitigation, potential impacts include:

- Some losses to wintering habitats (short to long term);
- Disturbance during construction (short term);
- Disturbance during operational phases (long term).

1.3.14. Given the limited use of the Site by wintering birds, impacts are considered **adverse** at Site level and of minor significance.

## 1.4. Additional Mitigation, Compensation and Enhancement Measures

1.4.1. This Section details the additional measures incorporated into the scheme such that potential effects on ecological receptors may be avoided or minimised, and enhancements sought. The measures

have been developed with input from other technical consultants in the Design Team, in order to ensure a viable scheme can be delivered, as well as with regard to discussions with relevant authorities (not least ecology consultees).

### Wintering Birds

1.4.2. The range of bird species recorded during the winter surveys confirmed the Site supports a relatively wide range of species, albeit in small numbers. Whilst the presence of some species, such as Goshawk and Water Pipit, added to the overall interest, the interest of the assemblage overall is assessed as low, as previously concluded within the submitted Biodiversity Chapter of the ES.

1.4.3. The avoidance, mitigation and enhancement measures outlined previously are therefore considered to remain appropriate and proportional for the Site. These measures are reiterated for completeness below. Where appropriate, specific consideration is given to target species such as Goshawk and Water Pipit.

1.4.4. Whilst SSR will be subject to significant modification, these works seek to create a naturalistic waterbody, replacing the somewhat artificial and steep banked feature currently present. The overall surface area of the waterbody will remain broadly unchanged. However, the emerging Proposals include for a reduction in waterbody depth (allowing it to be de-registered as a reservoir), and the removal of the concrete/aggregate lined banks, replacing these with gradual natural banks providing a wide draw down zone. Moreover, an island will be created within the centre of the Reservoir, providing optimal winter and breeding refuge, as well as foraging opportunities. This will ensure continued and enhanced opportunities for all of those species recorded within the SSR (and indeed other wetland habitats) during the winter survey work.

1.4.5. In addition, the Proposals would include for a dedicated ecology area measuring approximately 12ha, within which no formal public access will be permitted. The provision and retention of this dedicated ecology area, which adjoins the larger waterbodies within the Coed Darcy GCN SINC (and significant wetland), will ensure optimal wintering opportunities for a range of bird species. The retention of a resource within which disturbance is avoided in the long-term will moreover provide an enhancement relative to a baseline situation where extensive (if not irregular) disturbance has occurred over several years.

1.4.6. For example, in respect of Water Pipit, management will allow the retention of sparse and early successional habitats, including pools and marshy grassland which will ensure continued wintering opportunities in future years.

1.4.7. Moreover, the retention of woodland habitats (much of which will remain undisturbed on account of habitat topography) will ensure continued opportunities for species such as Woodcock. Regarding Goshawk, the retention of the woodland habitat will ensure the Site may continue to function as a component of a wider winter resource.

1.4.8. The adoption of a long-term management regime, to include marginal habitat creation and wetland habitat within the SSR, meadow management, open mosaic habitats (OMH) 're-generation' and waterbody management will further secure qualitative enhancement for wintering assemblages. The provision of retention/re-instatement of large areas of open grassland, to include for sensitive scrub

removal, will provide loafing habitat for waders, as well as foraging opportunities for flocks of Finches, whilst extensive areas of woodland and scrub will be retained for the benefit of Thrushes.

1.4.9. The retention and/or enhancement of large areas of open water, as well as extensive terrestrial habitat creation within the proposed green infrastructure network, will retain existing opportunities for wintering birds, with these to be further secured in the long-term through the establishment of appropriate management.

1.4.10. The above measures would further be secured within a Landscape Ecological Management Plan (LEMP) for the Site, with this to include targeted conservation measures (i.e. a Conservation Plan) for birds, amongst other relevant species.

1.4.11. As such, following mitigation and enhancements, potential effects are **positive** at Site level and of **minor** significance.

## 1.5. Residual Environment Impacts and Effects

1.5.1. Residual impacts remain as described within the submitted ES. For clarity, residual impacts will be positive at Site level and of minor significance.

## 1.6. Cumulative Effects

1.6.1. Cumulative effects remain as described within the submitted ES.

## 1.7. Assessment Summary

1.7.1. This Addendum is based on results from wintering bird surveys undertaken between December 2021 and February 2022. This addendum should be read in conjunction with the Biodiversity Chapter of the ES, as submitted in November 2021.

1.7.2. The Site supports a relatively wide variety of wintering bird species, albeit generally common and widespread and at relatively low numbers.

1.7.3. The most significant record was of a Goshawk, although this species was not recorded during previous breeding bird surveys in 2020 and therefore can be considered as a wandering individual. Likewise for the small number of Red Kites observed but not recorded during the previous breeding bird surveys.

1.7.4. A very small number of common and widespread species of waterfowl were recorded utilising the wetland habitats in the south-west of the Site and in the NSR and SSR. The wetland habitats in the south-west are to be fully retained as part of the Proposals, and the SSR will be enhanced.

1.7.5. The winter survey findings do not materially alter the conclusions reached within the original ES submission. The range of bird species recorded during the winter surveys confirmed the Site supports a relatively wide range of species, albeit in small numbers. Whilst the presence of some species such as Goshawk and Water Pipit added to the overall interest, the interest of the assemblage is low, as predicted within the submitted Biodiversity Chapter of the ES.

## Wintering Bird (Addendum to ES Chapter 10: Biodiversity)

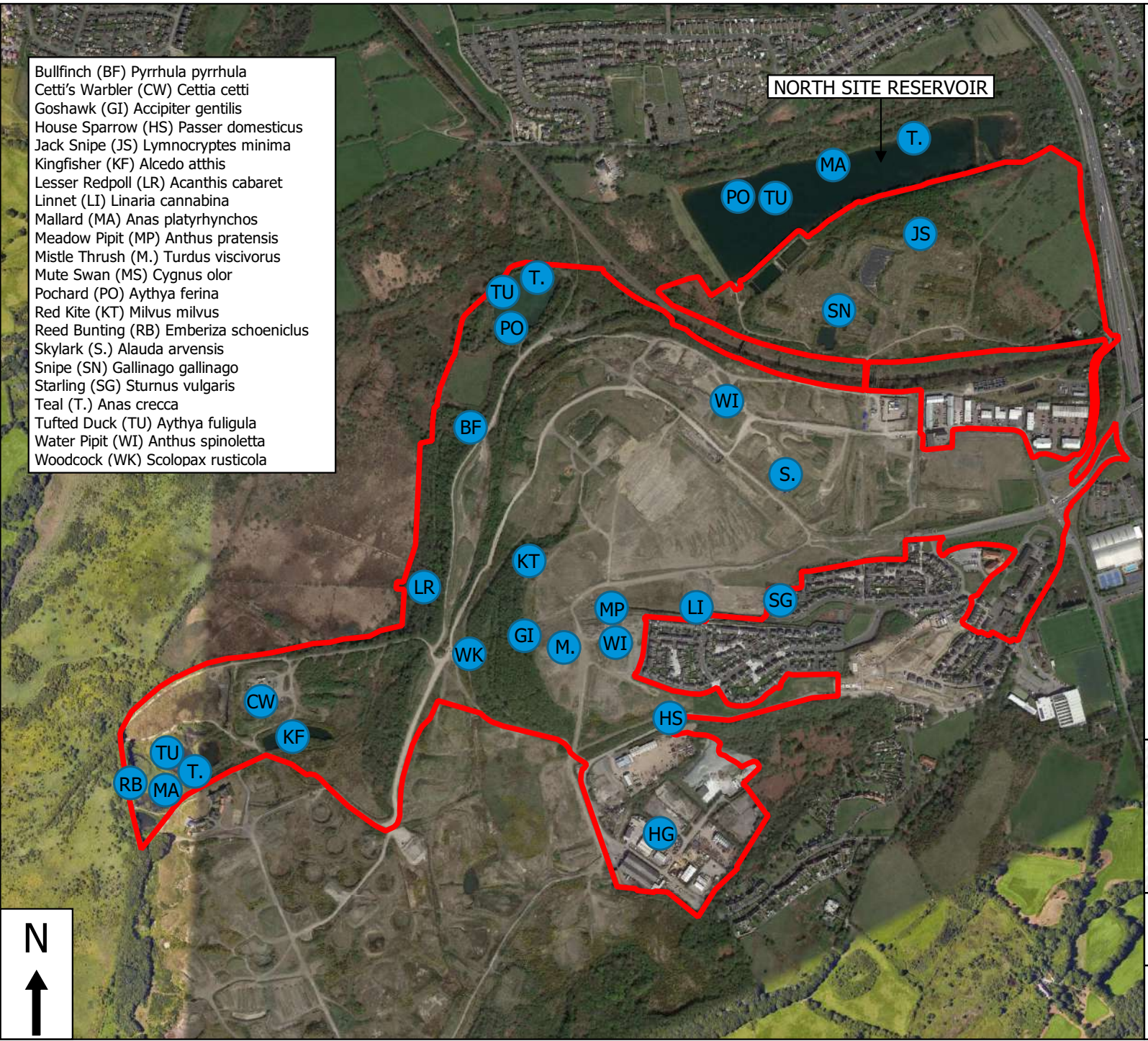
Coed Darcy




1.7.6. Accordingly, and with reference to the species recorded, the avoidance, mitigation and enhancement measures outlined previously remain appropriate and proportional for the Site. These measures will ensure adverse residual impacts on wintering bird populations will be avoided. Indeed, the suite of mitigation and enhancement measures proposed will ensure opportunities for positive ecological outcomes post-development

1.7.7. Overall, it is not considered the Proposals will have a significant impact on wintering birds at Coed Darcy, and the mitigation proposals will enhance opportunities to support wintering birds.

Topic	Mitigation Measures	Designed into the Proposed Development	Delivery via Condition (Outline/RM)	Delivery via Legal Obligation	Paragraph Reference in the ES	Proposed Monitoring Arrangement
Wintering Birds	Construction safeguards within CEMP. Dedicated Green Infrastructure design and, habitat creation and management. Provision of LEMP.	No	Yes		10.6.112 to 10.6.116	Construction monitoring by site personnel/ ecological oversight of relevant activities by Ecological Clerk of Works (ECoW). Long term habitat monitoring to be secured in LEMP and undertaken by adopted management body.



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9011M: COED DARCY, LLANDARCY, NEATH		
FIGURE 10-11: INDICATIVE DISTRIBUTION OF SELECTED WINTERING BIRDS		Rev: A Apr 22

## **APPENDIX 4**

### Invertebrate Survey Report

# Richard Wilson Ecology Limited



Terrestrial Invertebrate Survey, Former Llandarcy  
Oil Refinery, near Neath

Final Report

**Prepared for Ecology Solutions Limited**

October 2021

# Notice

This document and its contents have been prepared for Ecology Solutions Limited and is intended solely for information and use in relation to the proposed development located within the former Llandarcy Oil Refinery, near Neath, Glamorgan. This is the final report which should be used for the purposes of informing any ecological impact assessment, planning application or Development Consent Order.

Richard Wilson Ecology Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/ or its contents.

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# Executive Summary

- Ecology Solutions Ltd commissioned Richard Wilson Ecology Limited to undertake terrestrial invertebrate surveys for the purpose of informing an Ecological Impact Assessment for proposed residential development, known locally as Coed Darcy, within the former extensive footprint of the Llandarcy Oil Refinery ('the study site').
- The study site, located immediately to the south of Neath, covers just under 200 ha split unevenly between two land parcels; one to the north of the railway line and the substantial majority (170 ha) to the south. The habitats present include mosaics of grasslands, short perennial vegetation, scrub (scattered and more continuous), mature woodland and wetlands, much of which is identifiable as open mosaic habitat on previously developed land (OMH). The OMH is largely present within remediated and disturbed ground, which includes spoil heaps and other topography, which has resulted in a highly varied landscape. These have all been placed in context, considering invertebrate ecology, within the wider ecological landscape, considering the Swansea Bay National Landscape Character Area, and south Wales more generally.
- Two non-statutory sites are present within the study site and several more are designated within the local plan for their nature conservation interest.
- For the purposes of description, the study site has been divided in to two sectors, northern and southern, to reflect the proposed phasing of the development. However, evaluation has considered the site as a single entity. Reference to recent historical survey work within and immediately adjacent to the study site has been undertaken to place the 2020 data in context.
- Nine survey visits took place between mid-May and mid-September 2020 in reasonable to optimal weather conditions using a variety of methods including aerial netting, sweeping vegetation, vacuum sampling and direct observation. Static trapping (pitfall traps) were deployed to supplement the active surveying.
- A total of 505 species were recorded throughout the study site, of which 30 (6 % of the assemblage) are Key Species – those with a nature conservation status.
- Of the 30 Key Species, three are Rare Key Species (a spider – *Zodarion fuscum*; and two butterflies: dingy skipper and grayling); all of which are associated with dry grasslands and bare ground. Three Welsh threatened bees (*Andrena congruens*, *Sphecodes reticulatus* and brown-banded carder bee (*Bombus humilis*) were recorded in addition to several other species that are scarce or rare in the county/ Wales. The carder bee and both butterflies are also included in the Welsh Biodiversity List as Species of Principal Importance.
- Within the study site, 76 species are reliant on the vegetation communities present to complete their lifecycle, of which 57 species are present within the northern sector. Most are intrinsically linked with the OMH which represents a substantial resource in the context of the Swansea Bay National Landscape Character Area and south Wales.
- The physical characteristics of the OMH share similar properties to nearby coastal dune systems such as at Crymlyn Burrows SSSI and Kenfig SSSI. The OMH supports an assemblage of invertebrates that are characteristic of dry, flower-rich grasslands on highly heterogeneous topography of which coastal sand dune systems are interpreted as the natural equivalent. The study site is located within an ecological coastal landscape where there are several high quality protected sites such as at Crymlyn Burrows and Kenfig SSIs which are known to support important populations of individual Key Species.
- The invertebrate assemblages associated with the OMH has been evaluated to be of **regional nature conservation value**, based on the relative quality and extent of the habitat resource present for invertebrates within the wider region, number of Key Species and the proportion of stenotopic taxa (species dependent on restricted habitat conditions) recorded in specific assemblages, indicating favourable conservation status.

- Survey work during 2020 has been thorough, sufficient to evaluate the nature conservation value of invertebrate assemblages present within the study site and identify habitats and features of importance for terrestrial invertebrate assemblages.
- A narrative on relevant mitigation principles is provided, identifying development-led opportunities and means by which the existing OMH can be integrated within the proposed development and ensuring its resilience post-construction.

# 1 Introduction

## 1.1 Background

Richard Wilson Ecology Limited was commissioned by Ecology Solutions Ltd in mid-May 2020 to undertake terrestrial invertebrate surveys within the former Llandarcy Oil Refinery complex to inform the Ecological Impact Assessment (EclA) for a proposed phased residential development ('Coed Darcy') project.

This report provides the results of the survey work undertaken in 2020, including data analysis and evaluation, which can inform the future planning application's EclA.

### 1.1.1 Previous Invertebrate Surveys

The study site has had a prolonged ecological survey history dating back to the late 1990s (at least) and the Ecology and Nature Conservation chapter of the Environmental Statement that supported the Outline Planning Application (Planning Reference: P2005/0393) granted in February 2008 refers to "A *comprehensive suite of invertebrate surveys...*" in the summer of 2001 and again in 2004 (Parsons Brinckerhoff, 2005; paragraphs 16.3.9 to 16.3.11). However, whilst the relevant technical report (Appendix 16B to the Environmental Statement) has not been located, the report of the Planning and Development Control Committee (PDCC) meeting of <sup>1</sup>Neath Port Talbot County Borough Council (dated: 11<sup>th</sup> December 2007) provides a description which is summarised below:

The invertebrate surveys revealed a very diverse assemblage, including a number of species of conservation importance, including two Red Data Book species and eight that are nationally notable/ scarce. The high diversity is likely to be due to the variety of habitats present, as well as to the close proximity of the Crymlyn Bog SAC, which is known to support a very extensive invertebrate fauna. The most valuable areas for invertebrates were the large mosaic of woodland, grassland and heathland in the south-eastern corner of the site, the areas of species-rich grassland in the south-western corner, and the heathland/grassland habitats on the hillside in the centre of the site. However, species of conservation importance were distributed throughout the site.

The PDCC report further adds that:

A total of 195 moth species were recorded, including a number of Notable and 'local' species. This include dentated pug (*Anticollis sparsata*), silky wainscot (*Chilodes maritima*), thyme pug (*Eupithecia distinctaria*), marsh opaque-barred [sic] (it is actually marsh oblique-barred (*Hypenodes humidalis*)), dusky thorn (*Ennomos fuscantaria*) and frosted orange (*Gortyna flavago*), all of which are local priority species. The most significant result of the moth surveys was the presence of the double line (*Mythimna turca*) moth, which was recorded both in the south-west of the refinery site, near to the Crymlyn Bog, and within the corridor of the proposed Southern Access Route. This 'Notable B' [Nationally Scarce (Nb)] species is listed as a priority species in both the UKBAP [UK Biodiversity Action Plan] and the Neath Port Talbot LBAP, and is a species of principal importance listed under Section 74 of the Countryside and Rights of Way Act 2000. It is considered likely that its population is centred on Crymlyn Bog, but that areas of marshy grassland in the vicinity of the Bog are also used.

The <sup>2</sup>PDCC report further states that a total of 247 invertebrate species were recorded during these surveys though no complete list of taxa, even those with a nature conservation status, is included. The text refers to three Red Data Book (Rare) insects: an unspecified species of caddisfly (Trichoptera), horsefly (Diptera, Tabanidae) and rove beetle (Coleoptera, Staphylinidae); and the Nationally Scarce hairy dragonfly (*Brachytron pratense*).

<sup>1</sup> See [https://democracy.npt.gov.uk/Data/Planning%20and%20Development%20Control%20Committee/20071211/Agenda/\\$PLANDEV-111207-REP-EN-GW.doc.pdf](https://democracy.npt.gov.uk/Data/Planning%20and%20Development%20Control%20Committee/20071211/Agenda/$PLANDEV-111207-REP-EN-GW.doc.pdf); last accessed on the 11<sup>th</sup> February 2021.

<sup>2</sup> There is some confusion in the report as the initial paragraph refers to two Red Data Book and eight Nationally Scarce taxa (without stating what they are). Later, it refers to three unspecified Red Data Book species (see main text). Further, there is also confusion on the moth and butterfly species-richness: 195 species of moth are referred to initially; then 164 species of moth and butterfly.

In the absence of the detailed invertebrate survey report, given that moths and butterflies are the dominant component, representing between two-thirds and just over three-quarters of the assemblage (see Footnote 2), it suggests that the primary focus of the historical surveys was light-trapping moths, supplemented by direct observations of dragonflies and limited sampling of fauna.

The survey data is now between fifteen and twenty years old, and in the intervening period, substantial changes have occurred within the study site following remediation of the surface. Historical aerial photography on Google Earth illustrates that after 2009, substantial groundworks sequentially cleared surface infrastructure and vegetation communities that were present at the time of the invertebrate surveys, such that assemblages recorded then will have been substantially affected by habitat loss. Thus, the historical invertebrate survey work is likely to have limited relevance to placing assemblages present today in context as the vegetation communities that have developed post-remediation are likely to be different structurally and in terms of species composition. This said, given the extensive nature of the study site, there may be isolated small areas, particularly on the edge of the site or adjacent to the mature woodland where some previously recorded taxa, or remnant historical invertebrate assemblages have persisted, but in the absence of any detailed report, it is not possible to state with confidence whether species and assemblages recorded in 2020 are related to the earlier fauna. Therefore, any relationship between the current invertebrate assemblage and the historical one is likely to be tenuous, or a consequence of the adjacent, relatively more stable ecological landscape. This is considered in more detail in Section 4.1.

## 1.2 Study Site

The former Llandarcy Oil Refinery occupies approximately 196 ha over two separate land parcels separated by the Cardiff to Swansea mainline railway. The smaller land parcel to the north (Cefn Parc, centred on SS 716 963) occupies about 26 ha; and the substantially larger land parcel is to the south (centred on SS 708 954) and occupies about 170 ha. Additionally, there is a proposed approximate 1 km long Southern Access Road leading from Parc Amazon in the south (at SS 705 935) to the former Oil Refinery's southern boundary (at SS 705 944).

The Oil Refinery was constructed in the 1920s on a natural raised landform (ranging between 10 m AOD on its western flank to just over 90 m AOD on its eastern edge), between Neath and Aberavon to its east, and Swansea to its west, in south Wales (vice-county 41: Glamorgan). Following closure in 1998, the infrastructure was demolished in 2009.

The study site is located within the Swansea Bay National Landscape Character Area (NLCA), a narrow coastal plain with the steeply rising South Wales Valleys as its hinterland. The Swansea Bay NLCA is characterised by a mix of urban settlement and industry, coastal sand dunes and heaths and major estuaries, of which the Rivers Neath and Abertawe are proximal to the study site.

Immediately adjacent to the study site and sharing a boundary is Crymlyn Bog (Cors Crymlyn) Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC) and Ramsar Site (hereafter referred to as Crymlyn Bog SSSI for simplicity). Crymlyn Bog has been designated for a number of features including wetland invertebrate assemblages associated with flushes, streams and ditch habitats; and the presence of the <sup>3</sup>hornet robberfly (*Asilus crabroniformis*). Crymlyn Burrows SSSI is located approximately 1.4 km south of the former Oil Refinery (excluding the proposed footprint of the southern access road) and is also noted for the invertebrate assemblages associated with the sand dune system

Several non-statutory sites (Sites of Importance for Nature Conservation (SINC)) are present within a 2 km buffer of the study site, of which three are partially located within its boundaries. The mature oak woodland located within the study site (centred on SS 709 947) forms part of the more extensive Jersey Marine Woods SINC which extends to the east and also includes scrub, bracken and lowland meadow habitat. The land to the immediate south of the former Oil Refinery, associated with Penisa'r Coed farmhouse, and through which the proposed Southern Access Route passes (SS 701 945), and the large waterbody associated with the 'demonstration village' in the south-west of the study site (SS 701 953) is designated as the Coed Darcy Great Crested Newt Area SINC and is a receptor site for great crested newt (*Triturus cristatus*) that were translocated out from the study site in the late 2000s. Habitats include waterbodies, grasslands and scrub. The third non-statutory site lies at the southern end of the proposed southern access route: Amazon Woodlands SINC has been designated for a rare plant and woodland habitat.

<sup>3</sup> At the time of designation, the robberfly was Nationally Scarce, but it has since become more widespread and consequently downgraded to Least Concern (Drake, 2017).

### 1.2.1 Summary of Habitats and Vegetation Communities (2020)

Botanical surveys that have mapped vegetation communities within the study site have been completed by Ecology Solutions during 2020 and are reported elsewhere but for the purposes of this report, field notes and photographs taken by the surveyor have been used to provide the following description.

No evidence of surface infrastructure pertaining to the former Oil Refinery remains *in situ*, having been subject to demolition and remediation. As a consequence of the varying intensities of remediation over an extended period of time (i.e. several years), of which it is understood that the last main period occurred during 2018 (north-eastern area behind the security cabin), vegetation communities and cover are variable throughout the study site. Further, the made ground topography is highly heterogeneous with spoil heaps of soil, rubble and other broken hardstanding scattered throughout the extensive area. Based on an informal understanding of the recent site's history, vegetation communities within much of the study site are of variable age, ranging from recently established (< 2 years) upwards to approximately ten years old. These habitats include floristically diverse tall grassland swards, short perennial vegetation with a high percentage of bare ground, ephemeral wetland vegetation as a consequence of impeded drainage and scattered scrub, which form mosaics on a complicated topographical surface that includes hollows, vertical and sloping surfaces ('soft cliffs') and undulating level ground. Collectively, this entire area can be defined as Open Mosaic Habitat on Previously Developed Land (OMH), a Habitat of Principal Importance (HoPI) (see Section 2.1 for further details). The OMH included habitats with an abundant and diverse pollinator resource of varying species of which the Asteraceae (daisy family), and Apiaceae (carrot family, 'umbellifers') were a substantial component.

Established and stable vegetation communities occur as pockets associated with the extensive OMH such as adjacent to retained internal access roads/ tracks, or towards the edges of the study site. In the latter's instance, these retained communities exist as boundary features; for example, the woodland strip/ mature hedgerow delineating the former Oil Refinery's western edge and the adjacent Crymlyn Bog SSSI; and the mature woodland component of the Jersey Marine Woods SINCC.

In summary the dominant component of the study site is a diverse OMH that forms structurally complex vegetation communities with more established mature vegetation. The site's topography, including spoil heaps, smaller mounds and linear embankments in combination with the OMH and mature vegetation communities have provided a complex resource for terrestrial invertebrates. The composition of the invertebrate assemblages present will be influenced by the study site's relationship with the wider ecological landscape and this is considered in more detail below, and when evaluating the results (see Section 5).

### 1.2.2 Context with Surrounding Landscape

The study site is located on a natural landform that forms a distinctive ridge defined by the River Neath valley to its east, and Crymlyn Bog SSSI to its west. To the north, the land rises, forming north-south orientated valleys separated by linear high ground that define the South Wales Valleys. This landform is a prominent feature within the narrow coastal strip of the Swansea Bay NLCA, which is characterised by a mix of urban and industrial development in close proximity to more natural landforms such as the coastal sand dunes at Crymlyn Burrows SSSI and Baglan Bay; and the valley mire of Crymlyn Bog SSSI. The OMH, which is the dominant vegetation community within the study site is of relatively recent origin, following post-demolition remediation work that commenced about ten years ago, and is in stark contrast to the more established semi-natural vegetation communities, which are known to support nationally important invertebrate assemblages including those known from the adjacent statutory protected sites. However, the OMH share similar features with some of the coastal habitats including free-draining substrates, highly heterogeneous topography, flower-rich grasslands, a bare ground resource, including spoil heaps that mimic soft cliff exposures and therefore, the habitats present within the study site are potentially functionally connected to these high value habitats, despite their different origins. As a consequence, the invertebrate assemblages, particularly more mobile groups such as the Diptera and aculeate Hymenoptera may have affinities with these biotopes that are present in the not too distant wider landscape, including the protected coastal sites in the vicinity of the study site.

### 1.2.3 Proposed Development Footprint

The current proposals are for a multi-phased development of the entire site, including a Southern Access Road linking the future completed development to Parc Amazon. The survey work reported here covers the majority of the former Llandarcy Oil Refinery footprint (though see Section 1.3.2 for access limitations). However, only the extreme southern end of the Southern Access Route, immediately off Parc Amazon and within the Amazon Woodlands SINCC, was surveyed due to lack of access north of the Tennant Canal.

In January 2021, Ecology Solution Ltd communicated that the next phase of the development would be confined to the northern section of the study site, comprising Cefn Parc (smaller land parcel north of the railway line) and the northern half of the main site, approximately north of Tank Farm Road (see Appendix A).

## 1.3 Survey Limitations

### 1.3.1 Coronavirus Pandemic

In mid-March 2020, following the emergence of Coronavirus (Covid-19), the UK and devolved Governments announced a strict lockdown which extended through until late April 2020. This lockdown required all but essential workers to stay at home. As a consequence, and until the Chartered Institute of Ecology and Environmental Management (CIEEM) issued guidance following confirmation from the Welsh Government (Minister for Housing and Local Government), it was uncertain whether ecology surveys (within the planning system) were included in the definition of 'essential worker'. This was resolved in early May 2020, and thus the first survey commenced shortly after. The implications of this delayed start are discussed below.

### 1.3.2 Access Limitations

Access was not gained into the mature woodland that forms part of the Jersey Marine Woods SINC due to the dense impenetrable field layer, the western edge within the Oil Refinery being ringed by dense growth of continuous gorse (*Ulex europaeus*) and other scrub that formed a barrier at the base of a steeply sloping extensive spoil mound. An attempt was made to access the SINC from the minor road leading up from Jersey Marine and which forms the study site's eastern boundary. Most of the boundary is defined by tall metal fencing, though a section had been damaged sufficiently to gain safe access. However, the dense underscrub prevented any meaningful access in to the woodland.

Access was also not obtained along the proposed route of the Southern Access Road, with the exception of the short corridor leading north from Parc Amazon and the Tennant Canal (which was accessed via the towpath).

For safety reasons, the shoreline of the large reservoir in Cefn Parc was not approached, or spoil heaps where the substrate was considered unstable.

### 1.3.3 Weather Limitations

The spring of 2020 was remarkable for its prolonged dry and hot weather. Weather conditions leading up to the first main visit (mid-May 2020) were generally warmer and substantially drier than the long-term average (Meteorological Office <sup>4</sup> website). This was followed by a generally average, in terms of warmth (temperature), but a wetter and cloudier early to mid-summer (Meteorological Office <sup>5</sup> website). This combination of an exceptionally warm and dry spring followed by a cloudier and wetter summer is considered likely to have affected invertebrate species, especially their larval stages. Spring and early summer faunas are considered to have emerged early, in response to the clement weather, or died before emerging as adults due to desiccation. This, in combination with the delayed start as a consequence of Government restrictions arising from the Coronavirus Pandemic (see Section 1.3.1) resulted in this initial spring emergence possibly being at least partially missed.

### 1.3.4 Implications

The results of the surveys undertaken are likely to have been influenced by the conditions (weather and Pandemic) experienced in 2020 in that some spring and early summer species, if present, may have been missed. Evaluating the data will have a greater focus on invertebrate assemblages and not just individual species of conservation interest. This, combined with a thorough survey effort and consideration of habitat features will ensure a robust evaluation of the study site and individual land parcels, enabling an informed conclusion. Lack of survey in the Jersey Marine Woods SINC and the Southern Access Route corridor north of the Tennant Canal will have reduced our understanding of invertebrate assemblages associated with mature woodland and intact grasslands. Given that these sites are not being brought forward (Southern Access Route) or developed (SINC), there are no implications for the lack of access. However, if/ when these areas are brought forward, access will be required, especially within the SINC. For the latter, it may be necessary to initially clear some vegetation (outwith the breeding bird season) sufficient to create a safe access path into the woods.

<sup>4</sup> See [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk\\_monthly\\_climate\\_summary\\_spring\\_2020\\_may.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk_monthly_climate_summary_spring_2020_may.pdf); accessed on 22<sup>nd</sup> September 2020.

<sup>5</sup> See [https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk\\_monthly\\_climate\\_summary\\_summer\\_2020\\_3.pdf](https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk_monthly_climate_summary_summer_2020_3.pdf); accessed on 22<sup>nd</sup> September 2020.

## 2 Legislation

### 2.1 Legislation

Sixteen species of invertebrate present in the United Kingdom are protected through international law. These were originally included in Appendices to the European Union's Habitats Directive and transposed into domestic legislation by the Conservation of Habitats and Species Regulations 2017 (as amended). Since January 2021, following the UK's departure and the end of the transition period, retained EU-derived legislation has been carried over via Sections 2 and 3 of the European Union (Withdrawal Agreement) Act 2018 (as amended). This Act ensures the retention of the 2017 Regulations on and after departure day (1<sup>st</sup> January 2021). Further, for the purposes of biodiversity, the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 have been made to address failures of retained EU law to operate effectively and other deficiencies, by amending the 2017 Regulations to ensure their validity.

Approximately 50 species of invertebrate are included in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

Section 6 of the Environment (Wales) Act 2016 requires all local authorities to introduce an enhanced biodiversity and resilience of ecosystems duty (the Section 6 duty) in the exercise of functions in relation to Wales. The duty requires that public authorities must seek to maintain and enhance biodiversity so far as consistent with the proper exercise of their functions and in so doing promote the resilience of ecosystems. Further, Section 7 provides for a list of species and habitats of principal importance, of which 188 invertebrate taxa are listed.

A full list of all species covered by legislation and policy is available via the Biodiversity Wales' <sup>6</sup>website.

### 2.2 Policy

Paragraphs 6.4.1 to 6.4.27 inclusive of Planning Policy Wales conveys Welsh policy on conserving and enhancing the natural environment including protecting habitats and biodiversity in the planning system (Welsh Government, 2018a). Guidance underpinning Planning Policy Wales is available via the Technical Advice Note 5: Nature Conservation and Planning (Welsh Government, 2009) which provides a detailed narrative on considerations to protect and enhance biodiversity as part of the planning process.

The original Welsh National Pollinator Strategy (Welsh Government, 2013) is particularly relevant for nature conservation of pollinators and emphasised the then duty under Section 42 of the Natural Environment and Rural Communities Act 2006 for local authorities to have regard to biodiversity. This has now been updated to reflect the Environment (Wales) Act 2016 and the Well-being of Future Generations (Wales) Act 2015 (Welsh Government, 2018b).

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<sup>6</sup> See <https://www.biodiversitywales.org.uk/File/56/en-GB>; last accessed on the 12<sup>th</sup> February 2021.

## 3 Methodology

### 3.1 Desk Study

The ecological desk study has been undertaken by Ecology Solutions and relevant historical records of invertebrates received from the South-east Wales Biological Record Centre (SEWBReC) have been forwarded on for the report. Further information sources have been referred to as necessary, including from the author's library, in addition to referencing previous survey work (referred to in Section 1.1.1).

### 3.2 Field Survey

The purpose of the work was to undertake an appraisal of the study site's nature conservation value for terrestrial invertebrates and is therefore not intended to provide an exhaustive list of invertebrate taxa present. In achieving these aims, the surveys followed the methodologies described in Drake *et al.* (2007) using a variety of techniques, including sweeping of vegetation and aerial netting for flying invertebrates using a light-weight butterfly net as well as a more heavy duty sweep-net. This was complemented by vacuum sampling (using a commercially available modified garden blow-vac), sieving leaf-litter, searching under refugia and direct observation plus some limited pitfall trapping.

Specimens collected were either identified in the field or retained for subsequent microscopic identification. Surveys paid particular attention to those groups most likely to include species of nature conservation interest, focussing on aculeate Hymenoptera (solitary bees and wasps), Diptera (flies), Araneae (spiders), Coleoptera (beetles) and Hemiptera (bugs). However, a wide range of invertebrate orders were recorded including day-flying Lepidoptera (butterflies and moths).

### 3.3 Evaluation Methodologies

There is currently no standard frame of reference to evaluate the nature conservation value of invertebrate assemblages for the purposes of EclA, though increasingly, in addition to placing reliance on professional judgement of the surveyor and associates, the use of Pantheon (Webb *et al.*, 2018) is being applied.

#### 3.3.1 Proportion of Key Species

An initial indication of a study site's nature conservation value is the proportion of species with a nature conservation status (NCS) recorded. NCS species are those that are assigned a formal status based on three systems applied to British invertebrates since the late 1980s. Details are provided in Appendix B but in summary, all NCS species are assigned a formal status which initially included Red Data Book (Shirt, 1987; Bratton, 1991), and Nationally Notable species (by various species status reviews administered by the Joint Nature Conservation Committee). Since 2001, consideration of a species threat to survival such as through habitat loss, based on the International Union for the Conservation of Nature's (IUCN) criteria (IUCN, 2012) has been adopted and this is gradually replacing the old Red Data Book categories. Running parallel with the IUCN criteria are two British rarity categories, which are based on the hectad system, which again are being defined by <sup>7</sup>updating species status reviews.

Telfer (2017) provided a means of evaluating a study site's potential nature conservation value by considering the proportion of NCS species present within a study site, on the basis that the higher the percentage of NCS species, the more important the study site is. He refers to NCS species as 'Key Species' and splits this in to two groups: Rare Key Species, which are those taxa assigned Red Data, IUCN Threatened and Data Deficient, and Nationally Rare status; and Scarce Key Species, which are those assigned IUCN Near Threatened, and Nationally Scarce/ Notable status. As a rule of thumb, if close to 10 % of the species recorded are Key Species; and more than 1 % are Rare Key Species, it is suggestive that the study site is potentially of national significance for its invertebrate fauna.

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<sup>7</sup> Updated species status reviews are published on the JNCC website: <http://jncc.defra.gov.uk/page-3352>

### 3.3.2 Invertebrate Assemblages

In considering species assemblages, the taxa recorded within the study site have been entered into Pantheon, a database tool developed by <sup>8</sup>Natural England and the Centre for Ecology & Hydrology to analyse invertebrate sample data (Webb *et al.*, 2018). Pantheon has incorporated the Invertebrate Species-habitat Information System (ISIS) developed by Derek Lott and referenced in Drake *et al.*, (2007) but takes the analysis further by attaching associated habitats and resources, habitat fidelity scores and other ecological information against each species. This is currently based on approximately 13,000 invertebrate species out of an estimated 37,000 species known from the UK. The taxa primarily used for this analysis are Coleoptera, Diptera, Hemiptera, Lepidoptera, aculeate Hymenoptera and Araneae; hence the focus on these groups for survey. As for the original ISIS, some caution must be applied as strictly speaking, survey effort would normally require standardisation such as timed sweeps.

For the purposes of EcIA, the methods have allowed what <sup>9</sup>Webb *et al.* (2018) describe as a semi-ISIS approach, stated to include some standardised methods such as timed vacuum sampling, static trapping such as pitfall or Malaise trapping; but extending to include more freeform sampling such as focussed searches for pollinators in a non-standardised way. Nevertheless, Pantheon can at least inform which invertebrate assemblages recorded are of particular importance within a site, such as those associated with wood decay, floristically rich habitats or both. A positive aspect of this approach is that attention is given to assemblages rather than solely relying on the national status of individual species, though the latter can also be indicative, especially as a proportion of the total species recorded.

Pantheon interrogates the composition of the terrestrial invertebrate assemblage in terms of biotopes, habitats, and the distribution of stenotopic species i.e. those terrestrial invertebrates with very specific and restricted habitat requirements and have an intrinsic nature conservation value; referred to as <sup>10</sup>Specific Assemblage Types (SAT) (Webb *et al.*, 2018). In doing so, the limitations of Pantheon as a tool have been recognised based on the semi-ISIS compliant approach and confidence in the reported condition is therefore medium. To mitigate this confidence level, professional judgement has been applied where necessary to assist robust valuation.

Pantheon can only identify whether a site is in favourable or unfavourable condition expected for SSSIs, and condition is not strictly analogous with value. However, if favourable condition is concluded then this can, taking into account other factors, provide evidence that objectives for sites of national value (SSSIs) are being met and this seems a reasonable proxy in this instance for national value. However, use of unfavourable condition to argue against national value is more problematic and requires a degree of caution and application of professional judgement to determine the appropriate geographic scale of nature conservation value. In addition, as the survey did not strictly comply with methods described in Drake *et al.* (2007), such as timed sweeps, a degree of caution and professional judgement is likewise necessary to accommodate for any bias (detracting or enhancing) within the analysis that might introduce subjectivity into the evaluation.

In an attempt to inject some objectivity into the use of Pantheon SATs to inform evaluation of nature conservation value and to counteract some of the caveats given above, the threshold limits for each of the SATs has been noted with the intention of providing a reasonable judgement. This can be made in terms of the Proportion to Threshold (PtT) achieved for each SAT identified. The threshold referred to is the number of species within a SAT expected to be present if a site is considered to be in favourable condition (FC). Thus, if a SAT records or exceeds the expected threshold, the PtT will be 100 % or greater and this is taken as the basis for considering assigning national value. In the absence of other guidance, where the PtT is < 100 %, professional judgement is used to assist with the rationale for assessing a nature conservation value of the invertebrate assemblage in a sub-national context (i.e. regional, county, district, local). The further away from the threshold, the lower the nature conservation value the SAT. Other factors considered when determining the value include species-richness, proportion of Key Species in the assemblage, proportion of county rarities or significant records (where known), and site context within the landscape (i.e. availability and connectivity to similar semi-natural habitat, whether statutorily protected or not). Thus, whilst Pantheon remains a useful guide when assessing the

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<sup>8</sup> Whilst Pantheon was designed for use in England, biogeographically, the invertebrate fauna of coastal south Wales is not going to be substantially different to comparable habitats and environments in England, which is about 80 km (50 miles) east.

<sup>9</sup> See <http://www.brc.ac.uk/pantheon/lexicon/reported-condition>; last accessed on the 16<sup>th</sup> January 2019

<sup>10</sup> SATs are characterised by species restricted to certain features within habitats (= stenotopic species) such as types of decaying wood (e.g. sapwood, or heartwood), fluctuating marsh or rich flower resource. Some SATs such as rich flower resource are cross-cutting, i.e. can be present in more than one habitat.

nature conservation value for each of the land parcels for terrestrial invertebrates, professional judgement incorporating other evidence is necessary to come to a defensible evaluation.

### 3.3.3 Designated Site Guidelines

#### 3.3.3.1 Statutory Sites

The Joint Nature Conservation Committee (JNCC) has recently updated and <sup>11</sup> published its guidance on invertebrates for the selection of biological SSSIs (Curson *et al.*, 2019). This document has been useful in considering the study site's nature conservation value based on the presence of, for example, Key Species, edge of range species or species assemblages, and placing this in context with the Area of Search, which for the purpose of this approach, is taken to be the relevant NLCA. The relevant NLCA profile to the study site is the Swansea Bay NLCA (Natural Resource Wales, 2014).

In summary, Curson *et al.* (2019) state that any species which are Critically Endangered, Endangered or Vulnerable (IUCN); or Nationally Rare (British rarity status) should be represented in SSSIs; and Near Threatened and Nationally Scarce taxa should also be considered if certain caveats apply. The presence of any such designated species at a site is not in itself sufficient for that site to be formally designated, but it would reach a threshold *for it to be considered*. Therefore, the presence of Critically Endangered, Endangered, Vulnerable (<sup>12</sup>IUCN), or Nationally Rare species in a site can be considered as a proxy for considering national importance. The presence of Near Threatened or Nationally Scarce species in the absence of any of the previous four categories would need to consider additional factors such as their status in the vice-county/ region. A Near Threatened or Nationally Scarce species that is new, or rare in the vice-county would potentially merit consideration; whereas if it is frequent, it will likely fall short of the threshold for consideration.

#### 3.3.3.2 Non-Statutory Sites

Wales has a single set of guidelines which define how non-statutory sites, termed Sites of Importance for Nature Conservation (SINC), covering all authority areas (Wales Biodiversity Partnership, 2008). SINC's are selected based on five general criteria:

- *Any site which supports populations of a species, which is listed in the UK Red Data Book, or listed on the Section 42 [now the Section 7 List] List [SoPI] with the specific requirement for site protection action.*
- *Any site which supports an important assemblage or population(s) of 'Nationally Scarce' species. To be determined in consultation with appropriate experts.*
- *Any site which supports a species, recorded from 10 or fewer 10 km grid squares in Wales (where the distribution is well known).*
- *Any site which supports a species that breeds in 4 or fewer sites within a Vice County.*
- *Any site which supports a significant population or assemblage of Local Priority Species listed in a Local Biodiversity Action Plan.*

Further, for specific groups, such as butterflies and moths, additional criteria are set out:

- *Any site which supports a Section 42 species listed in their respective Tables.*
- *Sites which support significant populations or assemblages of species listed in their respective Tables. Their presence should also contribute towards the designation of sites that qualify under other guidelines.*

And for Odonata (dragonflies and damselflies) and Orthoptera (grasshoppers & crickets):

- *Any site which supports a species which is 'Nationally Scarce';*

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<sup>11</sup> Guidance is available via their website: <https://jncc.gov.uk/our-work/guidelines-for-selection-of-sssis/>; last accessed on 29<sup>th</sup> October 2020.

<sup>12</sup> International Union for the Conservation of Nature. See <https://www.iucnredlist.org/assessment/process> for more information.

- *Any site which supports an assemblage of 9 or more species;*
- *Any site which supports any species in list 'A' of their respective Table;*
- *Sites which support significant populations or assemblages of species in list 'B' of their Table. Their presence should also contribute towards the designation of sites that qualify under other guidelines.*

### 3.4 Personnel

The invertebrate survey (field visits) was undertaken by Richard Wilson CEnv MCIEEM Mem.RES MSc; an experienced field entomologist. He is a <sup>13</sup>recognised arachnid (spiders and harvestmen) specialist though he is familiar with a wider range of taxonomic groups. In addition to the arachnids, Richard identified some Diptera families such as the hoverflies (Syrphidae) and larger Brachycera (e.g. robberflies (Asiliidae)); and aculeate Hymenoptera in addition to groups readily identifiable in the field such as the Lepidoptera (butterflies and moths) and Odonata (dragonflies and damselflies). Steven Falk FRES, who is a recognised specialist in pollinators identified other Diptera families (e.g. Muscidae) and verified some of the aculeate Hymenoptera (e.g. *Lasioglossum* spp.). Steve Lane identified most of the Coleoptera and Hemiptera collected.

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<sup>13</sup> Richard is the YNU's spider recorder, the Yorkshire, County Durham and Northumberland recorder for the national spider recording scheme; and sits on the conservation committee of the British Arachnological Society.

## 4 Results and Interpretation

### 4.1 Desk Study

Ecology Solutions passed on relevant biological data received from SEWBRc which included 122 records of 56 species recorded within the former Oil Refinery between May 2001 and July 2018. The majority (35 spp.) were moths with a scattering of other Orders such as beetles (9 spp.), bumblebees (5 spp.), dragonflies (3 spp.) and one species each of butterflies, hoverflies, caddisflies and grasshoppers. A high proportion of the 56 species recorded are assigned a nature conservation status (32 spp.), though 21 taxa are moths which are Species of Principal Importance (SoPI) – Research Only. Eleven taxa (see Table 1) have a formal nature conservation status – Key Species – of which one, dingy skipper (*Erynnis tages*) is a Rare Key Species.

**Table 1:** Key species recorded historically between May 2001 and July 2018 within former Oil Refinery.

Order	Family	Species	Conservation status
Coleoptera	Curculionidae	<i>Ceutorhynchus atomus</i>	[Nationally Scarce (Na)]
Coleoptera	Curculionidae	<i>Orthochaetes setiger</i>	[Nationally Scarce (Nb)]
Coleoptera	Curculionidae	<i>Sitona waterhousei</i>	Nationally Scarce (Nb)
Coleoptera	Eirrhinidae	<i>Grypus equiseti</i>	[Nationally Scarce (Nb)]
Coleoptera	Hydrophilidae	<i>Cercyon nigriceps</i>	Nationally Scarce
Coleoptera	Rhynchitidae	<i>Temnocerus longiceps</i>	Nationally Scarce (Nb)
Coleoptera	Staphylinidae	<i>Lomechusa emarginata</i>	Nationally Scarce
Coleoptera	Staphylinidae	<i>Quedius scitus</i>	Nationally Scarce (Nb)
Diptera	Syrphidae	<i>Anasimyia lunulata</i>	Nationally Scarce
Lepidoptera	Hesperiidae	Dingy skipper	VU; SoPI
Trichoptera	Hydroptilidae	<i>Tricholeiochiton fagesii</i>	Nationally Scarce

The invertebrate records are scattered throughout the study site and the emphasis on moths suggests that the focus was on light-trapping. The dingy skipper was recorded at two locations towards the southern half of the former Oil Refinery in early summer 2006, but this is not to suggest populations were not present elsewhere as suitable habitat throughout the site was likely to be present. Two species, the hoverfly *Anasimyia lunulata* and the caddisfly *Tricholeiochiton fagesii* are most likely wanderers from the adjacent Crymlyn Bog SSSI; the former associated with bog-pools with abundant *Sphagnum* and bog-bean (*Menyanthes trifolia*), and the latter from fens.

Three of the taxa in Table 1 were recorded during the 2020 field season: the weevils *Sitona waterhousei* and *Grypus equiseti*; and dingy skipper. *S. waterhousei* and dingy skipper's foodplants are bird's-foot trefoil (*Lotus* spp.) where as *G. equiseti* is horsetails.

In 2012, a chance discovery of the of the Near Threatened and Nationally Rare 'Blue ground beetle', *Carabus intricatus* was made on a log-pile in a Neath garden. Prior to this, it was previously only known from riverine valleys south of Dartmoor, Devon. Survey work reported by Boyce and Walters (2017) following up this discovery identified a population of this large ground beetle in a Woodland Trust nature reserve at Coed Maesmelin (SS 724 981), which is about 3.6 km north north-east of Jersey Marine Woodland SINC. Despite searches in woodlands elsewhere in the Neath Valley, including Daren Wen (SS 745 939), Dyffryn Wood (SN 729 000), and Craig Gwladys Country Park (SS 760 992), all between 3.5 and 6.5 km from Jersey Marine Woodland SINC, no additional records of this beetle were recorded.

Based on its known ecology, the ground beetle requires open woodland with a sparse shrub and field layer. As discussed in Section 1.3.2, the underscrub and field layer at Jersey Marine Woodland SINC is dense and impenetrable, suggesting that its current state is not in favourable condition for this species and it is not likely to be present.

The historical survey work referred to in Section 1.1.1 has only been partially obtained via the PDCC and interpreting the narrative this contained. The data is approaching two decades old, and there have been substantial alterations to the vegetation communities since then, such that it is probable that the assemblage present in the late 2010s and in 2020 will be different to what was present prior to the remediation work undertaken in the intervening period. Therefore, whilst this data is of historical interest, it offers little in contextual information that can inform the current proposals.

## 4.2 Field Survey

### 4.2.1 Summary of Survey Results

Nine survey visits were completed during reasonable to optimal weather conditions for the time of year between mid-May and mid-September 2020. The details are conveyed in Table 2.

**Table 2:** Weather conditions for survey visits.

Date	Weather	Notes
19 <sup>th</sup> May 2020	<b>Cloud:</b> 8/8; <b>Temperature:</b> 15°C; <b>Wind Speed:</b> 1 (2) SW.	Scoping site
20 <sup>th</sup> May 2020	<b>Cloud:</b> 0/8; <b>Temperature:</b> 18°C to 28°C; <b>Wind Speed:</b> Calm.	Very dry everywhere with ephemeral wetlands or shallow waterbodies dried out.
21 <sup>st</sup> May 2020	<b>Cloud:</b> 8/8; <b>Temperature:</b> 16°C to 22°C; <b>Wind Speed:</b> 1.	
17 <sup>th</sup> June 2020	<b>Cloud:</b> 7/8; <b>Temperature:</b> 17.5°C; <b>Wind Speed:</b> 1	Rain from 11:45 hrs. Installed pitfall traps
2 <sup>nd</sup> July 2020	<b>Cloud:</b> 8/8 clearing to 6/8; <b>Temperature:</b> 14°C to 20°C; <b>Wind Speed:</b> 2 W to 1 SW	Light drizzle and intermittent showers until 13:00 hrs.
21 <sup>st</sup> July 2020	<b>Cloud:</b> 2/8 (high cloud); <b>Temperature:</b> 22°C; <b>Wind Speed:</b> Calm to 1 S.	
22 <sup>nd</sup> July 2020	<b>Cloud:</b> 4/8; <b>Temperature:</b> 18°C to 23°C <b>Wind Speed:</b> 1 (2) W to 2(3) SW.	
29 <sup>th</sup> July 2020	<b>Cloud:</b> 6/8; <b>Temperature:</b> 18°C; <b>Wind Speed:</b> Calm	
10 <sup>th</sup> September 2020	<b>Cloud:</b> 8/8 to 7/8; <b>Temperature:</b> 13°C to 17°C; <b>Wind Speed:</b> 1	

Two short transects of pitfall traps were placed in different OMH environments (see Table 3).

**Table 3:** Location of static traps.

Trap	National Grid Reference	Compartment & habitat
Pitfall traps (x 5)	SS 7089 9589	West facing slope on OMH from woodland edge to open short swards.
Pitfall traps (x 4)	SS 7068 9518	Edge of ephemeral waterbody with abundant sift rush ( <i>Juncus effusus</i> ) and bryophyte cover.

A total of 505 species were recorded throughout the former Oil Refinery, of which 30 taxa (excluding Research Only) are Key Species (as defined by Telfer (2017) with definitions provided in Appendix B).

In describing the results, the study site has been divided in to two compartments:

- Former Llandarcy Oil Refinery (northern sector); and
- Former Llandarcy Oil Refinery (southern sector).

Table 4 provides the breakdown of species-richness for each land parcel surveyed and Table 5 by taxonomic group. A complete list of species in taxonomic order is provided in Table 9 (Appendix C). The division of the study site into two sectors is based on the proposed phase being brought forward for planning following post-survey communication in January 2021; and not on a discernible ecological (e.g. change in habitat) or physical (e.g. fence) features (see Section 1.2.3 for more details). Sampling during 2020 covered most of the study site and included definable locations in the northern and southern sectors where methods such as vacuum sampling, grubbing or pitfall trapping efforts were contained within six, or eight-figure, national grid references. However, more mobile survey methods such as aerial netting for the purposes of collecting flying insects, or direct observations, were allocated to the 1 km grid square SS 70 95 (monad) which straddled the boundary between the two sectors. Given open habitat biotopes were broadly similar between the two sectors, all records relating to the monad SS 70 95 are included in both sectors. Mobile faunas such as Hymenoptera and Diptera are likely to be present throughout the site, such that these groups species-richness and presence/ apparent absence would be an artefact of survey effort and strategic planning decisions, and not ecology. Therefore, aggregating the data in this way is considered to reflect a more realistic distribution of species within the former Oil Refinery.

The data presented in Table 4 provides an indication of species-richness and proportion of the invertebrate assemblage that are Key Species and Rare Key Species in the study site's two sectors. The data suggests that the species-richness is broadly similar between the two sectors, as is the proportion of Key Species, which supports the observations of habitat distribution and extent throughout the study site. That the Northern Sector appears to proportionately support twice the number of Rare Key Species is considered a likely response to aggregating the data given the low absolute numbers involved and little should be inferred from this.

**Table 4:** Total species-richness distribution within study site and individual compartments.

Compartment	Species-Richness	Key Species	Proportion Key Species	Rare Key Species	Proportion Rare Key Species
Former Llandarcy Oil Refinery	505	30	5.9 %	3	0.6 %
Northern Sector	380	25	6.6 %	3	0.8 %
Southern Sector	357	22	6.2 %	2	0.6 %

Table 5 provides a breakdown of taxonomic groups recorded in each of the compartments, which suggest that the distribution of taxa is similarly broadly comparable between the two sectors, which supports the view that in general, equivalent invertebrate assemblages are distributed throughout the former Oil Refinery and that the distinction between a Northern and Southern sector is, in ecological terms, likely to be of no relevance.

**Table 5:** Distribution of main taxonomic groups studied. Red numbers in parentheses equate to Key Species (excluding Research Only – see text for explanation).

Taxonomic Group	Former Llandarcy Oil Refinery	Northern Sector	Southern Sector
Arachnida, Araneae & Opiliones (Spiders & harvestmen)	85 (7)	66 (6)	54 (4)
Coleoptera (Beetles)	158 (12)	103 (8)	113 (9)
Diptera (Flies)	102 (3)	78 (3)	74 (3)
Hemiptera (Bugs)	59 (1)	37 (0)	48 (1)
Hymenoptera (Bees, wasps & allies)	49 (4)	45 (4)	19 (1)

Taxonomic Group	Former Llandarcy Oil Refinery	Northern Sector	Southern Sector
Lepidoptera (Butterflies & moths)	28 (3)	28 (3)	28 (3)
Others	24 (0)	23 (0)	21 (0)

#### 4.2.2 Key Species

A total of 30 Key Species were recorded within the study site, of which four are Rare Key Species, including taxa that subject to a formal status review, will likely be downgraded. These 30 Key Species represent 6.0 % of the total number of species recorded and a similar proportion were recorded within each Sector. Rare Key Species represent just under 1 % of the fauna recorded taking the former Oil Refinery as a single entity; the variation between sectors a likely artefact of survey. Details, including their ecology and occurrence at the study site is conveyed in Table 6.

**Table 6:** Selection of species recorded with an NCS within the study site.

Species	Status	Sector Recorded	Ecology
<i>Pardosa tenuipes</i> Araneae, Lycosidae	Nationally Scarce	Northern Southern	A wolf-spider associated with sparsely vegetated but humid (damp) environments such as dune slacks, floodplain meadows and riparian vegetation. It is a southern species in Britain and very scattered records within Wales.  Recorded within damper hollows and edge of waterbodies where there are exposed substrates.
<i>Xerolycosa miniata</i> Araneae, Lycosidae	Nationally Scarce	Southern	A contrastingly marked large wolf-spider of coastal environments, particularly fixed sand dunes. It is recorded throughout Britain but nowhere is it common; in Wales it is recorded along the Glamorgan and Pembrokeshire coast.  A single individual recorded from the OMH just off Parc Amazon at the extreme southern tip of the proposed Southern Access Route.
<i>Argenna subnigra</i> Araneae, Dictynidae	Nationally Scarce	Northern.	A ground-dwelling spider associated with sparsely vegetated open grasslands, including those characteristic of brownfield sites.  A rare species in Wales with only a dozen known locations. It is more frequent in south-eastern England.
<i>Cheiracanthium virescens</i> Araneae, Cheiracanthiidae	Nationally Scarce	Northern Southern	A ground-dwelling species associated with open habitat biotopes including coastal grasslands, dunes, heathland and OMH on brownfield sites. Away from south-east England, there are scattered records in the Midlands, becoming rare north of an imaginary line linking the Humber and the Mersey. Within Wales, it is a predominantly coastal species.
<i>Zodarion fuscum</i> Araneae, Zodariidae	Vulnerable; Nationally Rare	Northern	A very rare species known from six locations (five hectads) in Britain with only one previous record from Wales (Porthkerry Country Park, near Barry). It requires open habitats where the vegetation is either short or patchy, thus exposed to sunshine, creating a locally warmer microclimate, where it specialises in hunting ants (Hymenoptera, Formicidae).  A single male was collected in a pitfall trap located on the west-facing slope near the centre of the Oil Refinery.
<i>Marpissa nivoyi</i> Araneae, Salticidae	Nationally Scarce	Northern	A characteristic jumping-spider associated with coastal semi-fixed dunes with marram ( <i>Ammophila</i>

Species	Status	Sector Recorded	Ecology
			<i>arenaria</i> ). The single individual was collected in tall dry grassland which presumably has a similar structure and environment. The species is restricted to coastal England with only five other modern Welsh records, though it has previously been recorded at Crymlyn Burrows SSSI in May 1991.
<i>Synageles venator</i> Araneae, Salticidae	Nationally Scarce	Northern	An ant-mimicking jumping spider associated with coastal dunes and other dry habitats, including inland. Within Wales, it is only known from the coast around Swansea and Port Talbot, where it has previously been recorded at Crymlyn Burrows SSSI.
<i>Haliphus mucronatus</i> Coleoptera, Haliplidae	Nationally Scarce	Northern Southern	A small brown 'crawling water beetle', distinctive within the genus due to its bulky appearance. It has a rather disjunct distribution, with its core across the east and south-east regions of England, but another centre of distribution occurs in south Wales clockwise into Somerset. Its habitat is typically on clay, including natural subsidence ponds, but also in man-made stagnant water bodies. The species probably feeds on plant and/ or algal matter.
<i>Elaphrus parvulus</i> Coleoptera, Carabidae	Nationally Scarce	Southern	This is a miniscule ground beetle, found on sandy and gravelly soils, but also in old walls and cracked paths, often in association with buildings. However, it can also occur next to water in gravel and sand pits and other post-industrial habitats. The species is widely distributed throughout southern and Midlands England and Wales and has recently been expanding its range. It has to date been found as far north as Cumbria.
<i>Paederus fuscipes</i> Coleoptera, Staphylinidae	Nationally Scarce (Nb)	Northern Southern	This is a remarkably colourful species as are all the members of the genus. It has striking metallic blue elytra, the remainder of the beetle being black and red. It is a predator, found in marshes and bogs, on the margins of ponds and dykes and in permanently wet mires. It is also recorded in saltmarsh habitats. Its distribution is patchy throughout England and Wales, with most records from the coastal fringes. Adults have been recorded in most months of the year.
<i>Meligethes fulvipes</i> & <i>Meligethes rotundicollis</i> Coleoptera, Nitidulidae	Nationally Scarce	<i>M.f.</i> (Northern) <i>M.r.</i> (Southern)	<i>M. fulvipes</i> is a nondescript, brown pollen beetle, is very locally distributed in England and Wales with a predominantly coastal stronghold (South Wales and south-east England), but also inland in several areas, including East Anglian Breckland. It feeds on brassicas, within which plant group, it is certainly associated with charlock ( <i>Sinapis arvensis</i> ).  <i>M. rotundicollis</i> is a small black, nondescript pollen beetle is primarily found in south-east England, but is also known from Wales. It can be located in waste and disturbed ground habitats, including brownfield sites, and road verges. Its foodplant associations are with charlock and also hedge mustard ( <i>Sisymbrium officinale</i> ) and possibly other plants in this family. Adults have been recorded in the field, mainly between April and August.
<i>Sitona waterhousei</i> Coleoptera, Curculionidae	Nationally Scarce (Nb)	Southern	This is a small weevil, with characteristic convex protruding eyes. It is found in England and Wales, although its distribution is predominantly coastal, with occurrences almost exclusively between

Species	Status	Sector Recorded	Ecology
			Anglesey anticlockwise to the Thames Gateway in West Kent. There are a very few inland records, from post-industrial sites. Otherwise, habitats such as coastal undercliffs, coastal shingle and coastal quarries are examples of its typical haunts. The species feeds on common bird's-foot trefoil ( <i>Lotus corniculatus</i> ) as both a larva and adult. Adults have been recorded between February and September.
<i>Bombylius canescens</i> Diptera, Bombyliidae	Nationally Scarce	Northern Southern	This small bee-fly is restricted to south-west England and southern Wales where it is associated with sparsely vegetated sandy or base-rich substrates in grasslands, woodland edge or coastal soft-cliffs (Stubbs and Drake, 2014; Harvey, 2018). It is a parasite of smaller mining bees in the genus <i>Lasiglossum</i> which are frequent within the study site.
<i>Drymus pilicornis</i> Hemiptera, Lygaeidae	Nationally Scarce	Southern	A small brown ground-bug. Sparsely distributed in southern England and Wales where it is associated with short turf habitats, including chalk downland. Adults overwinter, mating in spring to give a new generation of adults by August. There is one generation a year. It most probably feeds on mosses at ground level, and possibly also fungi.
<i>Andrena congruens</i> Hymenoptera, Andrenidae	Nationally Scarce (Na)	Northern	This mining bee is associated with exposures of soils, sand or chalk on sloping ground in southern England, with outlier populations associated with the region around the Forest of Dean and the Gower Peninsula in south Wales (Else and Edwards, 2018). It is identified as a threatened species in Wales (Olds <i>et al.</i> , 2018).  Several specimens were recorded within the former Oil Refinery and it seems likely that they are exploiting the various spoil heaps as nesting habitat.
<i>Bombus humilis</i> (brown-banded carder bee) Hymenoptera, Apidae	SoPI	Northern Southern	The brown-banded carder bee is a species of warm, dry sites with extensive flower-rich calcareous or coastal grasslands. Within Britain, it is largely restricted to coastal south-east, southern and south-west England, and in Wales, to the coastal fringes of Gwynedd, Glamorgan and Pembrokeshire (Else and Edwards, 2018).  It is identified as a threatened species in Wales (Olds <i>et al.</i> , 2018).
<i>Sphecodes reticulatus</i> Hymenoptera, Halictidae	[Nationally Scarce (Nb)]	Northern	This blood-bee (so called, because of its partially red abdomen) is more-or-less restricted to south-east England where it is associated with sandy sites in open woodland or grassland: the extensive dry grasslands and scrub mosaics likely providing suitable habitat for the species in the study site. There are only three Welsh locations; one being in VC 41 near Merthyr Tydfil (Else and Edwards, 2018); and consequently, it is identified as a threatened species in Wales (Olds <i>et al.</i> , 2018). It is a cuckoo of a few mining bees though its host range is poorly understood.  A female was recorded in May 2020 at the western end of the study site.
<i>Erynnis tages</i> (Dingy skipper)	Vulnerable; SoPI	Northern Southern	A declining butterfly which is generally associated with brownfield sites, colliery spoil heaps and similar places where habitats supporting short swards

Species	Status	Sector Recorded	Ecology
Lepidoptera, Hesperidae			where its food plant, bird's-foot trefoil ( <i>Lotus</i> spp.) occurs. Several individuals were recorded in late May 2020 at various locations within the OMH.
<i>Coenonympha pamphilus</i> (small heath) Lepidoptera, Nymphalidae	Near Threatened; SoPI	Northern Southern	Although a widespread species in the UK, this otherwise common species has experienced a substantial decline in both abundance and occurrence (Fox <i>et al.</i> , 2015), hence its classification as Near Threatened.
<i>Hipparchia semele</i> (Grayling [butterfly]) Lepidoptera, Nymphalidae	Vulnerable, SoPI	Northern Southern	A butterfly of patchy grasslands, which has suffered a substantial decline in Britain such that it is now more or less restricted to coastal habitats such as sand dunes and grasslands; or in Wales, colliery spoil heaps. Individuals were observed in late June and mid-July across the dunes.

### 4.3 Baseline Invertebrate Assemblage Analysis

The following section describes the invertebrate assemblages recorded within the Northern and Southern Sectors make up the study site. The species list for each of these has been analysed using Pantheon to identify the habitat associations and dependencies of the terrestrial invertebrate assemblage associated with each land parcel. The analysis first considers stenotopic species i.e. those terrestrial invertebrates with very specific and

**Photograph 1:** Examples of OMH within the former Llandarcy Oil Refinery (May 2020). **Top row:** Northern sector – variably vegetated spoil mounds with rich flower resource, bare ground and impeded drainage creating ephemeral pools. **Bottom left:** Southern sector – bare ground and scattered gorse ('scrub-heath') vegetation. **Bottom right:** west-facing slope with scrub edge habitat (background) and patchy short vegetation.



<sup>14</sup>restricted habitat requirements. They are considered to have an intrinsic nature conservation value as stenotopic species are generally only recorded on sites that are of nature conservation value. The analysis then considers the habitat affinities of the wider assemblage.

#### 4.3.1 Northern Sector

The sector analysed here comprises all habitats north of an imaginary line that extends from Tank Farm Road within the curtilage of the former Llandarcy Oil Refinery (see Appendix A). A total of 380 species were recorded in this compartment of which 359 have been <sup>15</sup>analysed by Pantheon. A total of 57 stenotopic species were recorded, representing 15 % of the invertebrate fauna identified from the compartment (see Table 10; Appendix C). Most (53 stenotopic species) are associated with the open habitat biotopes (SAT codes prefixed with an 'F' in Table 10) which are interpreted as representing the OMH that is prevalent throughout this sector. The OMH occurs across a range of topographies from spoil mounds though to predominantly level ground but on variable aspects such as south or west facing slopes, which collectively interplay with scattered scrub, taller, flower-rich grasslands and more established treed habitat such as where it adjoins the western boundary of Jersey Marine Woods SINC (see Section 1.2.1).

The surveys in 2020 recorded 23 stenotopic species that are indicative of the rich flower resource available within the OMH including the Nationally Scarce *Andrena congruens* which form nesting aggregations on sloping, sparsely vegetated ground such as is present on the numerous spoil heaps and more natural landforms within the study site. This is a rare species in Wales, which has only been recorded recently and known only from the Swansea area and eastern Pembrokeshire coast (Else and Edwards, 2018; p. 546).

The above habitats also support faunas that express a fidelity to calcareous grasslands, their presence having the potential to amplify the value of a habitat present within a study site as calcareous, or base-rich grasslands, are one of the most species-rich grassland types in Britain (Alexander, 2003; page 11) and so assemblages that support species with a moderate or high degree of fidelity to this habitat are potentially of nature conservation value.

**Photograph 2:** *Andrena congruens* (female) captured on former Llandarcy Oil Refinery. 22.vii.2020



Six species (see Table 7) have a moderate to high <sup>16</sup>fidelity to calcareous grasslands, of which the brown-banded carder bee (*Bombus humilis*) is most significant as it is a SoPI. In Britain, the species is largely confined to coastal flower-rich grasslands where there is an abundant pollinator resource and suitable nesting habitat in an open vegetation structure where ground temperatures can warm up (Else and Edwards, 2018; p. 368).

<sup>14</sup> Referred to as Specific Assemblage Types (SAT) in Pantheon (Webb *et al.* 2018).

<sup>15</sup> Pantheon analyses species, attaching associated habitats and resources, assemblage types (adapted from the Invertebrate Species-habitat Information System), conservation status, habitat fidelity scores and other information against them.

<sup>16</sup> **High:** species routinely recorded from calcareous grasslands. They may also be recorded to a greater or lesser degree from other open habitats on freely draining soils, but it is likely that they are mainly dependent on calcareous grasslands to sustain viable populations.

**Moderate:** species routinely recorded from calcareous grasslands, but also from semi-natural open habitats on freely-draining soils over all or part of their geographical area of distribution.

**Table 7:** Invertebrates scoring moderate or low fidelity to calcareous grassland recorded.

Order	Family	Species	Conservation Status	Habitat score
Hemiptera	Cicadellidae	<i>Aphrodes bicincta</i>		High
Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>		High
Araneae	Gnaphosidae	<i>Drassyllus pusillus</i>		Moderate
Hemiptera	Lygaeidae	<i>Scolopostethus puberulus</i>		Moderate
Hymenoptera	Apidae	<i>Bombus humilis</i>	SoPI	Moderate
Hymenoptera	Halictidae	<i>Lasioglossum morio</i>		Moderate

A substantial number of Key Species have been recorded within the northern sector including the Vulnerable and Nationally Rare spider *Zodarion fuscum* and five Nationally Scarce spiders: *Argenna subnigra*, *Cheiracanthium virescens*, *Marpissa nivoyi* and *Synageles venator*; in addition to two Near Threatened (small heath and wall) and one Vulnerable butterfly (grayling) are associated with the short swards and bare ground; the butterflies also being SoPI.

**Photograph 3:** Tall dry grassland swards with abundant pollinator resource. **Left:** Ox-eye daisy (*Leucanthemum vulgare*) in May 2020. **Right:** Wild carrot (*Daucus carota*) in July 2020. Tall open swards supported an abundant pollinator resource reflected in the 23 stenotopic species associated with this cross-cutting SAT (see main text for more details).



A common theme that the invertebrate assemblage analysis has identified is the number of taxa, including stenotopic and Key Species, that are associated with coastal grasslands and dune systems. The proximity of Crymlyn Burrows SSSI, which is between 2.2 km and 3.6 km south of the northern sector, and the similar physical characteristics of the vegetation communities and habitats, i.e. tall dry grasslands, flower-rich swards, open vegetation on a varied topography, has potentially enabled an invertebrate assemblage to develop within the OMH that share a similar composition. In contrast, there are few species recorded in the northern sector that are associated with valley fen and mire, potentially reflecting the lack of substantial or permanent wetland habitats (excluding the large reservoir) here. Thus, other than highly mobile taxa, such as dragonflies, there would not appear to be as strong an ecological connection with the adjacent Crymlyn Bog SSSI, even though it shares a boundary with the former Oil Refinery, in contrast to the PDCC report referred to in Section 1.1.1.

## 4.4 Southern Sector

The sector described here is south of the imaginary line leading from Tank Farm Road and is outwith the footprint of the proposed phase of the development (Appendix A). A total of 357 species were recorded in this sector of which 330 have been analysed by Pantheon.

A total of 50 stenotopic species were recorded, representing 14 % of the invertebrate fauna identified from the compartment (see Table 11; Appendix C). A similar assemblage is associated with the open habitat biotopes (SAT codes prefixed with an 'F' in Table 11), which as for the northern sector, are interpreted as representing the OMH that is also prevalent throughout.

**Photograph 4:** **Top left:** *Synageles venator*, an ant-mimicking Nationally Scarce jumping spider collected from OMH at the former Llandarcy Oil Refinery. **Bottom left:** Example of habitat where *S. venator* was collected (Cefn Parc, Northern Sector). **Top right:** *Zodarion fuscum*, a Vulnerable and Nationally Rare specialist ant predator. **Bottom right:** Location where *Z. fuscum* was collected on west-facing slope.



The distribution and nature of the OMH within the southern sector are broadly comparable with the northern section of the study site; the boundary between the two being defined by planning requirements and not ecology. There are some more permanent wetland habitats within the southern sector, for example the recently constructed waterbody within the Coed Darcy Great Crested Newt Area SINC, but also smaller drainage channels and ephemeral waterbodies. Three stenotopic species recorded solely within the southern sector are associated with wetland habitats, though the long-legged fly *Tachytrechus insignis* (Diptera, Dolichopodidae) is associated with saltmarsh and transitional brackish marsh so is likely a wanderer from the coast. The spider-hunting wasp *Anoplius concinnus* (Hymenoptera, Pompilidae) is associated with damp, gravelly sand and potentially occurs as a resident in such habitats as drainage channels and on the edge of ephemeral waterbodies where they may well predate wolf-spiders such as *Piratula latitans* which was recorded on the site.

All four SoPI previously mentioned were recorded, or are highly likely to be present, within the southern sector, and a further five Nationally Scarce taxa, including the wolf-spider *Xerolycosa miniate*, the weevil *Sitona waterhousei*, which was previously reported within the study site (see Section 4.1) and the western bee-fly (*Bombylius canescens*) (Diptera, Bombyliidae). The latter is a species restricted to south Wales and south-west England where it occurs on south-facing hillsides on limestone, open woodland (especially in Wales) and riparian grasslands where they occur on shingle or sandy alluvium (Stubbs and Drake, 2014).

**Photograph 5:** The Nationally Scarce western bee-fly (*Bombylius canescens*) was recorded from OMH at the southern end of the study site but is likely to be present throughout. It is a parasite of various solitary bees in the genera *Lasioglossum* and *Halictus*.



## 5 Nature Conservation Evaluation

As stated in Section 3.3, there is no standard frame of reference to evaluate a study site's invertebrate assemblages' nature conservation value. Instead, reliance is placed on various sources, including proportion of Key Species recorded, and analysis using Pantheon (Webb *et al.*, 2018). Added to this is recent guidance which considers how Key Species can best be represented in protected sites (SSSIs) (Curson *et al.*, 2019). Whilst the presence of Key Species in themselves is not a sole indication of national value, it is considered a useful guide as to where a particular site may sit in a geographical hierarchy.

For the purposes of evaluation, the entire study site has been considered as a single unit as the separation in to two separate compartments is solely based on the phased development proposals and not on ecological principles. Further, the baseline analysis has not identified any substantial ecological differences in invertebrate assemblages across the study site.

Curson *et al.* (2019) suggests that sites can be valued based on:

- individual species that are considered to be threatened species (IUCN and British rarity, see this report's Appendix B for details), species of country conservation priority (i.e. SoPI), species with restricted or disjunct ranges, and edge of range species; and
- assemblages of specialised habitats and habitat-based assemblages such as OMH faunas, and habitat heterogeneity/ mosaics.

In addition to the above, it remains relevant to assess the invertebrate assemblage recorded against non-statutory site guidelines, if applicable. The administrative region's guidelines includes reference to terrestrial invertebrates (Wales Biodiversity Partnership, 2008) and the criteria are referred to in Section 5.3.

This approach forms the basis for the following evaluation and in doing so, takes into consideration the criteria referred to above and more general points such as the relative value of how terrestrial invertebrate assemblages relate to both the importance and uniqueness of the habitats present, and the characteristics of the assemblage itself. The assessment first considers the presence of individual species recorded, also taking in to account the likelihood of continued presence of historically recorded taxa where relevant, followed by the assemblages recorded (i.e. not just the rarer taxa).

Following assessment of this, as explained in more detail below, the former Llandarcy Oil Refinery is considered to support an assemblage of terrestrial invertebrates of **regional nature conservation value**.

### 5.1 Individual Species

Out of a total species list of 505, 30 Key Species and three Rare Key Species (based on Telfer, 2017) were recorded, representing 5.9 % and 0.6 % of the assemblage respectively. Both these proportions are substantially below the proposed threshold for national importance (Key Species (10 %) and Rare Key Species (1 %)).

Applying Curson *et al.* (2019) three species are classified as Vulnerable (IUCN criteria): the Nationally Rare spider *Zodarion fuscum*, and two butterflies, dingy skipper and grayling (which are also SoPI). A butterfly (the Near Threatened small heath) and brown-banded carder bee are also SoPI (see Table 6 for details). Other taxa, including *Andrena congruens*, western bee-fly and the spiders *Argenna subnigra* and *Synageles venator* are rare in Wales, or their core range is restricted to south Wales. *Z. fuscum* is known from Wales from one other location where it was recorded from coastal shingle (Porthkerry Country Park, some 47 km south-east of the study site but within VC 41); *S. venator* has been recorded at Crymlyn Burrows SSSI immediately to the south of the study site; and *A. nigra* was collected from Kenfig Burrows SSSI, about 17 km to the south south-east. The SSSIs immediately adjacent to the study site (Crymlyn Bog SSSI, Crymlyn Burrows SSSI and Pant-y-Sais SSSI) are known to support important invertebrates, as are those further afield including Kenfig SSSI. The assemblages recorded within the study site, based on the SATs and individual taxa's ecologies, suggest that the OMH is providing an equivalent and supplementary resource that is present elsewhere within the coastal plain as characterised by Swansea Bay NLCA.

## 5.2 Habitat Assemblages

The relative value of the terrestrial invertebrate assemblages relates to both the importance and uniqueness of the habitats present, and the characteristics of the assemblage itself.

### 5.2.1 Landscape context

The Swansea Bay NLCA does not include information on the distribution and extent of OMH within the vicinity of the study site, so reference to Lush *et al.* (2016) and Gwent Wildlife Trust (2010) has been used instead to provide some context. Lush *et al.* (2016) identified that the distribution of OMH within Wales was patchy but concentrated in the south Wales coalfields and identified just over 6,600 ha throughout the Principality. An estimated 950 ha was identified as being highly likely or high/ medium likelihood of meeting the definition of OMH within Gwent (Gwent Wildlife Trust, 2010). It is estimated that there are approximately 115 ha of OMH within the study site, which represents an additional 1.7 % of Wales' resource and 12.1 % of south Wales' resource (taking Gwent as a proxy). Given that there is likely to be additional, but smaller habitat patches, within the Neath Port Talbot and Swansea conurbation, an approximate 10 % additional resource is considered a not unreasonable estimate.

It has also been noted that the OMH supports several taxa that are known from coastal sand dune systems.<sup>17</sup> Within the Swansea Bay NLCA, there are 1,617.4 ha of sand dunes including those at Kenfig and Crymlyn Burrows SSSIs, but also substantial areas within the Merthyr Mawr and Pembrey Coast SSSIs. From an invertebrate assemblage perspective, the OMH resource represents up to 7.1 % of additional similar habitat in terms of its edaphic features such as free-draining substrates, exposed friable material equivalent to soft-cliffs and ephemeral damp soils analogous to dune slacks. Whilst the processes and vegetation communities within the sand dune systems differ from the OMH within the former Oil Refinery, there would appear to be some overlap with species composition.

Therefore, the additional 115 ha, supporting 30 Key Species including four SoPI and three Vulnerable taxa, one of which (*Zodarium fuscum*) is only known from coastal dunes in Wales (and the only known semi-natural habitat in Britain) represents a substantial contribution to the total resource of OMH within the NLCA and more widely in south Wales; and as a proxy coastal sand dune system.

### 5.2.2 Stenotopic Species

The relative value of the notable habitats present for terrestrial invertebrate species can be interrogated in more detail regarding the stenotopic species recorded by the survey. As explained in Section 3.3, stenotopic species are dependent on quite specific and restricted habitat conditions that are rarely encountered in the wider landscape. Therefore, stenotopic species are considered to have an intrinsic nature conservation value and generally only occur in association with sites of relatively high nature conservation importance.

Pantheon has been used to investigate this further by interrogating the composition of the terrestrial invertebrate assemblage in terms of biotopes, habitats, and the distribution of stenotopic species recorded. In doing so, the limitations of Pantheon as a tool have been considered, and professional judgement has been applied where necessary to assist robust valuation.

**Table 8:** Invertebrate assemblage assessment for the former Llandarcy Oil Refinery.

Broad biotope	Habitat	SAT	No. of species	FC Threshold	Proportion to Threshold	Species with conservation status
Open habitats	Cross-cutting	F001: Scrub edge	17	11	155 %	
Open habitats	Cross-cutting	F002: Rich flower resource	23	15	153 %	1
Open habitats	Cross-cutting	F003: Scrub-heath & moorland	10	9	111 %	
Open habitats	Short sward & bare ground	F112: Open short sward	12	13	92 %	4

<sup>17</sup> Taken from the Welsh Sand Dune metadata available via the Multi-Agency Geographic Information for the Countryside (MAGIC) website, available here: [https://magic.defra.gov.uk/Metadata\\_for\\_MAGIC/magsanddune\\_wal.html](https://magic.defra.gov.uk/Metadata_for_MAGIC/magsanddune_wal.html); last accessed on 19<sup>th</sup> February 2021.

Broad biotope	Habitat	SAT	No. of species	FC Threshold	Proportion to Threshold	Species with conservation status
Open habitats	Short sward & bare ground	F111: Bare sand & chalk	12	19	63 %	6
Tree-associated	Decaying wood	A212: Bark & sapwood decay	8	19	42 %	
Wetland	Running water	W122: Riparian sand	1	5	20 %	
Tree-associated	Decaying wood	A211: Heartwood decay	1	6	17 %	
Coastal	Saltmarsh	M311: Saltmarsh & transitional brackish marsh	1	9	11 %	
Wetland	Running water	W111: Shingle banks	1	9	11 %	
Wetland	Peatland	W314: Reed-fen & pools	1	11	9 %	

Following review of the number of stenotopic species recorded and the thresholds published in Drake *et al.* (2007), as conveyed in Table 8, three cross-cutting SATs: scrub edge (F001), rich flower resource (F002) and scrub-heath and moorland (in this instance gorse scrub) (F003) have exceeded the threshold considered to represent Favourable Conservation Status; and two short sward and bare ground SATs (open short sward (F112) and bare sand and chalk (F111) achieve very high, or moderately high PtT scores. Whilst cross-cutting SATs have a poor discriminatory value in nature conservation terms (i.e. exceeding the threshold is not sufficient on its own to conclude national significance) (Webb *et al.*, 2018), that three do, in combination with two short sward and bare ground SATs scoring very high to moderately high PtT scores suggest that the invertebrate assemblages associated with the OMH are likely to compare positively with those present on the coastal dune dominated SSSIs present in the ecological landscape. This is consistent with the narrative conveyed in Section 5.2.1.

It should be recalled that survey work missed the spring season (i.e. April through to early May) and in combination with the very dry spring (see Section 1.3.3) was generally observed to have had a negative effect on insect activity, particularly pollinators, as the ground vegetation suffered from desiccation. This may have reduced activity and possibly resulted in increased species mortality at the pre-adult stage (larvae or pupae), or more rapid adult mortality, resulting in lower species-richness than otherwise may have been the case. Had surveys been undertaken, they may have resulted in additional stenotopic species being recorded within the two short sward and bare ground SATs (F112 and F111) reached or exceeded Favourable Conservation Status. Professional judgement has been applied and it is considered that the F112 Favourable Conservation Status threshold would almost certainly have been reached and likely exceeded; and the F112 would certainly have scored a higher PtT score; potentially reaching the threshold; and this has influenced the conclusion on the study site's nature conservation value for invertebrates.

### 5.3 Taxonomic Assemblages

In addition to the guidelines for statutory site designation (refer back to Section 5.1), there are published guidelines for non-statutory site designation (SINCs) in Wales (refer back to Section 3.3.3.2). The guidelines provide a coherent means by which the compartment can be assessed against. Applying the five general criteria, the study site would meet the guidelines for SINC designation based on four general criteria on the basis that:

- there are four SoPI taxa (brown-banded carder bee; and dingy skipper, small heath and grayling butterflies) in addition to the Nationally Rare (and Vulnerable) spider *Zodarion fuscum*; and
- there are 25 additional taxa that are formally assigned Nationally Scarce status, of which 20 species are considered to be genuinely so; and
- several of which (and including three of the above SoPI) are rare in Wales; and
- the presence of genuinely rare species in the vice-county (see above).

The former Llandarcy Oil Refinery also qualifies as a SINC on the presence of three butterfly species that are SoPI. It should also be noted that 21 species of butterfly were recorded, which represents half of all taxa present in Wales; and approximately two-thirds known from south Wales (<sup>18</sup>based on the species list for the adjacent Monmouth vice-county).

Finally, the site would also potentially qualify under the criterion for Odonata species-richness. Nine species were recorded as adults and certainly several will breed in the newly created waterbodies. If the criterion's definition of 'supported' extends to foraging habitat, as opposed to confirmed breeding, then it would qualify on this basis alone.

## 5.4 Conclusion

The invertebrate assemblage recorded within the former Oil Refinery in 2020 includes 30 Key Species, of which three are Rare Key Species; and four are SoPI. The entire site supports 76 stenotopic species, of which the northern sector supports 23; and the southern 50. The OMH supports an assemblage of invertebrates that are characteristic of dry, flower-rich grasslands on highly heterogeneous topography of which coastal sand dune systems are interpreted as the natural equivalent. The study site is located within an ecological coastal landscape where there are several high quality protected sites such as at Crymlyn Burrows and Kenfig SSSIs which are known to support important populations of individual species, some of which such as the ant-mimicking spider *Synageles venator*, are present within the OMH on the former Oil Refinery site.

The estimated 115 ha of OMH represents a substantial element of the OMH resource within south Wales, adding an additional 10 %; which given its similarity and functional connection, supporting Key Species associated with coastal sand dune and grassland systems, also represents an additional 7 % of this resource for invertebrate assemblages and taxa that are dependent on the edaphic characteristics of these habitats.

Data analysis has identified three cross-cutting SATs that are in Favourable Conservation Status, and two short sward and bare ground SATs that are close to being in a similar condition, and that if further survey work, or more amenable environmental conditions persisted in spring, are judged to likely be so.

Four out of the five general criteria for SINC status have been easily met for the entire invertebrate assemblage; and the site also meets the threshold for its butterfly and Odonata assemblages alone (Welsh Biodiversity Partnership, 2008).

In conclusion, the OMH, which dominates the study site, represents a substantial resource and contribution to invertebrate nature conservation within the vice-county and the NLCA. The assemblages present, and particularly for some taxa such as *Andrena congruens* and *Zodarion fuscum*, the study site is important in a Welsh context, though there are other locations such as the coastal dune SSSIs which support similar habitats and where these taxa may be present. For all the reasons summarised above, it is justifiable to conclude that the habitats within the former Llandarcy Oil Refinery are of **regional nature conservation value** for their invertebrate assemblages.

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<sup>18</sup> See <https://butterfly-conservation.org/sites/default/files/butterflies-of-montgomeryshire-2017.pdf>; last accessed on the 19<sup>th</sup> February 2021.

# 6 Recommendations and Mitigation Principles

## 6.1 Recommendations

Nine survey visits were completed between mid-May and mid-September 2020 and material collected by various methods was obtained from representative broad biotopes and habitats within the study site. The site has been evaluated as a single entity, but for the purposes of describing the habitats and invertebrate assemblages, the former Oil Refinery has been divided in to two sectors reflecting the proposed phasing of the future development. The evaluation has concluded that the invertebrate assemblages are of regional nature conservation value.

Consideration has been given to whether further survey effort is proportionate and justifiable to inform the future planning application in the northern and southern sectors. Survey work applying general methods (aerial netting, sweeping the field layer, vacuum sampling ground vegetation and direct observation) has resulted in a total of 505 species (30 Key Species) which is a diverse assemblage. This has been supplemented by some limited targeted static trapping (pitfall traps). This effort has been sufficient for the purposes of evaluating the nature conservation value of the broad biotopes and habitats within the study site **and** on the understanding that the two SINCs (Jersey Marine Woods and Coed Darcy Great Crested Newt Area ) and boundary hedgerow/ scrub adjacent to the Crymlyn Bog SSSI remain intact and their ecological integrity is maintained, including but not limited to no direct habitat loss, no further invertebrate survey is justified.

However, given the dynamic processes that occur on brownfield sites, and are occurring at the study site, including colonisation and maturation of vegetation communities and/ or anthropogenic activities such as remediation and disturbance, it *may* become appropriate for further survey if a submission for the northern sector is delayed for a period of approximately two years. In this instance, it is recommended in the first instance that a site walkover by an experienced entomologist (ideally, the same individual who undertook the 2020 survey) to visually appraise habitats and consider whether sufficient substantial changes have occurred that might justify further, more detailed surveys.

Likewise, the southern sector (at the time of writing in late February 2021) is not being taken forward for development. It remains unclear as to the end use for this development and for the same reasons as the paragraph above, if new proposals are brought forward, follow-up survey work is likely to be justified.

It is assumed that regardless of timescales, the SINCs will remain intact (or managed for nature conservation – see Section 6.2). However, if these habitats are to be directly affected, through habitat loss or alteration for the purposes of development footprints; or through meaningful indirect effects such as changes to nocturnal lux levels through inappropriate external lighting, then further survey work *is likely to be* justified within these land parcels. The loss of the woodland SINC, either in whole, or in part will result in a not insubstantial loss of an important and specific <sup>19</sup>dead wood resource, that cannot be straightforwardly replaced. Log piles or other artificial dead wood provision will not necessarily recreate the specific conditions for the relevant fungi to develop; and it is this process, which breaks down the woody material, which provides the specialist habitat that saproxylic invertebrates, and particularly those taxa which are Key Species, or stenotopic species, require.

Therefore, whilst survey effort has been sufficient to understand the nature conservation value for the purposes of the currently understood proposed development footprint, it is recommended that if this changes and has the potential to encroach in to safeguarded areas such as the SINCs, and has the potential to negatively affect ecological integrity, the requirement for further survey should be reviewed to ensure that appropriate mitigation is delivered and compliance with Welsh legislation and policy is met.

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<sup>19</sup> Based on a visual appraisal only.

## 6.2 Mitigation Principles

The following mitigation principles are provided for the purposes of informing the iterative design and assumes no further survey work is required (see above).

The survey work has identified that the extensive OMH within the former Oil Refinery is a substantial resource within the NLCA and shares similar features such as bare ground, rich flower resource, topographic and vegetation structural diversity to the nearby coastal dune systems, several of which are statutory protected sites. The disturbed vegetation communities within the northern sector will inevitably be lost to the development; and the southern sector are vulnerable to future development aspirations in the absence of formal protection or agreement with the landowner. However, and importantly, these disturbed vegetation communities are also temporary in nature and a 'do nothing' approach would likely result in their eventual loss to less diverse habitats such as tall, species-poor grasslands and/ or scrub. Thus, there is a development-led opportunity to recreate and retain these habitats within the intended greenspace provision and advantageously, where places such as Crymlyn Burrows SSSI share similar assemblages, increase their resilience within the wider ecological landscape.

There is potential for the qualities associated with the OMH such as the rich flower resource, mosaics of bare ground and varied topography, including exposures of soft friable substrates to be retained and/ or recreated in the boundary and greenspace provision within the northern sector's proposed development, thus maintaining connectivity with the southern sector and Crymlyn Burrows SSSI. This would concurrently provide an opportunity for the creation of a biodiverse corridor for pollinators that supports national pollinator policy (Welsh Government, 2018b) and wider biodiversity obligations as well as the potential to meet or possibly exceed Biodiversity Net Gain targets which will become a legal obligation through planning law, with the added potential benefit of reduced soft estate management. Details will be provided in a separate landscape and ecological management plan (or similar document) but it is sufficient to state here that there will be a requirement to reflect existing conditions with a varied topography, bare ground and a dominant rich flower resource. By reducing the grass cover, this will likely reduce mowing rates and volume of arisings (cut material) from being disposed.

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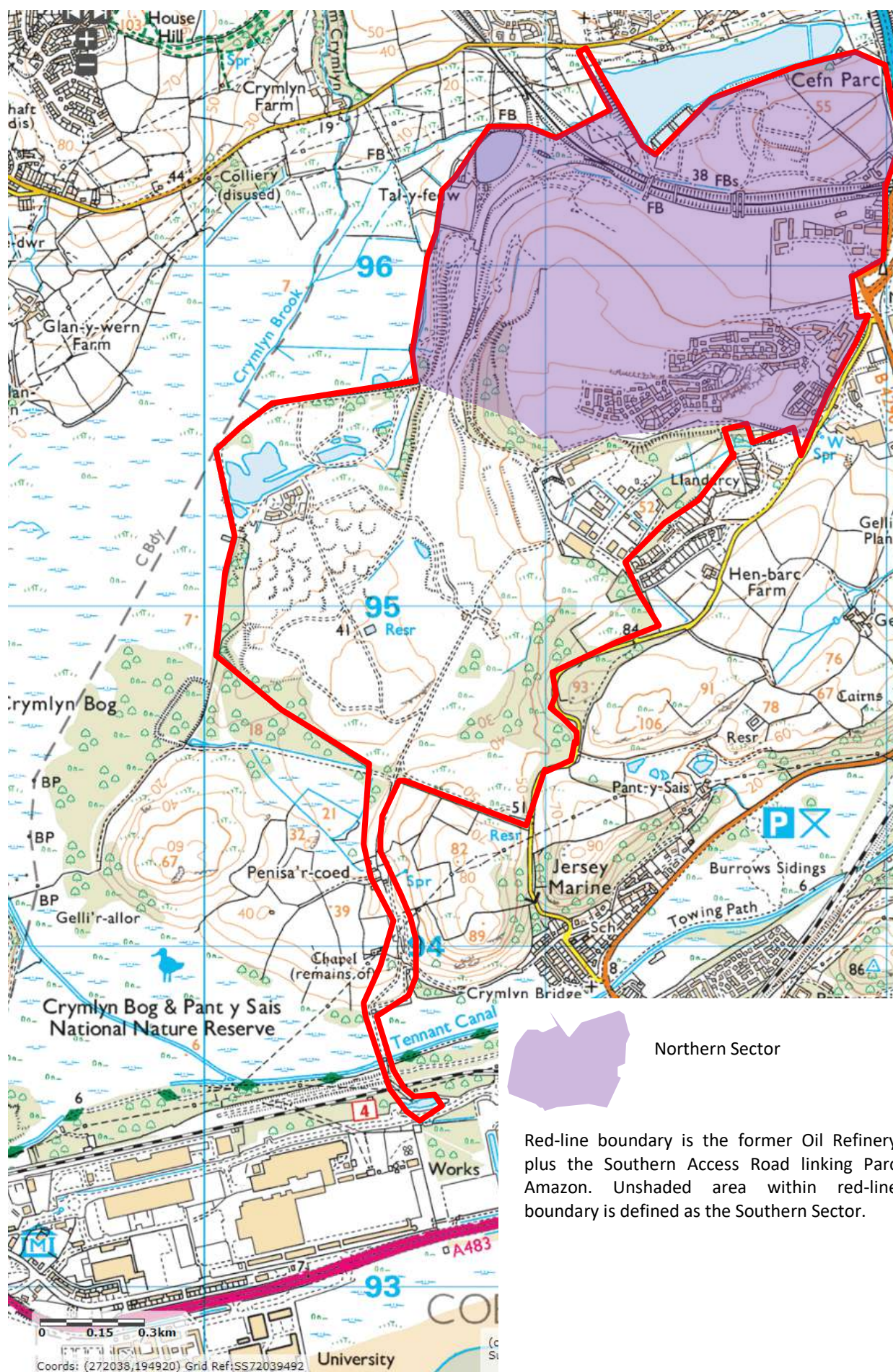
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## A. **Appendix A: Former Llandarcy Oil Refinery Sectors**



Northern Sector

Red-line boundary is the former Oil Refinery plus the Southern Access Road linking Parc Amazon. Unshaded area within red-line boundary is defined as the Southern Sector.

**B.      Appendix B: Nature Conservation Status Categories  
(Definitions)**

## Introduction

The up to date status of species of conservation concern have been taken from Pantheon, the web-based analytical package maintained by the national biological records centre and developed by Webb *et al.* (2018) but reference to the various published Species Status Reviews; and the <sup>20</sup>Joint Nature Conservation Committee database of species designations has been undertaken where the author is aware there might be a discrepancy. However, no guarantee is given that this has been entirely comprehensive and reliance has largely been placed on Pantheon's accuracy.

## Great Britain Rarity Status

Nationally Rare (NR) species are those that have been recently reassessed and are roughly equivalent to the old Red Data Book categories. These are defined as occurring in 15 or fewer hectads (10 km Ordnance Survey grid squares) and where there is reasonable confidence that intensive recording effort won't increase the number of hectads above 15.

Nationally Scarce (NS) species are those that are not NR and which have not been recorded in more than 100 hectads, and where there is reasonable confidence that intensive recording effort won't increase the number of hectads above 100.

Where taxa have yet to be reassessed under the Species Status Reviews, they formally retain their status based on historical reviews, which may date back to the late 1980s or early 1990s. These status' should be treated with caution as it is likely a significant proportion are no longer accurate, either due to a better understanding of their ecology, or have subsequently spread due to climate change or other amenable factors (e.g. they are more frequent and no longer deserve a nature conservation status); or they have declined; and may merit upgrading to a threat category.

Nationally Notable - species recorded, or likely to be restricted to 16 - 100 hectads in Britain. Historically, for some better recorded invertebrate taxa, they were further divided between Notable-A (Na) for species thought to occur in 30 or fewer hectads, and Notable-B (Nb) for those thought to occur between 31-100 hectads. These are referred to as Nationally Scarce (Na), or Nationally Scarce (Nb). Within Pantheon, some status' have been placed in square brackets, e.g. [Nationally Scarce (Nb)]. This denotes that in the professional judgement of the specialists (Webb *et al.*, 2018), this status is unreliable, but they have not been formally assessed against up to date criteria. The species are included in the relevant table in this report for the avoidance of doubt.

Red Data Book (RDB) species –species occurring in fewer than 16 10-km squares of the National Grid, divided as:

RDB 1: Endangered - for species known from a single population or in continuous recent decline and now known from five or fewer 10-km squares;

RDB 2: Vulnerable - likely to become endangered (RDB 1) if causal factors continue;

RDB 3: Rare: - species at risk but not qualifying as vulnerable; and

RDB K: Insufficiently Known - species likely to qualify at least as rare.

## UK Biodiversity Action Planning

Species of Principal Importance as listed in Section 41 of the National Environment and Rural Communities Act 2006. These are abbreviated as SoPI. Approximately 70 species of moth have been included in a list which proposes 'for Research only'; a frequently encountered example is the cinnabar (*Tyria jacobaeae*). These are widespread species which are believed to have experienced a decline and have been included to enable funding to be allocated for research. These species have not been included in Table 6.

<sup>20</sup> Joint Nature Conservation Committee, <http://jncc.defra.gov.uk/page-3408>

## UK Legal Protection

Approximately 50 species of invertebrate species in Britain receive legal protection through Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). About half receive limited protection; for example it is illegal to sell, or advertise for sale, a number of butterfly species. The remaining 28 species are more strictly protected, for example it is an offence to take or kill specimens without an appropriate licence. These species are generally extremely rare, restricted to a few, or a single site and none are likely to occur anywhere in the region.

## IUCN Threat Categories

In recent years, invertebrate taxa in Great Britain have been assessed against the International Union for the Conservation of Nature's (IUCN) threat criteria that considers factors influencing a species survival. These include population decline or geographic contraction through habitat loss. These assessments are ongoing as part of the Species Status Reviews, overseen by the Joint Nature Conservation Committee and mostly published by Natural England. The criteria are defined by the IUCN, which places an assessed taxon in one of seven categories from Extinct down to Least Concern, based on one of the five main criteria. The following categories are defined as Threatened (Red List):

**Critically Endangered (CR):** A taxon is Critically Endangered when the best available evidence indicates that it is considered to be facing an extremely high risk of extinction in the wild.

**Endangered (EN):** A taxon is Endangered when the best available evidence indicates that it is considered to be facing a very high risk of extinction in the wild.

**Vulnerable (VU):** A taxon is Vulnerable when the best available evidence indicates that it is considered to be facing a high risk of extinction in the wild.

A further category, Near Threatened (NT), is applied to a taxon, which following assessment, came close to, but failed to qualify as a Threatened species. However, it is considered that if the factors influencing its assessment continue, it is likely to move in to one of the threat categories; and thus it acts as a watching brief.

## C.      **Appendix C: Species Lists**

Table 9: Species recorded within the former Llandarcy Oil Refinery during 2020.

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Arachnida	Araneae	Theridiidae	<i>Episinus angulatus</i>			1	x	
Arachnida	Araneae	Theridiidae	<i>Anelosimus vittatus</i>			4	x	x
Arachnida	Araneae	Theridiidae	<i>Phylloneta sisypbia</i>			4	x	x
Arachnida	Araneae	Theridiidae	<i>Theridion varians</i>			3	x	
Arachnida	Araneae	Theridiidae	<i>Neottiura bimaculata</i>			2		x
Arachnida	Araneae	Theridiidae	<i>Paidiscura pallens</i>			1	x	
Arachnida	Araneae	Theridiidae	<i>Enoplognatha ovata sens. str.</i>			1	x	
Arachnida	Araneae	Theridiidae	<i>Enoplognatha latimana</i>			3	x	x
Arachnida	Araneae	Theridiidae	<i>Enoplognatha thoracica</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Walckenaeria atrotibialis</i>			1		x
Arachnida	Araneae	Linyphiidae	<i>Hylyphantes graminicola</i>			3	x	
Arachnida	Araneae	Linyphiidae	<i>Gnathonarium dentatum</i>			2		x
Arachnida	Araneae	Linyphiidae	<i>Dismodicus bifrons</i>			2	x	
Arachnida	Araneae	Linyphiidae	<i>Peponocranium ludicrum</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Pocadicnemis pumila sens. str.</i>			3	x	x
Arachnida	Araneae	Linyphiidae	<i>Pocadicnemis juncea</i>			1		x
Arachnida	Araneae	Linyphiidae	<i>Oedothorax fuscus</i>			7	x	x
Arachnida	Araneae	Linyphiidae	<i>Oedothorax retusus</i>			5	x	x
Arachnida	Araneae	Linyphiidae	<i>Pelecopsis parallela</i>			4	x	x
Arachnida	Araneae	Linyphiidae	<i>Cnephalocotes obscurus</i>			10	x	x
Arachnida	Araneae	Linyphiidae	<i>Troxochrus scabriculus</i>			1		x
Arachnida	Araneae	Linyphiidae	<i>Gongylidiellum vivum</i>			2	x	x
Arachnida	Araneae	Linyphiidae	<i>Erigonella hiemalis</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Savignia frontata</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Diplocephalus latifrons</i>			1		x
Arachnida	Araneae	Linyphiidae	<i>Erigone dentipalpis</i>			4	x	x
Arachnida	Araneae	Linyphiidae	<i>Erigone atra</i>			9	x	x
Arachnida	Araneae	Linyphiidae	<i>Prinerigone vagans</i>			2		x
Arachnida	Araneae	Linyphiidae	<i>Porrhomma pygmaeum</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Agyneta rurestris</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Agyneta saxatilis sens. str.</i>			1		x
Arachnida	Araneae	Linyphiidae	<i>Agyneta affinis</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Tenuiphantes tenuis</i>			6	x	x
Arachnida	Araneae	Linyphiidae	<i>Neriene peltata</i>			1	x	
Arachnida	Araneae	Linyphiidae	<i>Microlinyphia pusilla</i>			3	x	x

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Arachnida	Araneae	Tetragnathidae	<i>Tetragnatha extensa</i>			3	x	x
Arachnida	Araneae	Tetragnathidae	<i>Tetragnatha montana</i>			3	x	
Arachnida	Araneae	Tetragnathidae	<i>Pachygnatha clercki</i>			1		x
Arachnida	Araneae	Tetragnathidae	<i>Pachygnatha degeeri</i>			3	x	x
Arachnida	Araneae	Araneidae	<i>Gibbaranea gibbosa</i>			1		x
Arachnida	Araneae	Araneidae	<i>Araneus diadematus</i>	Garden Spider		2	x	x
Arachnida	Araneae	Araneidae	<i>Araneus quadratus</i>			2	x	x
Arachnida	Araneae	Araneidae	<i>Larinioides cornutus</i>			1		x
Arachnida	Araneae	Araneidae	<i>Nuctenea umbratica</i>			1	x	x
Arachnida	Araneae	Araneidae	<i>Agalenatea redii</i>			2	x	x
Arachnida	Araneae	Araneidae	<i>Araniella cucurbitina sens. str.</i>			2	x	
Arachnida	Araneae	Lycosidae	<i>Pardosa pullata</i>			6	x	x
Arachnida	Araneae	Lycosidae	<i>Pardosa prativaga</i>			1		x
Arachnida	Araneae	Lycosidae	<i>Pardosa nigriceps</i>			1	x	
Arachnida	Araneae	Lycosidae	<i>Pardosa tenuipes</i>		Nationally Scarce	8	x	x
Arachnida	Araneae	Lycosidae	<i>Xerolycosa miniata</i>		Nationally Scarce	1		x
Arachnida	Araneae	Lycosidae	<i>Trochosa terricola</i>			2	x	
Arachnida	Araneae	Lycosidae	<i>Pirata piraticus</i>			2		x
Arachnida	Araneae	Lycosidae	<i>Piratula latitans</i>			6	x	x
Arachnida	Araneae	Pisauridae	<i>Pisaura mirabilis</i>			1	x	x
Arachnida	Araneae	Agelenidae	<i>Agelena labyrinthica</i>			4	x	x
Arachnida	Araneae	Dictynidae	<i>Argenna subnigra</i>		Nationally Scarce	2	x	
Arachnida	Araneae	Anyphaenidae	<i>Anyphaena accentuata</i>			1	x	
Arachnida	Araneae	Phrurolithidae	<i>Phrurolithus festivus</i>			3	x	x
Arachnida	Araneae	Clubionidae	<i>Clubiona reclusa</i>			1	x	
Arachnida	Araneae	Clubionidae	<i>Clubiona stagnatilis</i>			1		x
Arachnida	Araneae	Clubionidae	<i>Clubiona neglecta sens. str.</i>			2	x	x
Arachnida	Araneae	Cheiracanthiidae	<i>Cheiracanthium virescens</i>		Nationally Scarce	1	x	x
Arachnida	Araneae	Zodariidae	<i>Zodarion fuscum</i>		VU; Nationally Rare	1	x	
Arachnida	Araneae	Gnaphosidae	<i>Drassyllus pusillus</i>			1	x	
Arachnida	Araneae	Gnaphosidae	<i>Micaria pulicaria sens. str.</i>			1		x
Arachnida	Araneae	Philodromidae	<i>Philodromus dispar</i>			1	x	
Arachnida	Araneae	Philodromidae	<i>Philodromus aureolus</i>			2	x	
Arachnida	Araneae	Philodromidae	<i>Philodromus cespitum</i>			1	x	
Arachnida	Araneae	Thomisidae	<i>Misumena vatia</i>			1	x	x
Arachnida	Araneae	Thomisidae	<i>Xysticus cristatus</i>			1	x	

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Arachnida	Araneae	Thomisidae	<i>Xysticus kochi</i>			2	x	
Arachnida	Araneae	Thomisidae	<i>Xysticus ulmi</i>			1		x
Arachnida	Araneae	Thomisidae	<i>Ozyptila sanctuaria</i>			2	x	x
Arachnida	Araneae	Salticidae	<i>Heliophanus cupreus</i>			3	x	x
Arachnida	Araneae	Salticidae	<i>Heliophanus flavipes</i>			8	x	x
Arachnida	Araneae	Salticidae	<i>Marpissa nivoyi</i>		Nationally Scarce	2	x	x
Arachnida	Araneae	Salticidae	<i>Euophrys frontalis</i>			1		x
Arachnida	Araneae	Salticidae	<i>Talavera aequipes</i>			3	x	
Arachnida	Araneae	Salticidae	<i>Synageles venator</i>		Nationally Scarce	1	x	
Arachnida	Opiliones	Nemastomatidae	<i>Nemastoma bimaculatum</i>			1		x
Arachnida	Opiliones	Phalangiidae	<i>Phalangium opilio</i>			6	x	x
Arachnida	Opiliones	Leiobunidae	<i>Dicranopalpus ramosus sens. str.</i>			1	x	x
Arachnida	Opiliones	Leiobunidae	<i>Leiobunum rotundum</i>			1	x	
Arachnida	Pseudoscorpiones	Chernetidae	<i>Dinocheirus panzeri</i>			1	x	x
Chilopoda	Lithobiomorpha	Lithobiidae	<i>Lithobius forficatus</i>			1	x	
Gastropoda	Pulmonata	Helicidae	<i>Cornu aspersum</i>	Garden Snail		1	x	
Insecta	Coleoptera	Haliplidae	<i>Haliphus mucronatus</i>		Nationally Scarce	1	x	x
Insecta	Coleoptera	Dytiscidae	<i>Agabus bipustulatus</i>			1	x	x
Insecta	Coleoptera	Carabidae	<i>Carabus problematicus</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Nebria brevicollis</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Nebria salina</i>			2	x	x
Insecta	Coleoptera	Carabidae	<i>Notiophilus biguttatus</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Notiophilus palustris</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Notiophilus substriatus</i>			5	x	x
Insecta	Coleoptera	Carabidae	<i>Cicindela campestris</i>	Green Tiger Beetle		1		x
Insecta	Coleoptera	Carabidae	<i>Trechus quadristriatus</i>			2		x
Insecta	Coleoptera	Carabidae	<i>Bembidion lampros</i>			2	x	
Insecta	Coleoptera	Carabidae	<i>Bembidion properans</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Elaphropus parvulus</i>		Nationally Scarce	2		x
Insecta	Coleoptera	Carabidae	<i>Poecilus cupreus</i>			2	x	x
Insecta	Coleoptera	Carabidae	<i>Poecilus versicolor</i>			2	x	x
Insecta	Coleoptera	Carabidae	<i>Pterostichus madidus</i>			3	x	x
Insecta	Coleoptera	Carabidae	<i>Pterostichus niger</i>			3	x	x
Insecta	Coleoptera	Carabidae	<i>Pterostichus melanarius</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Abax parallelepipedus</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Olisthopus rotundatus</i>			7	x	x

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Insecta	Coleoptera	Carabidae	<i>Anchomenus dorsalis</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Agonum muelleri</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Amara plebeja</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Amara aenea</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Amara similata</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Amara tibialis</i>			1	x	
Insecta	Coleoptera	Carabidae	<i>Harpalus affinis</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Harpalus rubripes</i>			2	x	x
Insecta	Coleoptera	Carabidae	<i>Harpalus rufipes</i>			2	x	
Insecta	Coleoptera	Carabidae	<i>Ophonus puncticeps</i>			1	x	x
Insecta	Coleoptera	Carabidae	<i>Anisodactylus binotatus</i>			2		x
Insecta	Coleoptera	Carabidae	<i>Stenolophus mixtus</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Acupalpus dubius</i>			2		x
Insecta	Coleoptera	Carabidae	<i>Acupalpus parvulus</i>			1		x
Insecta	Coleoptera	Carabidae	<i>Paradromius linearis</i>			2	x	x
Insecta	Coleoptera	Carabidae	<i>Syntomus foveatus</i>			1		x
Insecta	Coleoptera	Helophoridae	<i>Helophorus aequalis</i>			1	x	x
Insecta	Coleoptera	Hydrophilidae	<i>Anacaena lutescens</i>			1		x
Insecta	Coleoptera	Hydrophilidae	<i>Sphaeridium scarabaeoides</i>			1		x
Insecta	Coleoptera	Hydrophilidae	<i>Megasternum concinnum</i>			1	x	
Insecta	Coleoptera	Silphidae	<i>Silpha atrata</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Metopsia clypeata</i>			2		x
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus nigripennis</i>			2	x	x
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus dispar</i>			5	x	x
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus nitidulus</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus solutus</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Aloconota gregaria</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Philhygra volans</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Mocyta fungi agg.</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Drusilla canaliculata</i>			1	x	
Insecta	Coleoptera	Staphylinidae	<i>Cypha longicornis</i>			4	x	x
Insecta	Coleoptera	Staphylinidae	<i>Carpelimus corticinus</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Stenus clavicornis</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Stenus juno</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Stenus brunnipes</i>			4	x	x
Insecta	Coleoptera	Staphylinidae	<i>Stenus fulvicornis</i>			1		x

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Insecta	Coleoptera	Staphylinidae	<i>Stenus flavipes</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Stenus nitidiusculus</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Stenus aceris</i>			3	x	x
Insecta	Coleoptera	Staphylinidae	<i>Stenus ossium</i>			12	x	x
Insecta	Coleoptera	Staphylinidae	<i>Paederus fuscipes</i>		Nationally Scarce (Nb)	2	x	x
Insecta	Coleoptera	Staphylinidae	<i>Staphylinus dimidiaticornis</i>			2	x	x
Insecta	Coleoptera	Staphylinidae	<i>Ocypus olens</i>	Devil's Coach-horse		1	x	
Insecta	Coleoptera	Staphylinidae	<i>Quedius levicollis</i>			1	x	
Insecta	Coleoptera	Staphylinidae	<i>Quedius persimilis</i>			1	x	
Insecta	Coleoptera	Staphylinidae	<i>Quedius schatzmayri</i>			2	x	x
Insecta	Coleoptera	Staphylinidae	<i>Quedius semiobscurus</i>			4	x	x
Insecta	Coleoptera	Staphylinidae	<i>Gyrophypnus wagneri</i>			1		x
Insecta	Coleoptera	Staphylinidae	<i>Xantholinus longiventris</i>			1		x
Insecta	Coleoptera	Scirtidae	<i>Cyphon coarctatus</i>			1	x	
Insecta	Coleoptera	Scirtidae	<i>Cyphon padi</i>			2	x	x
Insecta	Coleoptera	Byrrhidae	<i>Cytilus sericeus</i>			1		x
Insecta	Coleoptera	Elateridae	<i>Agrypnus murinus</i>			1		x
Insecta	Coleoptera	Elateridae	<i>Athous haemorrhoidalis</i>			1	x	
Insecta	Coleoptera	Elateridae	<i>Agriotes lineatus</i>			1	x	
Insecta	Coleoptera	Elateridae	<i>Agriotes pallidulus</i>			1	x	
Insecta	Coleoptera	Elateridae	<i>Melanotus villosus sens. str.</i>			1	x	
Insecta	Coleoptera	Elateridae	<i>Zoroachros minimus</i>			2		x
Insecta	Coleoptera	Cantharidae	<i>Cantharis cryptica</i>			1	x	
Insecta	Coleoptera	Cantharidae	<i>Cantharis decipiens</i>			2	x	x
Insecta	Coleoptera	Cantharidae	<i>Cantharis flavilabris</i>			1		x
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha limbata</i>			1	x	
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha fulva</i>			1	x	x
Insecta	Coleoptera	Malachiidae	<i>Anthocomus rufus</i>			1	x	x
Insecta	Coleoptera	Nitidulidae	<i>Meligethes carinulatus</i>			2	x	x
Insecta	Coleoptera	Nitidulidae	<i>Meligethes fulvipes</i>		Nationally Scarce	1	x	
Insecta	Coleoptera	Nitidulidae	<i>Meligethes rotundicollis</i>		Nationally Scarce	1		x
Insecta	Coleoptera	Phalacridae	<i>Olibrus aeneus</i>			1	x	
Insecta	Coleoptera	Phalacridae	<i>Olibrus liquidus</i>			6	x	x
Insecta	Coleoptera	Cryptophagidae	<i>Micrambe ulicis</i>			2	x	x
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius litura</i>			8	x	x
Insecta	Coleoptera	Coccinellidae	<i>Coccidula rufa</i>			1		x

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Insecta	Coleoptera	Coccinellidae	<i>Nephus redtenbacheri</i>			4	x	x
Insecta	Coleoptera	Coccinellidae	<i>Propylea quattuordecimpunctata</i>	14-spot Ladybird		1	x	
Insecta	Coleoptera	Coccinellidae	<i>Harmonia axyridis</i>	Harlequin Ladybird		1	x	x
Insecta	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	7-spot Ladybird		5	x	x
Insecta	Coleoptera	Latridiidae	<i>Corticarina minuta</i>			4	x	x
Insecta	Coleoptera	Latridiidae	<i>Corticara gibbosa</i>			5	x	x
Insecta	Coleoptera	Tenebrionidae	<i>Lagria hirta</i>			1	x	
Insecta	Coleoptera	Oedemeridae	<i>Oedemera nobilis</i>	Swollen-thighed Beetle		4	x	x
Insecta	Coleoptera	Oedemeridae	<i>Oedemera lurida</i>			5	x	x
Insecta	Coleoptera	Scraptiidae	<i>Anaspis frontalis</i>			1	x	
Insecta	Coleoptera	Scraptiidae	<i>Anaspis garneysi</i>			1	x	
Insecta	Coleoptera	Cerambycidae	<i>Grammoptera ruficornis</i>			1		x
Insecta	Coleoptera	Chrysomelidae	<i>Bruchidius villosus</i>			2		x
Insecta	Coleoptera	Chrysomelidae	<i>Bruchus loti</i>			1		x
Insecta	Coleoptera	Chrysomelidae	<i>Chrysolina hyperici</i>			1		x
Insecta	Coleoptera	Chrysomelidae	<i>Hydrothassa glabra</i>			1	x	
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus melanocephalus</i>			1	x	
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus pratensis</i>			1		x
Insecta	Coleoptera	Chrysomelidae	<i>Neocrepidodera transversa</i>			4	x	x
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema hortensis</i>			1		x
Insecta	Coleoptera	Chrysomelidae	<i>Sphaeroderma rubidum</i>			1		x
Insecta	Coleoptera	Chrysomelidae	<i>Sphaeroderma testaceum</i>			1	x	
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus pusillus</i>			1	x	
Insecta	Coleoptera	Apionidae	<i>Exapion ulicis</i>	Gorse Weevil		7	x	x
Insecta	Coleoptera	Apionidae	<i>Protapion apricans</i>			5	x	x
Insecta	Coleoptera	Apionidae	<i>Protapion assimile</i>			2		x
Insecta	Coleoptera	Apionidae	<i>Protapion filirostre</i>		Nationally Scarce (Nb)	1		x
Insecta	Coleoptera	Apionidae	<i>Protapion fulvipes</i>	White Clover Seed Weevil		8	x	x
Insecta	Coleoptera	Apionidae	<i>Protapion nigritarse</i>			5	x	x
Insecta	Coleoptera	Apionidae	<i>Protapion trifolii</i>			4	x	x
Insecta	Coleoptera	Apionidae	<i>Apion frumentarium</i>			1	x	
Insecta	Coleoptera	Apionidae	<i>Catapion pubescens</i>		[Nationally Scarce (Nb)]	2	x	x
Insecta	Coleoptera	Apionidae	<i>Stenopterapion melliloti</i>			1		x
Insecta	Coleoptera	Apionidae	<i>Ischnopterapion loti</i>			5	x	x
Insecta	Coleoptera	Apionidae	<i>Holotrichapion pisi</i>			2		x
Insecta	Coleoptera	Apionidae	<i>Oxystoma cerdo</i>		[Nationally Scarce (Nb)]	1	x	

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Insecta	Coleoptera	Apionidae	<i>Oxystoma pomonae</i>			4	x	x
Insecta	Coleoptera	Apionidae	<i>Eutrichapion ervi</i>			1		x
Insecta	Coleoptera	Eirrhinidae	<i>Grypus equiseti</i>	Horsetail Weevil	[Nationally Scarce (Nb)]	1	x	
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus singularis</i>	Raspberry Weevil		1	x	
Insecta	Coleoptera	Curculionidae	<i>Polydrusus cervinus</i>			3	x	
Insecta	Coleoptera	Curculionidae	<i>Polydrusus formosus</i>		[Nationally Scarce (Na)]	1	x	x
Insecta	Coleoptera	Curculionidae	<i>Polydrusus pterygomalis</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Coelositona cambricus</i>			4	x	x
Insecta	Coleoptera	Curculionidae	<i>Sitona cylindricollis</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Sitona hispidulus</i>			5	x	x
Insecta	Coleoptera	Curculionidae	<i>Sitona humeralis</i>			3		x
Insecta	Coleoptera	Curculionidae	<i>Sitona lepidus</i>			3	x	x
Insecta	Coleoptera	Curculionidae	<i>Sitona lineatus</i>			4	x	x
Insecta	Coleoptera	Curculionidae	<i>Sitona puncticollis</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Andrion regensteinense</i>			2	x	x
Insecta	Coleoptera	Curculionidae	<i>Sitona striatellus</i>			4	x	x
Insecta	Coleoptera	Curculionidae	<i>Sitona sulcifrons</i>			2		x
Insecta	Coleoptera	Curculionidae	<i>Sitona waterhousei</i>		Nationally Scarce (Nb)	1		x
Insecta	Coleoptera	Curculionidae	<i>Hypera meles</i>		[Nationally Scarce (Na)]	2	x	x
Insecta	Coleoptera	Curculionidae	<i>Hypera plantaginis</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Hypera postica</i>	Clover Leaf Weevil		3		x
Insecta	Coleoptera	Curculionidae	<i>Hypera venusta</i>			2	x	x
Insecta	Coleoptera	Curculionidae	<i>Dorytomus taeniatus</i>			2	x	
Insecta	Coleoptera	Curculionidae	<i>Glocianus distinctus</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Trichosirocalus troglodytes</i>			1		x
Insecta	Coleoptera	Curculionidae	<i>Archarius pyrrhoceras</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Tychius meliloti</i>			1	x	
Insecta	Coleoptera	Curculionidae	<i>Tychius picirostris</i>			3	x	x
Insecta	Coleoptera	Curculionidae	<i>Mecinus pascuorum</i>			6	x	x
Insecta	Coleoptera	Curculionidae	<i>Orchestes signifer</i>			1	x	
Insecta	Dermaptera	Forficulidae	<i>Forficula auricularia</i>	Common Earwig		1	x	x
Insecta	Diptera	Tabanidae	<i>Chrysops relictus</i>			1	x	
Insecta	Diptera	Stratiomyidae	<i>Nemotelus notatus</i>			1	x	
Insecta	Diptera	Stratiomyidae	<i>Oxycera trilineata</i>			1	x	
Insecta	Diptera	Bombyliidae	<i>Bombylius canescens</i>		Nationally Scarce	1	x	x
Insecta	Diptera	Empididae	<i>Empis nuntia</i>			1	x	

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Insecta	Diptera	Empididae	<i>Empis tessellata</i>			2		x
Insecta	Diptera	Dolichopodidae	<i>Dolichopus griseipennis</i>			1	x	x
Insecta	Diptera	Dolichopodidae	<i>Tachytrechus insignis</i>			1		x
Insecta	Diptera	Dolichopodidae	<i>Syntormon pallipes</i>			1	x	x
Insecta	Diptera	Syrphidae	<i>Melanostoma mellinum</i>	a hoverfly		2	x	x
Insecta	Diptera	Syrphidae	<i>Melanostoma scalare</i>	a hoverfly		2	x	x
Insecta	Diptera	Syrphidae	<i>Platycheirus albimanus</i>	a hoverfly		1	x	
Insecta	Diptera	Syrphidae	<i>Platycheirus angustatus</i>	a hoverfly		1	x	
Insecta	Diptera	Syrphidae	<i>Platycheirus clypeatus</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Platycheirus scutatus sens. str.</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Chrysotoxum festivum</i>	a hoverfly		2	x	
Insecta	Diptera	Syrphidae	<i>Episyrphus balteatus</i>	a hoverfly		3	x	x
Insecta	Diptera	Syrphidae	<i>Scaeva pyrastris</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Sphaerophoria interrupta</i>	a hoverfly		1	x	
Insecta	Diptera	Syrphidae	<i>Sphaerophoria scripta</i>	a hoverfly		2	x	x
Insecta	Diptera	Syrphidae	<i>Xanthogramma pedissequum</i>	a hoverfly		1	x	
Insecta	Diptera	Syrphidae	<i>Cheilosia impressa</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Cheilosia pagana</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Cheilosia proxima</i>	a hoverfly		1	x	
Insecta	Diptera	Syrphidae	<i>Cheilosia scutellata</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Sphegina sibirica</i>	a hoverfly		1		x
Insecta	Diptera	Syrphidae	<i>Eristalis arbustorum</i>	a hoverfly		4	x	x
Insecta	Diptera	Syrphidae	<i>Eristalis pertinax</i>	a hoverfly		2	x	x
Insecta	Diptera	Syrphidae	<i>Eristalis tenax</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Myathropa florea</i>	a hoverfly		1	x	x
Insecta	Diptera	Syrphidae	<i>Volucella bombylans</i>	a hoverfly		2	x	x
Insecta	Diptera	Syrphidae	<i>Syritta pipiens</i>	a hoverfly		2	x	
Insecta	Diptera	Micropezidae	<i>Micropeza corrigiolata</i>			1		x
Insecta	Diptera	Conopidae	<i>Conops quadrifasciata</i>			1	x	
Insecta	Diptera	Conopidae	<i>Physocephala rufipes</i>			2	x	
Insecta	Diptera	Conopidae	<i>Thecophora atra</i>			1	x	x
Insecta	Diptera	Neottiophilidae	<i>Neottiophilum praeustum</i>			1		x
Insecta	Diptera	Platystomatidae	<i>Rivellia syngenesiae</i>	a picture-winged fly		2		x
Insecta	Diptera	Tephritidae	<i>Tephritis matricariae</i>			4	x	x
Insecta	Diptera	Tephritidae	<i>Tephritis neesii</i>			2		x
Insecta	Diptera	Tephritidae	<i>Terellia ruficauda</i>			1		x

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Insecta	Diptera	Tephritidae	<i>Euleia heraclei</i>			1		x
Insecta	Diptera	Lauxaniidae	<i>Pseudolyciella pallidiventris</i>			1		x
Insecta	Diptera	Lauxaniidae	<i>Minettia fasciata</i> (=rivosa)			2	x	
Insecta	Diptera	Lauxaniidae	<i>Sapromyza quadripunctata</i>			2	x	
Insecta	Diptera	Chamaemyiidae	<i>Chamaemyia aridella</i>			1		x
Insecta	Diptera	Sciomyzidae	<i>Pherbellia cinerella</i>			4	x	x
Insecta	Diptera	Sciomyzidae	<i>Dictya umbrarum</i>		Nationally Scarce	1	x	x
Insecta	Diptera	Sciomyzidae	<i>Elgiva sollicita</i>			1	x	x
Insecta	Diptera	Sciomyzidae	<i>Hydromya dorsalis</i>			1	x	x
Insecta	Diptera	Sciomyzidae	<i>Ilione albiseta</i>			1		x
Insecta	Diptera	Sciomyzidae	<i>Pherbina coryleti</i>			1	x	x
Insecta	Diptera	Sciomyzidae	<i>Tetanocera punctifrons</i>		Nationally Scarce	1	x	x
Insecta	Diptera	Sepsidae	<i>Nemopoda nitidula</i>			1		x
Insecta	Diptera	Sepsidae	<i>Sepsis cynipsea</i>			1	x	
Insecta	Diptera	Opomyzidae	<i>Opomyza germinationis</i>			1	x	x
Insecta	Diptera	Opomyzidae	<i>Opomyza petrei</i>			1		x
Insecta	Diptera	Ephydriidae	<i>Hydrellia griseola</i>			1	x	x
Insecta	Diptera	Anthomyiidae	<i>Anthomyia liturata</i>			3	x	x
Insecta	Diptera	Anthomyiidae	<i>Anthomyia procellaris</i>			1		x
Insecta	Diptera	Anthomyiidae	<i>Botanophila striolata</i>			2	x	x
Insecta	Diptera	Anthomyiidae	<i>Hylemya urbica</i>			2	x	x
Insecta	Diptera	Anthomyiidae	<i>Hylemya vagans</i>			1		x
Insecta	Diptera	Anthomyiidae	<i>Delia platura</i>			1		x
Insecta	Diptera	Anthomyiidae	<i>Hydrophoria ruralis</i>			1		x
Insecta	Diptera	Anthomyiidae	<i>Pegoplata aestiva</i>			2	x	x
Insecta	Diptera	Anthomyiidae	<i>Paradelia intersecta</i>			1		x
Insecta	Diptera	Fanniidae	<i>Fannia corvina</i>			1	x	
Insecta	Diptera	Fanniidae	<i>Fannia fuscula</i>			1	x	
Insecta	Diptera	Fanniidae	<i>Fannia sociella</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Schoenomyza litorella</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Limnophora maculosa</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Lispe pygmaea</i>			1		x
Insecta	Diptera	Muscidae	<i>Morellia aenescens</i>			2	x	x
Insecta	Diptera	Muscidae	<i>Musca autumnalis</i>			3	x	x
Insecta	Diptera	Muscidae	<i>Neomyia cornicina</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Graphomya maculata</i>			1	x	

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Insecta	Diptera	Muscidae	<i>Helina depuncta</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Helina impuncta</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Helina lasiophthalma</i>			1	x	x
Insecta	Diptera	Muscidae	<i>Helina reversio</i>			5	x	x
Insecta	Diptera	Muscidae	<i>Phaonia incana</i>			1	x	
Insecta	Diptera	Muscidae	<i>Phaonia tuguriorum</i>			2	x	x
Insecta	Diptera	Calliphoridae	<i>Bellardia viarum</i>			1	x	
Insecta	Diptera	Calliphoridae	<i>Calliphora vicina</i>			1		x
Insecta	Diptera	Calliphoridae	<i>Lucilia sericata</i>			1	x	
Insecta	Diptera	Polleniidae	<i>Pollenia angustigena</i>			2	x	x
Insecta	Diptera	Polleniidae	<i>Pollenia rudis</i>			3	x	
Insecta	Diptera	Polleniidae	<i>Pollenia viatica</i>			1	x	x
Insecta	Diptera	Rhinophoridae	<i>Rhinophora lepida</i>			3	x	x
Insecta	Diptera	Sarcophagidae	<i>Ravinia pernix</i>			1		x
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga pumila</i>			1	x	
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga filia</i>			3	x	x
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga haemorrhoea</i>			1	x	
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga anaces</i>			2	x	x
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga nigriventris</i>			1	x	
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga carnaria</i>			1	x	
Insecta	Diptera	Sarcophagidae	<i>Sarcophaga variegata</i>			1	x	
Insecta	Diptera	Tachinidae	<i>Eriothrix rufomaculata</i>			1		x
Insecta	Diptera	Tachinidae	<i>Exorista rustica</i>			1		x
Insecta	Diptera	Tachinidae	<i>Phasia hemiptera</i>			2	x	x
Insecta	Diptera	Tachinidae	<i>Phasia obesa</i>			1	x	
Insecta	Diptera	Tachinidae	<i>Linnaemya picta</i>			1	x	x
Insecta	Hemiptera, Auchenorrhyncha	Aphrophoridae	<i>Philaenus spumarius</i>			6	x	x
Insecta	Hemiptera, Auchenorrhyncha	Aphrophoridae	<i>Neophilaenus campestris</i>			3	x	x
Insecta	Hemiptera, Auchenorrhyncha	Aphrophoridae	<i>Neophilaenus lineatus</i>			2	x	x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Megophthalmus scabripennis</i>			1		x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Megophthalmus scanicus</i>			2		x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Cicadella viridis</i>			3	x	x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Idiocerus lituratus</i>			3	x	x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Anoscopus albifrons</i>			3	x	x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Aphrodes bicinctus</i>			5	x	x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Adarrus ocellaris</i>			1		x

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Arthaldeus pascuellus</i>			1		x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Psammotettix confinis</i>			2	x	x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Euscelis incisus</i>			2		x
Insecta	Hemiptera, Auchenorrhyncha	Cicadellidae	<i>Macrosteles horvathi</i>			1		x
Insecta	Hemiptera, Auchenorrhyncha	Delphacidae	<i>Conomelus anceps</i>			2	x	x
Insecta	Hemiptera, Auchenorrhyncha	Delphacidae	<i>Muellerianella fairmairei</i>			1		x
Insecta	Hemiptera, Heteroptera	Acanthosomatidae	<i>Acanthosoma haemorrhoidale</i>	Hawthorn Shieldbug		1	x	x
Insecta	Hemiptera, Heteroptera	Scutelleridae	<i>Eurygaster testudinaria</i>	Tortoise Shieldbug		1	x	
Insecta	Hemiptera, Heteroptera	Pentatomidae	<i>Aelia acuminata</i>	Bishop's Mitre Shieldbug		2	x	x
Insecta	Hemiptera, Heteroptera	Pentatomidae	<i>Dolycoris baccarum</i>	Hairy Shieldbug		5	x	x
Insecta	Hemiptera, Heteroptera	Pentatomidae	<i>Palomena prasina</i>	Common Green Shieldbug		3	x	x
Insecta	Hemiptera, Heteroptera	Pentatomidae	<i>Pentatoma rufipes</i>	Red-legged Shieldbug		1	x	x
Insecta	Hemiptera, Heteroptera	Pentatomidae	<i>Piezodorus lituratus</i>	Gorse Shieldbug		3	x	x
Insecta	Hemiptera, Heteroptera	Coreidae	<i>Coriomeris denticulatus</i>	Denticulate Leatherbug		3	x	x
Insecta	Hemiptera, Heteroptera	Rhopalidae	<i>Chorosoma schillingii</i>			1		x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Cymus claviculus</i>			2	x	x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Cymus melanocephalus</i>			1		x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Drymus pilicornis</i>		Nationally Scarce (Nb)	1		x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Drymus sylvaticus</i>			4	x	x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Nysius huttoni</i>			4	x	x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Peritrechus geniculatus</i>			3		x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Plinthisus brevipennis</i>			2		x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Scolopostethus puberulus</i>			1	x	
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Scolopostethus thomsoni</i>			2		x
Insecta	Hemiptera, Heteroptera	Lygaeidae	<i>Stygnocoris sabulosus</i>			6	x	x
Insecta	Hemiptera, Heteroptera	Berytidae	<i>Berytinus minor</i>			1		x
Insecta	Hemiptera, Heteroptera	Tingidae	<i>Acalypta parvula</i>			2		x
Insecta	Hemiptera, Heteroptera	Nabidae	<i>Himacerus apterus</i>			1	x	
Insecta	Hemiptera, Heteroptera	Nabidae	<i>Himacerus major</i>			1		x
Insecta	Hemiptera, Heteroptera	Anthocoridae	<i>Anthocoris confusus</i>			1	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Adelphocoris lineolatus</i>			3	x	x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Atractotomus mali</i>			1		x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Calocoris roseomaculatus</i>			3	x	x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Campyloneura virgula</i>			1	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Closterotomus norwegicus</i>			1	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Heterocordylus tibialis</i>			3		x

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Insecta	Hemiptera, Heteroptera	Miridae	<i>Leptopterna ferrugata</i>			1		x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Lopus decolor</i>			2	x	x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Lygus rugulipennis</i>			1	x	x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Orthops campestris</i>			2	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Phytocoris varipes</i>			3	x	x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Pithanus maerkelii</i>			1		x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Plagiognathus chrysanthemi</i>			8	x	x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Stenodema calcarata</i>			1	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Stenodema laevigata</i>			1	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Stenotus binotatus</i>			1		x
Insecta	Hemiptera, Heteroptera	Miridae	<i>Trigonotylus caelestialium</i>			1	x	
Insecta	Hemiptera, Heteroptera	Miridae	<i>Trigonotylus ruficornis</i>			1		x
Insecta	Hemiptera, Heteroptera	Saldidae	<i>Saldula saltatoria</i>			1	x	
Insecta	Hymenoptera	Argidae	<i>Arge berberidis</i>	Berberis sawfly		1	x	
Insecta	Hymenoptera	Tenthredinidae	<i>Athalia rosae</i>	a sawfly		2	x	x
Insecta	Hymenoptera	Tenthredinidae	<i>Tenthredo temula</i>	a sawfly		1		x
Insecta	Hymenoptera	Cynipidae	<i>Biorhiza pallida</i>	Gall causer		1	x	x
Insecta	Hymenoptera	Crabronidae	<i>Crossocerus dimidiatus</i>	Blunt Tailed Digger Wasp		1	x	
Insecta	Hymenoptera	Crabronidae	<i>Ectemnius continuus</i>	a digger wasp		3	x	x
Insecta	Hymenoptera	Crabronidae	<i>Lindenius albilabris</i>	a digger wasp		1	x	
Insecta	Hymenoptera	Crabronidae	<i>Tachysphex pompiliiformis</i>	a digger wasp		1	x	
Insecta	Hymenoptera	Crabronidae	<i>Pemphredon inornata</i>	a digger wasp		1	x	
Insecta	Hymenoptera	Sphecidae	<i>Ammophila sabulosa</i>	Red Banded Sand Wasp		1	x	x
Insecta	Hymenoptera	Andrenidae	<i>Andrena denticulata</i>	Grey-banded Mining Bee		1	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena thoracica</i>	Cliff Mining Bee		1	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena minutula</i>	Common Mini-miner		2	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena subopaca</i>	Impunctate Mini-miner		1	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena congruens</i>	Long-fringed Mining Bee	Nationally Scarce (Na)	1	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena dorsata</i>	Short-fringed Mining Bee		2	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena ovatula</i>	Small Gorse Mining Bee		1	x	
Insecta	Hymenoptera	Andrenidae	<i>Andrena wilkella</i>	Wilke's Mining Bee		1	x	
Insecta	Hymenoptera	Apidae	<i>Bombus lucorum sens. lat.</i>	White-tailed Bumblebee		2	x	x
Insecta	Hymenoptera	Apidae	<i>Bombus terrestris</i>	Buff-tailed Bumblebee		4	x	x
Insecta	Hymenoptera	Apidae	<i>Bombus lapidarius</i>	Red-tailed Bumblebee		3	x	x
Insecta	Hymenoptera	Apidae	<i>Bombus hypnorum</i>	Tree Bumblebee		2	x	x
Insecta	Hymenoptera	Apidae	<i>Bombus pratorum</i>	Early Bumblebee		1	x	

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Insecta	Hymenoptera	Apidae	<i>Bombus humilis</i>	Brown-banded Carder Bee	SoPI	2	x	x
Insecta	Hymenoptera	Apidae	<i>Bombus pascuorum</i>	Common Carder Bee		4	x	x
Insecta	Hymenoptera	Apidae	<i>Nomada flava</i>	Flavous Nomad Bee		1	x	
Insecta	Hymenoptera	Colletidae	<i>Colletes hederæ</i>	Ivy Bee		1	x	x
Insecta	Hymenoptera	Colletidae	<i>Colletes daviesanus</i>			1	x	
Insecta	Hymenoptera	Colletidae	<i>Hylaeus communis</i>	Common Yellow-face Bee		1	x	
Insecta	Hymenoptera	Colletidae	<i>Hylaeus hyalinatus</i>	Hairy Yellow-face Bee		1	x	x
Insecta	Hymenoptera	Halictidae	<i>Lasioglossum leucopus</i>	White-footed Furrow Bee		1	x	
Insecta	Hymenoptera	Halictidae	<i>Lasioglossum morio</i>	Green Furrow Bee		3	x	x
Insecta	Hymenoptera	Halictidae	<i>Lasioglossum punctatissimum</i>	Rufous-footed Furrow Bee		1	x	
Insecta	Hymenoptera	Halictidae	<i>Lasioglossum leucozonium</i>	White-zoned Furrow Bee		2	x	x
Insecta	Hymenoptera	Halictidae	<i>Sphecodes geoffrellus</i>	Geoffroy's Blood-bee		2	x	
Insecta	Hymenoptera	Halictidae	<i>Sphecodes gibbus</i>	Dark-winged Blood Bee		1	x	
Insecta	Hymenoptera	Halictidae	<i>Sphecodes reticulatus</i>	Reticulate Blood-bee	Nationally Scarce (Na)	1	x	
Insecta	Hymenoptera	Pompilidae	<i>Priocnemis parvula</i>	a spider-hunter wasp		1	x	
Insecta	Hymenoptera	Pompilidae	<i>Anoplius concinnus</i>	a spider-hunter wasp		1		x
Insecta	Hymenoptera	Pompilidae	<i>Anoplius nigerrimus</i>	a spider-hunter wasp		1	x	
Insecta	Hymenoptera	Pompilidae	<i>Arachnospila anceps</i>	a spider-hunter wasp		2	x	
Insecta	Hymenoptera	Pompilidae	<i>Arachnospila spissa</i>	a spider-hunter wasp		1	x	
Insecta	Hymenoptera	Pompilidae	<i>Episyron rufipes</i>	Red Legged Spider Wasp		1		x
Insecta	Hymenoptera	Pompilidae	<i>Ceropales maculata</i>	a spider-hunter wasp		1	x	x
Insecta	Hymenoptera	Tiphiidae	<i>Tiphia minuta</i>	The Small Tiphia	Nationally Scarce (Nb)	1		x
Insecta	Hymenoptera	Vespidae	<i>Ancistrocerus trifasciatus</i>	a mason wasp		1	x	
Insecta	Hymenoptera	Vespidae	<i>Dolichovespula norvegica</i>	Norwegian Wasp		1	x	
Insecta	Hymenoptera	Vespidae	<i>Vespula vulgaris</i>	Common Wasp		1	x	
Insecta	Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>	Six-belted Clearwing		1	x	x
Insecta	Lepidoptera	Zygaenidae	<i>Zygaena filipendulae</i>	Six-spot Burnet		1	x	x
Insecta	Lepidoptera	Hesperiidae	<i>Erynnis tages</i>	Dingy Skipper	VU; SoPI	2	x	x
Insecta	Lepidoptera	Hesperiidae	<i>Thymelicus sylvestris</i>	Small Skipper		1	x	x
Insecta	Lepidoptera	Pieridae	<i>Anthocharis cardamines</i>	Orange-tip		1	x	x
Insecta	Lepidoptera	Pieridae	<i>Pieris brassicae</i>	Large White		3	x	x
Insecta	Lepidoptera	Pieridae	<i>Pieris rapae</i>	Small White		1	x	x
Insecta	Lepidoptera	Pieridae	<i>Pieris napi</i>	Green-veined White		1	x	x
Insecta	Lepidoptera	Pieridae	<i>Gonepteryx rhamni</i>	Brimstone		1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Lasiommata megera</i>	Wall		1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Pararge aegeria</i>	Speckled Wood		2	x	x

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	NT; SoPI	1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Aphantopus hyperantus</i>	Ringlet		1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Maniola jurtina</i>	Meadow Brown		4	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	Gatekeeper		1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Hipparchia semele</i>	Grayling	VU; SoPI	1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Vanessa cardui</i>	Painted Lady		1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Aglais io</i>	Peacock		2	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Aglais urticae</i>	Small Tortoiseshell		1	x	x
Insecta	Lepidoptera	Nymphalidae	<i>Polygonia c-album</i>	Comma		1	x	x
Insecta	Lepidoptera	Lycaenidae	<i>Lycaena phlaeas</i>	Small Copper		1	x	x
Insecta	Lepidoptera	Lycaenidae	<i>Callophrys rubi</i>	Green Hairstreak		1	x	x
Insecta	Lepidoptera	Lycaenidae	<i>Polyommatus icarus</i>	Common Blue		3	x	x
Insecta	Lepidoptera	Erebidae	<i>Orgyia antiqua</i>	Vapourer		1	x	x
Insecta	Lepidoptera	Erebidae	<i>Tyria jacobaeae</i>	Cinnabar	SoPI - RO	2	x	x
Insecta	Lepidoptera	Erebidae	<i>Euclidia glyphica</i>	Burnet Companion		1	x	x
Insecta	Lepidoptera	Noctuidae	<i>Autographa gamma</i>	Silver Y		2	x	x
Insecta	Lepidoptera	Noctuidae	<i>Phlogophora meticulosa</i>	Angle Shades		1	x	x
Insecta	Odonata	Coenagriidae	<i>Pyrrosoma nymphula</i>	Large Red Damselfly		1	x	x
Insecta	Odonata	Coenagriidae	<i>Ischnura elegans</i>	Blue-tailed Damselfly		3	x	x
Insecta	Odonata	Coenagriidae	<i>Enallagma cyathigerum</i>	Common Blue Damselfly		5	x	x
Insecta	Odonata	Coenagriidae	<i>Coenagrion puella</i>	Azure Damselfly		2	x	x
Insecta	Odonata	Aeshnidae	<i>Aeshna grandis</i>	Brown Hawker		1	x	x
Insecta	Odonata	Aeshnidae	<i>Aeshna cyanea</i>	Southern Hawker		2	x	x
Insecta	Odonata	Aeshnidae	<i>Anax imperator</i>	Emperor Dragonfly		1	x	x
Insecta	Odonata	Libellulidae	<i>Libellula quadrimaculata</i>	Four-spotted Chaser		1	x	x
Insecta	Odonata	Libellulidae	<i>Sympetrum striolatum</i>	Common Darter		1	x	x
Insecta	Orthoptera	Conocephalidae	<i>Conocephalus discolor</i>	Long-winged Conehead		2	x	x
Insecta	Orthoptera	Tetrigidae	<i>Tetrix subulata</i>	Slender Ground Hopper		1	x	x
Insecta	Orthoptera	Tetrigidae	<i>Tetrix undulata</i>	Common Ground Hopper		1	x	x
Insecta	Orthoptera	Acrididae	<i>Omocestus viridulus</i>	Common Green Grasshopper		1	x	x
Insecta	Orthoptera	Acrididae	<i>Chorthippus brunneus</i>	Common Field Grasshopper		2	x	x
Insecta	Orthoptera	Acrididae	<i>Chorthippus parallelus</i>	Meadow Grasshopper		1	x	x
Malacostraca	Isopoda	Asellidae	<i>Asellus aquaticus</i>	a waterlouse		1		x
Malacostraca	Isopoda	Philosciidae	<i>Philoscia muscorum</i>	Common Striped Woodlouse		2	x	x
Malacostraca	Isopoda	Oniscidae	<i>Oniscus asellus</i>	Common Shiny Woodlouse		1	x	
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium nasatum</i>	a pill woodlouse		3	x	x

Class	Order	Family	Taxon	Vernacular	National Status	Records	Northern Sector	Southern Sector
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium vulgare</i>	Common Pill Woodlouse		3	x	x
Malacostraca	Isopoda	Porcellionidae	<i>Porcellio scaber</i>	Common Rough Woodlouse		2	x	x
			505		30		380	357

Table 10: Stenotopic species recorded within the former Llandarcy Oil Refinery Northern Sector during 2020.

Order	Family	Species	SQS	Conservation status	Broad biotope	Habitat	SAT	SAT Name	Habitat score
Diptera	Syrphidae	<i>Myathropa florea</i>	1		tree-associated	decaying wood	A211	Heartwood decay	
Coleoptera	Scrptiidae	<i>Anaspis frontalis</i>	1		tree-associated	decaying wood	A212	Bark & sapwood decay	
Coleoptera	Scrptiidae	<i>Anaspis garneysi</i>	1		tree-associated	decaying wood	A212	Bark & sapwood decay	
Hymenoptera	Crabronidae	<i>Crossocerus dimidiatus</i>	1		open habitats; tree-associated	decaying wood	A212, F001	Bark & sapwood decay; Scrub edge	
Hymenoptera	Crabronidae	<i>Ectemnius continuus</i>	1		open habitats; tree-associated	decaying wood	A212, F001	Bark & sapwood decay; Scrub edge	
Hymenoptera	Crabronidae	<i>Pemphredon inornata</i>	1		open habitats; tree-associated	decaying wood	A212, F001	Bark & sapwood decay; Scrub edge	
Hymenoptera	Colletidae	<i>Hylaeus hyalinatus</i>	1		open habitats; tree-associated	decaying wood	A212, F002	Bark & sapwood decay; Rich flower resource	
Araneae	Agelenidae	<i>Agelena labyrinthica</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Hymenoptera	Vespidae	<i>Ancistrocerus trifasciatus</i>	1		open habitats; tree-associated	decaying wood	F001	Scrub edge	
Araneae	Salticidae	<i>Heliophanus cupreus</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Araneae	Salticidae	<i>Heliophanus flavipes</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	calcareous grassland: Low
Lepidoptera	Nymphalidae	<i>Pararge aegeria</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Araneae	Lycosidae	<i>Pardosa nigriceps</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Hymenoptera	Andrenidae	<i>Andrena subopaca</i>	1		open habitats	short sward & bare ground	F001, F002	Scrub edge; Rich flower resource	
Coleoptera	Curculionidae	<i>Andrion regensteinense</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Coleoptera	Apionidae	<i>Exapion ulicis</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Hemiptera	Pentatomidae	<i>Piezodorus lituratus</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Coleoptera	Curculionidae	<i>Sitona striatellus</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Hymenoptera	Andrenidae	<i>Andrena congruens</i>	4	Nationally Scarce (Na)	open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Andrenidae	<i>Andrena denticulata</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Andrenidae	<i>Andrena dorsata</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	soft rock cliff: 3
Hymenoptera	Andrenidae	<i>Andrena minutula</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Andrenidae	<i>Andrena ovatula</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Andrenidae	<i>Andrena thoracica</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Andrenidae	<i>Andrena wilkella</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus humilis</i>	1	SoPI	open habitats	tall sward & scrub	F002	Rich flower resource	calcareous grassland: Moderate
Hymenoptera	Apidae	<i>Bombus hypnorum</i>	1		open habitats; tree-associated	shaded woodland floor; tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus lapidarius</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus pascuorum</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus pratorum</i>	1		open habitats; tree-associated	shaded woodland floor; tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus terrestris</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Colletidae	<i>Colletes daviesanus</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Colletidae	<i>Colletes hederæ</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Colletidae	<i>Hylaeus communis</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Halictidae	<i>Lasioglossum leucopus</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Halictidae	<i>Lasioglossum leucozonium</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Halictidae	<i>Lasioglossum morio</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	calcareous grassland: Moderate

Order	Family	Species	SQS	Conservation status	Broad biotope	Habitat	SAT	SAT Name	Habitat score
Hymenoptera	Halictidae	<i>Lasioglossum punctatissimum</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Nomada flava</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Araneae	Araneidae	<i>Agalenatea redii</i>	1		open habitats		F003	Scrub-heath & moorland	
Coleoptera	Carabidae	<i>Harpalus rufipes</i>	1		open habitats	tall sward & scrub	F003	Scrub-heath & moorland	
Coleoptera	Carabidae	<i>Ophonus puncticeps</i>	1		open habitats	short sward & bare ground	F003, F111	Scrub-heath & moorland; Bare sand & chalk	
Araneae	Dictynidae	<i>Argenna subnigra</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Araneae	Miturgidae	<i>Cheiracanthium virescens</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Lepidoptera	Nymphalidae	<i>Hipparchia semele</i>	1	VU; SoPI	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Araneae	Salticidae	<i>Marpissa nivoyi</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Araneae	Salticidae	<i>Synageles venator</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Araneae	Salticidae	<i>Talavera aequipes</i>	1		open habitats	short sward & bare ground	F111	Bare sand & chalk	calcareous grassland: Low
Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>	4		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: High
Hemiptera	Miridae	<i>Calocoris (Calocoris) roseomaculatus</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	1	NT; SoPI	open habitats	short sward & bare ground	F112	Open short sward	
Hemiptera	Lygaeidae	<i>Cymus clavicolus</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Lepidoptera	Nymphalidae	<i>Lasiommata megera</i>	1	NT; SoPI	open habitats	short sward & bare ground	F112	Open short sward	
Coleoptera	Curculionidae	<i>Tychius meliloti</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Coleoptera	Malachiidae	<i>Anthocomus rufus</i>	1		wetland	peatland	W314	Reed-fen & pools	

Table 11: Stenotopic species recorded within the former Llandarcy Oil Refinery Southern Sector during 2020.

Order	Family	Species	SQS	Conservation status	Broad biotope	Habitat	SAT	SAT Name	Habitat score
Diptera	Syrphidae	<i>Myathropa florea</i>	1		tree-associated	decaying wood	A211	Heartwood decay	
Coleoptera	Cerambycidae	<i>Grammoptera ruficornis</i>	1		tree-associated	decaying wood	A212	Bark & sapwood decay	
Diptera	Syrphidae	<i>Sphegina sibirica</i>	1		tree-associated	decaying wood	A212	Bark & sapwood decay	
Hymenoptera	Crabronidae	<i>Ectemnius continuus</i>	1		open habitats; tree-associated	decaying wood	A212, F001	Bark & sapwood decay; Scrub edge	
Hymenoptera	Colletidae	<i>Hylaeus hyalinatus</i>	1		open habitats; tree-associated	decaying wood	A212, F002	Bark & sapwood decay; Rich flower resource	
Araneae	Agelenidae	<i>Agelena labyrinthica</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Araneae	Salticidae	<i>Heliophanus cupreus</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Araneae	Salticidae	<i>Heliophanus flavipes</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	calcareous grassland: Low
Lepidoptera	Nymphalidae	<i>Pararge aegeria</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	1		open habitats	tall sward & scrub	F001	Scrub edge	
Coleoptera	Curculionidae	<i>Andrion regensteinese</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Coleoptera	Chrysomelidae	<i>Bruchidius villosus</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Coleoptera	Apionidae	<i>Exapion ulicis</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Hemiptera	Miridae	<i>Heterocordylus (Heterocordylus) tibialis</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Hemiptera	Pentatomidae	<i>Piezodorus lituratus</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Coleoptera	Curculionidae	<i>Sitona striatellus</i>	1		open habitats		F001, F003	Scrub edge; Scrub-heath & moorland	
Hymenoptera	Apidae	<i>Bombus humilis</i>	1	SoPI	open habitats	tall sward & scrub	F002	Rich flower resource	calcareous grassland: Moderate
Hymenoptera	Apidae	<i>Bombus hypnorum</i>	1		open habitats; tree-associated	shaded woodland floor; tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus lapidarius</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus pascuorum</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Apidae	<i>Bombus terrestris</i>	1		open habitats	tall sward & scrub	F002	Rich flower resource	
Hymenoptera	Colletidae	<i>Colletes hederæ</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Halictidae	<i>Lasioglossum leucozonium</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	
Hymenoptera	Halictidae	<i>Lasioglossum morio</i>	1		open habitats	short sward & bare ground	F002	Rich flower resource	calcareous grassland: Moderate
Araneae	Araneidae	<i>Agalenatea redii</i>	1		open habitats		F003	Scrub-heath & moorland	
Coleoptera	Carabidae	<i>Carabus problematicus</i>	1		open habitats		F003	Scrub-heath & moorland	
Coleoptera	Carabidae	<i>Ophonus puncticeps</i>	1		open habitats	short sward & bare ground	F003, F111	Scrub-heath & moorland; Bare sand & chalk	
Araneae	Miturgidae	<i>Cheiracanthium virescens</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Hemiptera	Rhopalidae	<i>Chorosoma schillingi</i>	1		open habitats	short sward & bare ground	F111	Bare sand & chalk	
Coleoptera	Carabidae	<i>Cicindela campestris</i>	1		open habitats	short sward & bare ground	F111	Bare sand & chalk	calcareous grassland: Low
Hymenoptera	Pompilidae	<i>Episyron rufipes</i>	1		open habitats	short sward & bare ground	F111	Bare sand & chalk	
Lepidoptera	Nymphalidae	<i>Hipparchia semele</i>	1	VU; SoPI	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Araneae	Salticidae	<i>Marpissa nivoyi</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Hemiptera	Lygaeidae	<i>Plinthisus brevipennis</i>	1		open habitats	short sward & bare ground	F111	Bare sand & chalk	
Araneae	Lycosidae	<i>Xerolycosa miniata</i>	4	Nationally Scarce	open habitats	short sward & bare ground	F111	Bare sand & chalk	
Hemiptera	Tingidae	<i>Acalypta parvula</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Coleoptera	Elateridae	<i>Agrypnus murinus</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Moderate
Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>	4		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: High

Order	Family	Species	SQS	Conservation status	Broad biotope	Habitat	SAT	SAT Name	Habitat score
Hemiptera	Berytidae	<i>Berytinus (Berytinus) minor</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Hemiptera	Miridae	<i>Calocoris (Calocoris) roseomaculatus</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Coleoptera	Chrysomelidae	<i>Chrysolina hyperici</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	1	NT; SoPI	open habitats	short sward & bare ground	F112	Open short sward	
Hemiptera	Lygaeidae	<i>Cymus claviculus</i>	1		open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low
Lepidoptera	Nymphalidae	<i>Lasiommata megera</i>	1	NT; SoPI	open habitats	short sward & bare ground	F112	Open short sward	
Coleoptera	Apionidae	<i>Protapion filirostre</i>	4	Nationally Scarce (Nb)	open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Moderate
Coleoptera	Curculionidae	<i>Sitona waterhousei</i>	4	Nationally Scarce (Nb)	open habitats	short sward & bare ground	F112	Open short sward	calcareous grassland: Low Ssoft rock cliff: 3
Diptera	Dolichopodidae	<i>Tachytrechus insignis</i>	4		coastal	saltmarsh	M311	Saltmarsh & transitional brackish marsh	
Coleoptera	Elateridae	<i>Zorochros minimus</i>	1		wetland	running water	W111	Shingle banks	ERS (Coleoptera): 1
Hymenoptera	Pompilidae	<i>Anoplius concinnus</i>	4		wetland	running water	W122	Riparian sand	
Coleoptera	Malachiidae	<i>Anthocomus rufus</i>	1		wetland	peatland	W314	Reed-fen & pools	

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## **APPENDIX 5**

### Landscape Strategy

Suggested Species List

Seed Mixes:

EM8 - Emorsgate Wetland Meadow species rich grassland mix (or similar and approved) installed as per suppliers recommendations

EP1 - Emorsgate Pond Edge species mix (or similar and approved) installed as per suppliers recommendations

Localised humps and depressions left in ground profile within meadow areas

Bare ground left to naturally colonise

EXISTING BROADLEAVED WOODLAND RETAINED

EXISTING BROADLEAVED WOODLAND RETAINED

Lower sections seeded with pond edge mix to stabilise ground

Excavated fill from embankment placed on slopes leaving undulating profiles not steeper than 1:3m'

Reprofiled slopes seeded with wetland meadow mix to stabilise ground

KEY

- RED LINE BOUNDARY
- EXISTING BROAD LEAVED WOODLAND TO BE RETAINED
- EM8 WETLAND MEADOW MIX (BY EMORSGATE OR SIMILAR AND APPROVED)
- EM8 POND EDGE MIX (BY EMORSGATE OR SIMILAR AND APPROVED)
- BARE GROUND
- WATERCOURSE
- HUMPS AND DEPRESSIONS CREATED DURING GROUND RE-PROFILING
- EXCAVATED FILL FROM EMBANKMENT NOTCH

LANDSCAPE STRATEGY

The strategy for the landscape proposals the North South Reservoir is to deliver areas of meadow grassland and early successional, open sward habitats in order to secure significant net gains in semi-natural habitat relative to the current, predominantly bare baseline scenario.

Seeding will also help to ensure stabilisation of the newly profiled slopes and ground following remediation.

The following landscape types are proposed;

Seeding mixes

Prior to any sowing commencing, necessary soil remediation works will be completed, after which soils will be suitably tilled and prepared to receive seed. In preparing soils for seeding, care will be taken to create a diverse surface microtopography to enhance structural and botanical diversity in future years. This will include for localised humps and small depressions within meadow areas.

The seeded areas will require little maintenance once established. Each year, a rotational mowing regime with only 30% of the meadow cut at any time would allow more tussocky sward to develop over winter. This would provide a habitat for overwintering birds.

In order to allow for a component of natural re-colonisation, a proportion of proposed grassland (25%) habitats are proposed to be left un-seeded as bare ground. This approach will both improve overall habitat diversity, and promote local genetic stock within the site.

Watercourse / Waterbody (including aquatic and marginal vegetation)

The proposals seek to deliver a sinuous, naturalistic watercourse within the basin of the restored grassland valley. The final design will be refined as the flood modelling is completed which will included channel depth and bank gradients.

This proposal will mitigate for the net loss of unvegetated, standing water habitat providing enhancement to that which is currently present.

NOTES

GENERAL NOTES:

- This drawing is to be read in conjunction with all other relevant Engineering and Architect's details.
- The design shown is for preliminary discussion and will be subject to further design and iteration when further details of flood modelling have been carried out.
- The watercourse design shown is indicative and is subject to assessment via hydrological modelling, and further design.
- The design details presented must be reviewed in conjunction with the wider site information and site constraints which may not be evident on drawing and must be requested if not already provided. This includes, but not limited to, ground conditions (geotechnical and geo-environmental), groundwater levels, buried services, remnant obstructions, ecology, tree protection and topography.
- The Engineer shall be notified immediately, in writing, should any errors or discrepancies be found prior to the commencement or continuation of any works.
- All work is to be carried out in accordance with current British Standards, Building Regulations and NHBC Standards.
- It is the responsibility of the Contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015. The Contractor will be deemed to have allowed for full compliance, including full liaison with the CDM Co-ordinator, within his rates.
- Any existing details which are shown on this drawing are for guidance only and are not suitable for construction. Any variations are to be recorded and reported to the engineer immediately.
- Before work commences contractor should consult the engineer and the SI report regarding any contamination issues. All necessary Health and Safety measures to be taken
- This drawing should be read in conjunction with all relevant documents, drawings and standard details
- PJA accept no liability for the accuracy of third party data.
- PJA accept no responsibility for changes made to these drawings by third party without consent

INFORMATION


P01	17.05.23	Text and colour amendments	PO
REV	DATE	REVISION NOTE	BY



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CLIENT

St Modwen Developments Ltd

PROJECT

Coed Darcy

DRAWING TITLE  
NSR Landscape Strategy  
For PAC submission

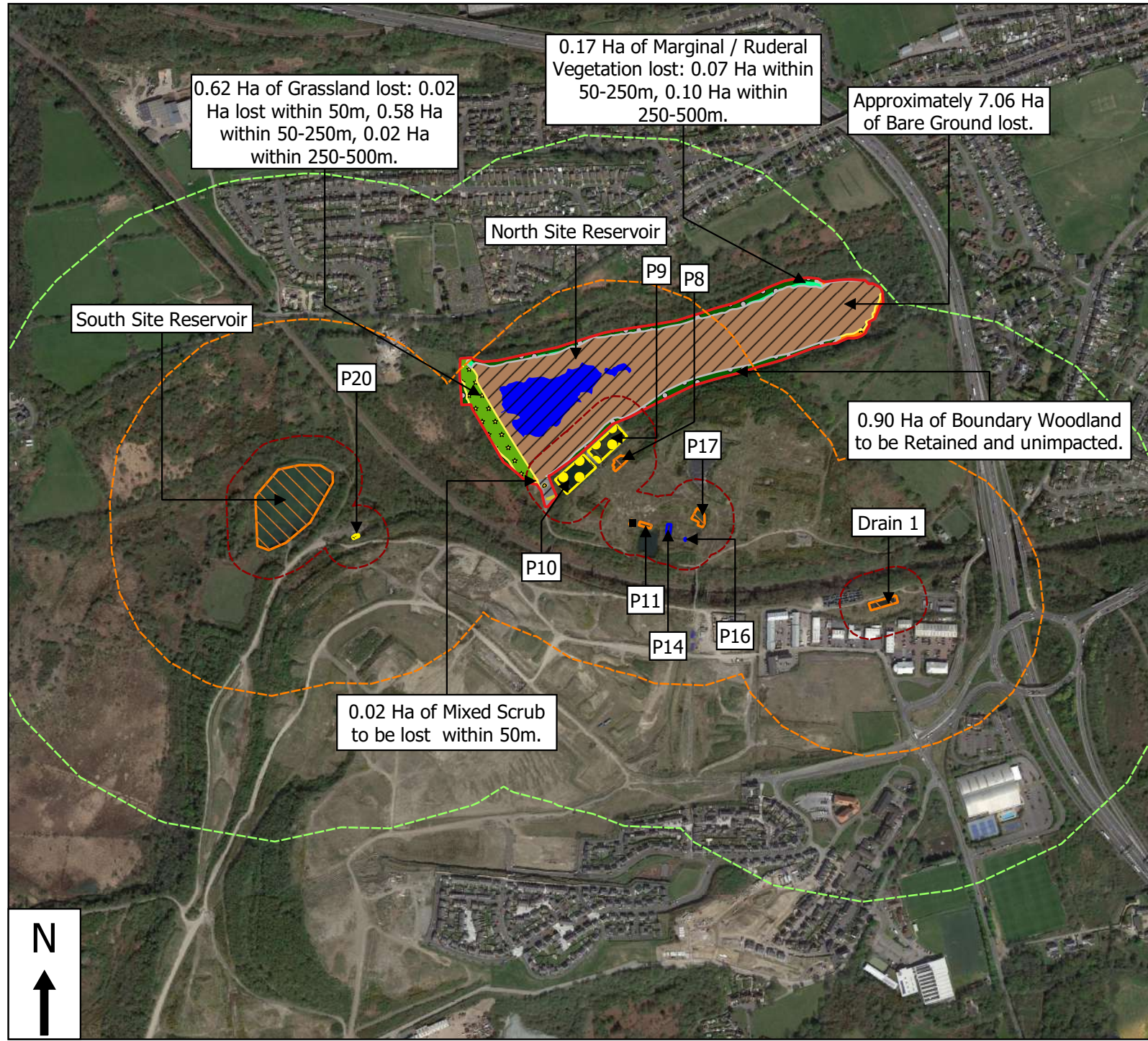
DRAWING ISSUE STATUS

PJA JOB No.	SUB-CODE	DRAWING NO.	REVISION
04020	- L -	SK919 - PO1	
Revision Letter: P = Prelim / A = Approval / T = Tender / C = Construction			
BIM DRAWING REFERENCE			

SCALE	DRAWN	REVIEWED	DATE
AI@1:NTS	AC	CP	28.04.2023


## **APPENDIX 6**

### GCN Habitat Impacts



**Key:**

- Application Site
- 500m Buffer
- 250m Buffer
- 50m Buffer
- Sub-optimal Habitat
- Suitable Habitat
- Unsuitable Habitat
- GCN Recorded in 2021
- GCN Recorded in 2021 & 2023
- GCN Recorded in 2023



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APPENDIX 6: GCN  
HABITAT IMPACTS

Rev: A  
May 23

## **APPENDIX 7**

### **GCN Fencing & Capture Plan**

WATERBODY TO BE SENSITIVELY DRAINED UNDER ECOLOGICAL WATCHING BRIEF: SEPTEMBER TO OCTOBER 2023. PUMP TO BE FITTED WITH APPROPRIATE MESH GAUZE.

ECOLOGIST TO OVERSEE DRAINAGE WITH NET TO REMOVE AMPHIBIANS IF PRESENT. FINAL SEARCH OF BASIN TO COMMENCE FOLLOWING FULL DRAINAGE.

BARE GROUND TO BE TORCHED FOR MINIMUM 10-NIGHT PERIOD, FOLLOWING A PREDETERMINED TRANSECT ROUTE AVOIDING AREAS OF SOFT GROUND. AMPHIBIANS TO BE COLLECTED AND TRANSLOCATED OVER FENCE.

CARPET TILES TO BE INSTALLED EVERY 20 METRES,  
DEPLOYED IN GRID FASHION SUBSEQUENT TO  
WATERBODY DRAINAGE. TILES TO BE CHECKED  
FOR 10-NIGHT PERIOD.

PITFALL TRAPS TO BE INSTALLED AROUND INSIDE PERIMETER OF AMPHIBIAN FENCING COMPARTMENTS, STAGGERED WITH CARPET TILES (1X TRAP/TILE PER 2.5M).

FOLLOWING COMPLETION OF ACTIIVE CAPTURE,  
GRASSLAND SUBJECT TO SOIL-STRIP DESTRUCTIVE SEARCH  
UNDER ECOLOGICAL WATCHIN BRIEF.

-  Application Site
-  Indicative Transect Route
-  Temporary Drift Fencing
-  Temporary Perimeter Fencing
-  Proposed Translocation Area
-  Bare Ground
-  Grassland
-  Marginal Vegetation
-  Waterbody
-  Pump Compound
-  Recolonising Vegetation
-  Scrub
-  Access Track
-  Woodland



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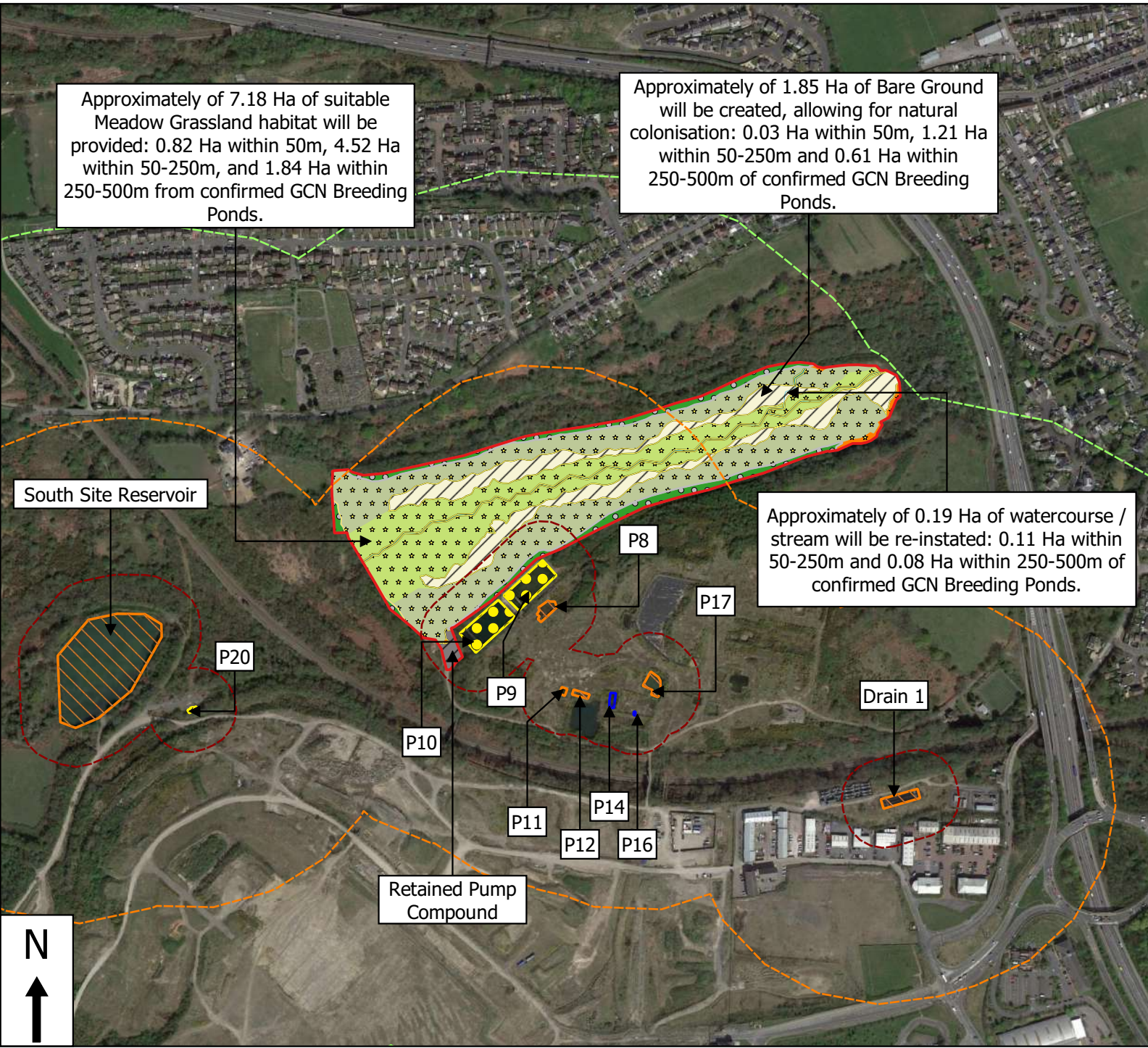
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FIGURE 7: GCN  
FENCING & CAPTURE

Rev: A  
May 23

## **APPENDIX 8**

### Proposed GCN Habitat Provision



### Key:

- Application Site
- 500m Buffer
- 250m Buffer
- 50m Buffer
- Sub-optimal Habitat
- Suitable Habitat
- Unsuitable Habitat
- Bare Ground
- Meadow Grassland
- Retained Pump Compound
- Retained Scrub
- Stream / Watercourse
- Meadow Grassland (Wet)
- Retained Woodland
- GCN Recorded in 2021
- GCN Recorded in 2021
- GCN Recorded in 2023



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APPENDIX 8: PROPOSED  
GCN HABITAT PROVISION

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May 23



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