Cove Communities

Medmerry Holiday Park

Updated Ecological Survey Report

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Author	Joe Prodger	**Technical reviewer**	Nick Henson
Signature	[redacted]	Signature	[redacted]
Date:	03 November 2023	Date:	03 November 2023
Project manager	Thomas Webb	**Quality reviewer**	Nick Henson
Signature	[redacted]	Signature	[redacted]
Date:	03 November 2023	Date:	03 November 2023

Switchboard: +44 (0)330 223 1074 Company contact: Enquiries@biocensus.co.uk

EXECUTIVE SUMMARY

1. This report presents the results of ecological surveys carried out at Medmerry Holiday Park, Chichester, West Sussex, PO20 7JP. The surveys were undertaken to inform an ecological impact assessment of the re-development of the holiday park.
2. The Medmerry holiday park is located on the southern coast of West Sussex within 1km of Bracklesham Bay and Earnley and lies adjacent to the Bracklesham Bay Site of Special Scientific Interest (SSSI) and Medmerry RSPB Reserve, both designated for their important bird and plant populations. The Site is also within 5km of both Pagham Harbour Special Protection Area (SPA) and Ramsar and also Chichester and Langstone Harbour SPA and Ramsar site, which are both designated for internationally important bird populations.
3. The majority of the Site comprised of other neutral grassland surrounding a central section of urban built-up areas with managed amenity grassland, and linear features including hedgerows, tree lines and ditches along field margins throughout. A single pond was recorded to the west. Other habitats recorded included a small area of woodland, mixed and gorse scrub, and coastal habitats.
4. Two priority habitat types (habitats of Principal Importance) listed under Section 41 of the Natural England and Rural Communities Act (2006) were identified during the survey, which were priority habitat hedgerow and coastal vegetated shingle. Priority habitat hedgerow was recorded along the field boundaries to the north and north-east and was closely associated with ditches. Coastal vegetated shingle was recorded to the west of the Site between the field boundaries and beach. Within this habitat were good populations of IUCN Red List 8Least concern9plant, yellow-horned poppy (*Glacium flavum*).
5. Stands of the invasive non-native species Japanese Knotweed (*Reynoutria japonica sps.*) were identified adjacent to the tennis courts in the east. The plant is listed on Schedule 9 of the Wildlife and Countryside Act (1981) (as amended) making it illegal to plant it or otherwise cause it to grow in the wild.
6. A small amount of badger activity was found within the Site, though no setts were identified. Badgers are a highly mobile species and regularly change territories and establish new setts.
7. Extensive evidence of water vole presence was identified in several ditches throughout the Site including burrows, latrines, feeding remains, footprints and observations of individuals. The metapopulation across the site can be assessed as a whole as being of a high density and likely associated the larger metapopulation within the Chichester Coastal Plain.
8. Despite the high habitat suitability of some waterbodies in the Site and within 500 m, no evidence of great crested newt was found from an environmental DNA (eDNA) analysis of water samples taken from those waterbodies, confirming the likely absence of this species within the Site.

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1.0 INTRODUCTION

1.1 Purpose of this report

1.1.1 This report presents the results of a desk-based study and habitat assessment, with assessment for protected or otherwise notable species, at the Medmerry Park, Stoney Ln, Chichester, PO20 7JP which is hereafter known as the 'Site'. The assessment was undertaken to inform an Ecological Impact Assessment (EcIA) in relation to the proposed re-development of the Site (hereafter known as the 'Proposed Development'). This assessment was completed by RSK Biocensus on behalf of Cove Communities.

1.1.2 ABPmer completed a suite of ecological surveys in relation to the Site between 2018 and 2019 to assess its ecological value and inform an assessment of effects associated with the construction of a previous iteration of the Proposed Development. The results of these surveys are now considered to be out of date and an update to the ecological baseline of the Site was required, so that potential impacts from the Proposed Development can be accurately assessed.

1.1.3 The ecological assessments presented in this report includes desk studies and field surveys completed in 2023 to inform the Proposed Development, specifically:

- A desk-based review of relevant designated sites of ecological interest and records of specially protected species and habitats;
- UK Habitat Classification surveys;
- Badger surveys;
- Water vole surveys; and
- Great crested newt surveys.

1.2 Landscape context

1.2.1 The Medmerry Holiday Park is located to the south-east of the town of West Wittering along the southern coast of West Sussex and comprises of a central urban area, that makes up the holiday park, surrounded by areas of semi-natural habitat including grassland, hedgerows, woodland, scrub, ditches, and ponds. The Site is centred at Ordnance Survey (OS) grid reference SZ 82011 95765. The Site layout is shown in Figure 1.

1.2.2 Further afield, the Site lies within a mixed landscape of holiday developments, arable farmland, the urban area of West Wittering and areas designated for nature preservation including the neighbouring RSPB Medmerry Nature Reserve. Designated under The Conservation of Habitats and Species Regulations 2017 (as amended), the Medmerry Reserve is made up of saltmarshes, mudflats, and coastal lagoons (e.g., the adjacent Stilt Pools bordering the east of the holiday park) and acts as compensatory habitat for predicted losses of such habitat elsewhere in the Solent.

1.2.3 Within the wider area of the Site lies the Bracklesham Bay Site of Specific Scientific Interest (SSSI), Pagham Harbour Special Protection Area (SPA) and Ramsar site, Solent Maritime

Special Area of Conservation (SAC) and Chichester and Langstone Harbour SPA/Ramsar site, designated for their nationally and internationally important bird populations and habitats.

1.2 Survey validity

1.3.1 It should be noted that ecological features are transient, and that the distributions of habitats and species may be subject to change. As such, in line with Chartered Institute of Ecology and Environmental Management (CIEEM) guidance, the ecological survey data presented in this report are considered valid for at least two years (CIEEM, 2019), after which it may be necessary for further field surveys to be undertaken to update the ecological baseline conditions for the Site.

2.0 METHODS

2.1 Background data search

2.1.1 An updated desktop study was undertaken by RSK Biocensus in March 2023 (see *Annex C*) for reference materials relating to the ecology of the Site. A list of sources is given in Table 1.

Table 1: Data sources used in the background data search.

Information Obtained	Available From
Protected and noteworthy species-records	Sussex Biodiversity Record Centre (SxBRC)
Designated site locations and citations	Natural England website
Designated site locations and citations	Joint Nature Conservation Committee (JNCC) website
Designated site locations and citations	Sussex Biodiversity Record Centre
Designations and legal protection of noteworthy species	Joint Nature Conservation Committee (JNCC) website
Ornithological data	Sussex Ornithological Society: Sussex Bird Report
Areas / Habitats of Strategic Significance	https://dnu7gk7p9afoo.cloudfront.net/Files/swt-planning-guidance-2014.pdf
Areas / Habitats of Strategic Significance	National Habitat Networks https://www.data.gov.uk/dataset/0ef2ed26-2f04-4e0f-9493-ffbdbfaeb159/habitat-networks-england
Areas / Habitats of Strategic Significance	National Priority Focus Areas https://www.data.gov.uk/dataset/c20a40c5-c975-43e1-9abd-d1257aa58432/natural-england-national-priority-focus-areas
Areas / Habitats of Strategic Significance	Nature Improvement Areas https://www.data.gov.uk/dataset/a19c95e3-9657-457d-825e-3d2f3993b653/nature-improvement-areas

2.1.2 A search was made for information relating to statutory (often internationally and nationally important sites for ecology) and non-statutory designated sites (often important in a local context) within 2km of the Site. The search was extended to 10km for internationally designated sites. A search was also made for priority habitats and records of protected and/or noteworthy species within 1km of the Site. Species in the search parameters were:

- European protected species (listed on Schedule 2 and 5 of The Conservation of Habitats and Species Regulations 2017 (as amended));
- Nationally protected species under Schedule 1, 5, and 8 of The Wildlife and Countryside Act 1981 (as amended) and The Protection of Badgers Act 1992;
- Species listed as critically endangered, endangered, or vulnerable based on the IUCN Red List Categories and Criteria 2001;
- All species listed on the RSPB Birds of Conservation Concern 5 (Stanbury *et al*. 2021) as red or amber9

- Nationally rare or nationally scarce species;
- Notable invertebrates; and
- Species of principal importance listed under Schedule 41 of The Natural Environment and Rural Communities (NERC) Act (2006) or priority species listed under the Local Biodiversity Action Plan (LBAP) for West Sussex.

2.2 Habitat survey

UK Habitat Classification survey

2.2.1 The field survey was based on the UK habitats (UKHab) survey methodology (Version 1.1; Butcher et al. 2020), as extended for use in environmental impact assessment (Institute of Environmental Assessment 1995). The UKHab classification system is the habitat classification that underpins the Defra Biodiversity Metric and is therefore the favoured habitat classification to use when surveys need to inform a Biodiversity Net Gain Calculation. This field survey was undertaken in line with CIEEM 2017 and involved the following elements.

- habitat mapping using a set of standard colour codes to indicate habitat types on a habitat map (Figure 1); and
- a description of features of possible ecological or nature conservation interest in notes relating to numbered locations on the habitat map, called 'target notes'

2.2.2 A condition assessment was carried out for each habitat based on the Defra 4.0 Biodiversity Metric. Habitats were assigned conditions of 'poor', 'moderate' or 'good' as a result of assessment in the field. The results of these assessments can be used to calculate biodiversity loss/gain using the Defra 4.0 calculator.

2.2.3 Subjective estimates of the relative abundance of species within the Site were added to the list using a modified DAFOR scale. The DAFOR scale ranks species according to their relative abundance in a given parcel of land as follows: D = dominant, A = abundant, F = frequent, O = occasional, R = rare. In addition, the following prefixes are used: L = locally, (P) = protected.

2.2.4 Plant nomenclature in this report follows Stace (2019) for native and naturalised species of vascular plant. Lichen nomenclature follows Dobson (2018) and mosses and liverworts follow Hill *et al*. (2008). Vegetative identification was assisted using Poland (2020). Introduced species and garden varieties were identified using relevant Floras. Plant names in the text are given with common names with the scientific name (in italics) immediately following the first time it is mentioned. Doubtful identifications are preceded by 'cf.' placed before the specific epithet where the plant is very probably the species indicated, but it could not be distinguished from similar members of the genus with certainty. A plant species list is provided in *Annex F*.

2.2.5 The survey was carried out on 23rd February 2023 by Pete Flood and assisted by Thomas Webb. Pete Flood is a suitably qualified and experienced Senior ecological consultant, a member of CIEEM, Level 6 FISC certified and accredited assessor with extensive experience in undertaking botanical and habitat assessment surveys.

Invasive non-native species (INNS)

2.2.6 UK Habitat Classification surveys do not involve exhaustive surveying for individual plant species, and various invasive species may be little in evidence at various times of year (depending on the species). A survey seeking to identify habitat types cannot therefore be relied upon to provide firm information about the presence or extent of any INNS. However, any INNS that were encountered during the habitat survey were noted, including Japanese Knotweed (*Reynoutria japonica*), Giant Hogweed (*Heracleum mantegazzianum*) and Himalayan Balsam (*Impatiens glandulifera*), as well as any invasive non-native species of animals if present.

2.2 Badger survey

2.3.1 Systematic surveys for badger (*Meles meles*) involved searching for setts, foraging signs, paths (runs) and latrines. Individual holes or setts were described using terminology defined by Harris *et al*. (1984, 1989) as set out below:

- " Well-used holes 3 these are clear of any debris and vegetation, are obviously in regular use, and may or may not have been excavated recently.
- " Partially-used holes 3 these are not in regular use and have debris such as leaves or twigs in the entrance or have moss of other plants growing in or around the entrance. Partially used holes could be in regular use after minimal amount of clearance.
- " Disused holes 3 these have not been in use for some time, are partially or completely blocked, and cannot be used without a considerable amount of clearance. If the hole has been disused for some time, all that may be visible is a depression in the ground where the hole used to be, and the remains of a spoil heap, which may be covered in moss or other plants.
- " Currently-used setts 3 Any sett entrance that is well-used or partially-used can fall within the category of current use as interpreted by English Nature (1995 & 2002).
- " Disused setts 3 if all the entrances of a sett are disused, then even though it was originally dug by a badger, it is no longer a badger sett as defined under The Protection of Badgers Act 1992.
- " Cohabitation 3 Both fox and rabbit are sometimes known to occupy badger setts at the same time as badgers are resident. The presence of fox hair and rabbit signs at a sett complex does not necessarily indicate that the sett is being used exclusively by these animals. These findings should be considered in conjunction with other findings or observation in and around the sett.
- " Main Sett 3 A badger sett forming the main abode of a social group of badgers. Main setts are occupied continually throughout the year and are generally used by at least one sow to rear young. In a national survey of setts, the average number for a main sett was 12, although there may any number holes from one to more than 40.
- " Annexe sett 3 setts situated in the immediate vicinity of a main sett. Although such setts are often occupied throughout the year, they will generally only be used for breeding when the main sett is used by another breeding sow. These setts can

have any number of holes although it is usually around eight. The distinguishing feature of these setts is an obvious, well-used path running to the main sett.

- Subsidiary sett 3 setts situated away from the main sett that may represent an area of particularly good foraging. Such setts are used occasionally throughout the year and occasionally for breeding but are more likely to be used only to exploit a seasonal food source. These setts usually have around four holes.
- Outlying sett 3 these setts are away from the main sett. They have a small number of holes, often only one or two. Such setts rarely in continuous occupation and are most often used either to exploit a seasonal food source or as a refuge when visiting certain parts of the territory.

2.4 Water vole survey

Habitat Assessment

2.4.1 The ditches within the survey area were assessed for water voles according to subjective criteria, which were then used to categorize habitat according to suitability for the species. The following habitat factors are taken into consideration:

- water quality;
- water-level regime;
- channel dimensions;
- bank type and material;
- vegetation for cover and food sources;
- shading;
- predation and competition; and
- habitat management.

2.4.2 Classification of habitat suitability was made as follows:

- Optimal 3 ideal or optimal habitat with good cover, food sources and other elements that would allow a population of water voles to thrive throughout the year.
- Good 3 habitat that has all the elements required for water voles certainly in the summer, and probably through most winters.
- Suitable but poor 3 habitat that has some of the habitat features that are suitable for water vole, but with some constraints so that suitability throughout the year is not certain.
- Negligible 3 habitat lacking one or more crucial element for use by water voles. This category does not necessarily preclude the habitat being used by commuting water voles, but it would not be able to support a resident population.

Evidence of water vole

2.4.3 Survey for evidence of water vole activity followed standard methods adapted from Strachan (1998) and Strachan and Moorhouse (2011). All of the suitable habitats were

systematically and thoroughly searched for signs of the species. This involved an intensive search of the bankside and water-edge habitat, searching for water vole field signs including:

- burrows;
- feeding platforms and evidence of feeding;
- food remains;
- latrines; and
- footprints.

Population assessment

2.4.4 The number of water vole field signs (specifically latrines) were used to give an indication of the relative population size and were helpful in identifying the most valuable parts of the Site for water voles. Morris *et al*. (1998) published a predictive equation that describes the relationship between water voles and latrine numbers in the breeding season; $y = 1.48 + 0.683x$, where y = water vole numbers and x = number of latrines. Latrine numbers and the survey extent can therefore be used to give an indication on the population density of a ditch/water feature. The survey area can be subdivided into areas supporting water voles at 'high', 'medium', or 'low' density, which can be interpretated with guidance from Dean *et al*. (2016).

Table 2. Guidance on estimating relative population density of water voles (Dean et al. 2016).

Relative population density	Approximate number of latrines per 100m of bankside habitat	
	First half of survey season (mid-April to end of June)	Second half of survey season (July to September)
High	10 or more	20 or more
Medium	3-9	6-19
Low	f 2 (or none, but with other confirmatory field signs)	f 5 (or none, but with other confirmatory field signs)

2.4.5 Targeted water vole surveys were undertaken on the 12th, 19th April and 18th September 2023. These surveys were conducted by Amy Copping and Thomas Webb, and Thomas Web. All surveyors have extensive experience surveying water voles.

2.2 Great crested newt survey

Habitat Suitability Index

2.5.1 Water features were assessed to determine their suitability for great crested newts (*Triturus cristatus*) (GCN) using a Habitat Suitability Index (HSI) developed by Oldham *et al*. (2000), which is derived from assessment systems developed by the US Fish and Wildlife Service. It is a numerical index, between 0 and 1, where 0 indicates unsuitable

habitat and 1 represents optimal habitat. The HSI for the GCN uses ten factors (suitability indices (SI) 1 to 10), which are thought to affect GCN as follows:

- geographic location (SI 1);
- surface area (SI 2);
- hydrology (drying) (SI 3);
- water quality (SI 4);
- shade (SI 5);
- presence of water fowl (SI 6);
- presence of fish (SI 7);
- number of adjacent water features (SI 8);
- terrestrial habitat (SI 9); and
- macrophyte cover (SI 10).

2.5.2 Each factor is scored, and the scores are converted to SI scores on a scale from 0.01 to 1 from graphs given in Oldham et al. (2000). The HSI result is calculated using the following formula:

2.5.3 HSI = (SI1 × SI2 × SI3 × SI4 × SI5 × SI6 × SI7 × SI8 × SI9 × SI10) 1/10

2.5.4 Further research by Brady (unpublished) has developed a system for using HSI scores to define pond suitability for Great Crested Newts according to the following categories:

- HSI <0.5 = poor
- HSI 0.5 3 0.59 = below average
- HSI 0.6 3 0.69 = average
- HSI 0.7 3 0.79 = good
- HSI > 0.8 = excellent

2.5.5 There is a positive correlation between HSI scores and presence and abundance of GCN in ponds. Generally, ponds with high HSI scores are likely to support larger populations. However, the relationship is not sufficiently precise to conclude that a pond with a high HSI will definitely have a large newt population, or that a pond with a low HSI score will only have a small newt population or no newts at all.

Environmental DNA analysis surveys

2.5.6 This method investigates whether GCNs have been in a water feature by analysing the water for their DNA (which can be shed in skin secretions, excrement etc.). Using kits from approved suppliers, samples were taken from the suitable water features following the HSI assessments using strict protocols (Biggs *et al*. 2014) approved by Natural England, which, among other things, ensure that samples do not get cross-contaminated. Sampling took place at the recommended time, i.e., between mid-April and June. Subject to safety of access, sample spacing was regular, except in so far as it targeted aquatic vegetation that might be used for egg-laying. From each water feature, 20 samples from a water feature were collected into a single sample bag and gently homogenized, from which six sub-

samples were preserved in an ethanol-based preservative and sent to the ADAS laboratory for analysis.

2.5.7 Habitat Suitability Index and Environmental DNA surveys were carried out on the 17th April 2023 by George Wilkinson and Thomas Webb, and on the 18th April, 28th April and 5th May 2023 by Thomas Webb and Ellis Perry. All surveyors are suitably qualified to carry out the surveys.

2.2 Constraints and limitations

2.6.1 Whilst desk study data are useful in providing supplementary information ecological information for a site, it should be acknowledged that these data are dependent on the submission of records to the relevant organisation. As such, a lack of records for a particular species does not necessarily mean that the species is absent from the Site and/or the wider search area. Similarly, records of a particular species do not necessarily mean that the species is still present within the Site and/or wider search area.

2.6.2 Less conspicuous plant species (including INNS or notable species) vary in life history and therefore may have been missed as a result of the survey being undertaken outside of the ideal survey season for that species. Specific consideration for notable species recorded in the desk study was identified during the field survey of the grassland within the Site. However, the majority of plants present were confidently identified, and the survey was sufficient to make a broad assessment of the habitats present on the Site.

2.6.3 Some areas within the Site proved inaccessible due to large amounts of dense vegetation or dangerous waterside banks. It is possible that foraging signs and badger setts were missed. Some areas just outside the Site boundaries were also not surveyed due to access restrictions.

2.6.4 In some cases, access to waterbodies was limited as a result of excessive vegetation, dangerously steep banks, or constrained by nesting birds. This restricted survey efforts for great crested newts as it was not always possible to reach the water to collect water samples for eDNA analysis. Figure 5 identifies those water features that were assessed for great crested newt as well as those that could not be assessed. Similarly, water vole survey efforts were restricted somewhat, since some banks were inaccessible. Figure 6 identifies those water features that were assessed for water vole as well as those that could not be assessed.

3.0 RESULTS AND EVALUATIONS

2.1 Background Data Search

3.1.1 A data search was undertaken in March 2023 which returned records from the SxBRC for statutory designated sites, non-statutory designated sites, habitats and protected and notable species records. Results of the background data search are presented in *Annex C*.

3.1.2 No records of ancient woodland were returned in the data search within 1 km of the Site.

Designated sites

Internationally designated sites

3.1.3 There are no internationally designated sites within the Site. The desk study did however identify seven internationally designated sites within 10 km. The sites comprise of three Special Protection Areas (SPA) which are also designated as Ramsar sites, and one Special Area of Conservation (SAC).

3.1.4 Table 3 provides information on the internationally designated sites including a summary of the designated features and their distances from the Site; the locations of which are shown on Figure 2.

Table 3. Internationally designated statutory sites within 10km of the Site.

Site Name	Designation	Distance (m) and orientation
Medmerry Reserve (Compensatory Habitat)	Internationally protected site (under paragraph 118 NPPF)	Adjacent - E
Qualifying Features / Reason for Designation The Medmerry Reserve is protected under the Conservation of Habitat and Species Regulations 2107 (as amended), and acts as compensation for predicted losses of SAC and SPA intertidal habitat elsewhere in the Solent over the next 20 years due to rising sea levels causing coastal squeeze effects. Compensatory habitat is given the same protection as European Sites by paragraph 118 of the National Planning Policy Framework (NPPF). Medmerry Reserve does not have any designated features yet but has been designed to create saltmarsh, mudflats, and coastal lagoons to replace the losses in the Solent and is being managed to support the assemblage of wintering and breeding birds for which the Solent sites are currently designated. Therefore, the qualifying features of the Solent internationally designated sites being compensated for will be listed under the Medmerry Reserve accordingly.		
Solent and Dorset Coast	SPA	10 - S
Qualifying Features / Reason for Designation The Solent and Dorset Coast SPA was classified in January 2020 to protect important foraging areas at sea used by the below designated species that are qualifying features of adjacent SPAs. The SPA is located along the coasts of Dorset, Hampshire, Isle of Wight, and West Sussex, and adjacent areas offshore. It overlaps, abuts, and is close to many designated areas for conservation. The SPA qualifies under Article 4 of the Birds Directive (2009/147/EC) for regularly supporting more than 1% of the Great Britain breeding populations of three species listed in Annex		

Site Name	Designation	Distance (m) and orientation
I of the Birds Directive. Therefore, the site qualifies for SPA classification in accordance with the UK SPA selection guidelines (stage 1.1). **Article 4.1 qualifying species (79/409/EEC)** " **Breeding season:** Sandwich tern (*Sterna sandvicensis)* (4.01% of GB breeding population); common tern (*Sterna hirundo*) (4.77% of GB breeding population); little tern (*Sternula albifrons*) (3.31% of GB breeding population).		
Pagham Harbour	RAMSAR	2719 - E
Qualifying Features / Reason for Designation The Pagham Harbour Ramsar site is located between Bognor Regis and Chichester. The estuarine basin is made up of an extensive central area of saltmarsh and intertidal mud-flats, surrounded by lagoons, shingle, open water, reed swamp, and wet permanent grassland. The mud-flats are rich in invertebrates and algae and provide important feeding areas for the many bird species that use the Ramsar site. **Criterion 6 species/populations occurring at levels of international importance** " Species with peak counts in winter: dark-bellied brent goose (*Branta bernicla bernicla*) **Possible future designated under Criterion 6** " Species with peak counts in winter: black-tailed godwit (*Limosa limosa islandica*)		
Pagham Harbour	SPA	2719 - E
Qualifying Features / Reason for Designation **Article 4.1 qualifying species (79/409/EEC)** " **Breeding season**: little tern, common tern " **Wintering season**: ruff (*Philomachus pugnax*) **Article 4.2 qualifying species (migratory) (79/409/EEC)** " **Wintering season:** dark-bellied brent goose		
Solent Maritime	SAC	3762 - W
Qualifying Features / Reason for Designation The Solent encompasses a major estuarine system on the south coast of England with four coastal plain estuaries and four bar-built estuaries. Sediment habitats within the estuaries include extensive estuarine flats, intertidal areas, mudflats, sandflats, and coastal lagoons. **Annex I habitats that are primary reason for selection of site** " 1130 Estuaries " 1320 Spartina swards (*Spartinion maritimae*) " 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Annex I habitats present as a qualifying feature, but not a primary reason for selection** " 1110 Sandbanks which are slightly covered by sea water all the time " 1140 Mudflats and sandflats not covered by seawater at low tide " 1150 Coastal lagoons *Priority feature " 1210 Annual vegetation of drift lines " 1220 Perennial vegetation of stony banks " 1310 Salicornia and other annuals colonizing mud and sand " 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") **Annex II species present as a qualifying feature, but not a primary reason for selection** " 1016 Desmoulin's whorl snail (*Vertigo moulinsiana*)		
Chichester and Langstone Harbours	RAMSAR	4481 - NW

Site Name	Designation	Distance (m) and orientation
Qualifying Features / Reason for Designation Chichester and Langstone Harbours covers two large, estuarine basins and forms one of the most sheltered intertidal areas on the South Coast of England. The area has a complex arrangement of tidal channels, which create areas of saltmarsh, grazing marsh, and mud-flats rich in invertebrates. The mix of different coastal habitats support important numbers of waterbirds. In summer, the estuary supports breeding terns, whilst in winter it supports important numbers of geese, ducks, and waders. **Criterion 6 species/populations occurring at levels of international importance** " Species with peak counts in winter: dark-bellied brent goose **Possible future designated under Criterion 6** " Species with peak counts in winter: black-tailed godwit.		
Chichester and Langstone Harbours	SPA	4481 3 NW
Qualifying Features / Reason for Designation **Article 4.1 qualifying species (79/409/EEC)** " **Breeding season**: little tern, common tern, Sandwich tern. **Article 4.2 qualifying species (migratory) (79/409/EEC)** " **Wintering season**: northern pintail (*Anas acuta*), northern shoveler (*Spatula clypeata*), teal (*Anas crecca*), wigeon (*Anas penelope*), ruddy turnstone (*Arenaria interpres*), dark-bellied brent goose, sanderling (*Calidris alba*), dunlin (*Calidris alpina alpina*), ringed plover (*Charadruis hiaticula),* red-breasted merganser (*Mergus serrator*), curlew (*Numenius arquata*), grey plover (*Pluvialis squatarola*), shelduck (*Tadorna tadorna*) and redshank (*Tringa totanus*). **Article 4.2 assemblage qualification (79/409/EEC)** " Over winter, the area regularly supports 93,230 individual waterfowl (5-yr peak mean 1991/92 3 1995/96).		

Nationally designated sites

3.1.5 There is one nationally designated site within the proposed enhancement area of the Site (i.e., within the blue line boundary on Figure 1), namely the Bracklesham Bay SSSI. Other sites included within the 2km search parameters included the Selsey Bill and the Hounds Marine Conservation Zone (MCZ). Such designated sites are of national importance for nature conservation.

3.1.6 Table 4 provides information on the nationally designated sites including a summary of the qualifying features and their distances from the Site; the locations of which are shown on Figure 2.

Table 4: Nationally designated statutory sits within 2km of the Site.

Site Name	Designation	Distance (m) and orientation
Bracklesham Bay	SSSI	On Site
Qualifying Features / Reason for Designation Site consists of coastline with rough unimproved grazing pastures important for bird populations. Coastal habitats include a small area of saltmarsh, shingle bank, the rifes (wide flowing ditches) and associated reed beds (as well as intertidal exposures of geological interest). Seasonal flooding of the pasture forms a community with species such as red fescue (*Festuca rubra*), sea couch (*Elymus pycnanthus*) and creeping bent (*Agrostis stolonifera*). The banks of the rifes9rough grassland is dominated by sea couch, sheep9s fescue (*Festuca ovina*), with local abundances of saltmarsh plants such as common saltmarsh grass (*Puccinellia maritima*), sea aster (*Aster tripolium*) and sea purslane (*Halimione portulacoides*). Breeding birds include redshank, ringed plover, snipe (*Gallinago gallinago*) and lapwing. Wintering birds include dark-bellied brent goose, ruff and golden plover. Many species of which are qualifying for the nearby SPAs.		
Selsey Bill and the Hounds	MCZ	1125 - SE
Qualifying Features / Reason for Designation This site supports examples of peat and clay exposures (e.g., the Mixon Hole) and rock outcrops of clay and limestone (The Hounds) supporting a rich diversity of habitats and species. The Site would also protect short-snouted seahorse Hippocampus found in seagrass and seaweeds. Species include crabs, bivalves, such as native oyster Ostrea edulis, and fish species such as tompot blenny *Parablennius gattorugine*. A variety of algae, anemones, sponges, hydroids, and ascidians are also supported.		

Non-statutory sites

3.1.7 There are no non-statutory sites within 1 km of the Site boundary.

Priority habitats

3.1.8 Within 250m of the Proposed Development, there were four priority habitats identified which include: Coastal Vegetated Shingle, Maritime Cliffs and Slopes, Coastal and Floodplain Grazing Marsh, and Lowland Meadows. Information regarding each priority habitat is included in Table 5 and shown in Figure 3**.**

3.1.9 Such habitats have been identified using the online Multi-Agency Geographic Information for the Countryside (MAGIC) mapping system, which has mapped all habitats listed under the priority habitat inventory. Coastal vegetated shingle was shown to be present in a small area on the southernmost part of the Site within the blue-line boundary. Additionally, lowland meadows and coastal floodplain grazing marsh have further been identified within the Site, the latter of which is shown to be extensive in its distribution across the Site and the Medmerry Reserve.

Table 5. Priority habitat types within 250m of the Site and their ecological valuation.

Habitat type	Distance from site (m)	Direction	Extent (Ha)	Importance
Coastal vegetated shingle	0	S	7.5	Coastal shingle is known to support habitat-specific plant communities, breeding birds and diverse invertebrate populations. Shingle habitats supporting perennial vegetation are notably rare on a global scale.
Coastal and floodplain grazing marsh	0	All sides except NE	247.1	This habitat type is important for rare flora and for supporting breeding wading birds, including snipe (*Gallinago gallinago*) and lapwing (*Vanellus vanellus*). Some slight fragmentation due to roads and pathways.
Lowland meadows	0	S, SE	51	A declining habitat type as a result of agricultural intensification, lowland meadows support increasingly restricted grassland communities. Some slight fragmentation due to roads and pathways.
Maritime cliffs and slopes	60	S	0.3	The uncommon environmental conditions present in this habitat type give rise to uncommon plant and invertebrate assemblages, often with a combination of marine and terrestrial species.

3.2 UK Habitat Classification Survey

3.2.1 The UK Habitat Classification habitat map is provided within Figure 4 and shows the location of the target notes referred to in the text below. A full description for each of the target notes is given in Annex A. A description of those habitats present within the survey area is provided below. Photographs taken during the surveys are provided in Annex E**.**

Table 6. Habitats identified onsite according to UKHab classification system.

Broad habitat	UK Habitat type	Habitat codes	Extent	Ecological valuation
Grassland	Other neutral grassland	g3c	15.45ha	Low
	Lolium 3 Cynosurus neutral grassland	g3c6	3.77ha	Low
	Holcus-juncus neutral grassland	g3c8	0.15ha	Low
	Modified grassland	g4	1.47ha	Low
Woodland and tree lines	Other broadleaved woodland	w1g7	0.24ha	Low
	Line of trees	w1g6	0.34km	Low
Scrub	Blackthorn scrub	h3a	0.07ha	Low
	Bramble scrub	h3d	1.27ha	Low
	Gorse scrub `	h3e	1.42ha	Low

Broad habitat	UK Habitat type	Habitat codes	Extent	Ecological valuation
Hedgerows	Hedgerow Priority Habitat	h2a	0.07km	Low
	Other hedgerows	h2b	0.57km	Low
Coastal habitat	Coastal vegetated shingle	s3b	0.03ha	Low
	Beach (littoral sediment)	t2h	0.11ha	Negligible
Ditches and ponds	Canals	r1e	3.98km	Low
	Eutrophic standing waters	r1a	0.06ha	Low
Urban	Built-up areas and gardens	u1	8.41ha	Negligible
	Developed land, sealed surface	u1b	0.21ha	Negligible
	Buildings	u1b5	0.03ha	Negligible

Coastal floodplain grazing marsh

3.2.2 Whilst this habitat was shown extensively across the Site on the priority habitat inventory, the habitat assessments undertaken within the Site identified no areas of coastal floodplain grazing marsh. It was noted that the water table was too low to be able to achieve functioning coastal floodplain grazing marsh, with none of the fields being extensively flooded in shallow water less than 50cm in accordance with the definition of this habitat under the UK Biodiversity Action Plan Priority Habitat Descriptions (BRIG, 2011). Additionally, in order to achieve coastal floodplain grazing marsh status, ditches need to be feeding high quality water through to areas of pasture, and they further have to be assessed as being in good condition. No ditches within the Site were assessed as being of good condition due to poor water quality, and in some areas due to dense scrub on the banks. Furthermore, the areas of grassland have not been subjected to management which is appropriate to achieve functioning coastal floodplain grazing marsh, with swards of grass becoming too rank and tussocky with scrub encroachment increasing in its extent.

Lowland meadows (g3a)

3.2.3 Lowland meadows were also shown on the priority habitat inventory within the Site, in a small area within the blue-line boundary. Similarly, to coastal floodplain grazing marsh, habitat assessments have not identified such area as achieving criteria for designation of lowland meadow. The lack of appropriate management, poor botanical diversity, and scrub encroachment means that no areas within the Site have been identified as functional areas of lowland meadow in accordance with the definition of this habitat under the UK Biodiversity Action Plan Priority Habitat Descriptions (BRIG, 2011).

Other neutral grassland (g3c)

3.2.4 The majority of the grassland within the Site comprised of other neutral grassland (g3c), This habitat was widely distributed across the survey area, generally parcellated surrounding the holiday park (Figure 4). Grassland was surrounded by hedgerow and ditches running the lengths of the field margins providing good habitat for reptiles (*Target Note 1*). Botanical species composition varied in diversity with low dominant species diversity at the time of survey. Dominant species included Perennial Rye-grass (*Lolium perenne*), Cock's-foot (*Dactylis glomerata*), False Oat-grass (*Arrhenatherum elatius*), Red

Fescue (*Festuca rubra*), Yorkshire-fog (*Holcus lanatus*), Common Couch (*Elytrigia repens*) and Common Reed (*Phragmites australis*). Structural diversity ranged from tall single species stands of Common Reed, through tussocky fields with Cock's-foot and False Oat-grass to stock-fenced pastures with a low, level, mixed sward.

3.2.5 Grasslands located to the south and west often formed a complex mosaic with scrub, frequent bushes, or sprawling plants of Gorse (*Ulex europaeus*), Dewberry (*Rubus caesius*), Blackthorn (*Prunus spinosa*) and Bramble (*Rubus fruticosus agg*.). Within these areas the topography was also more varied, with bunds, sea defenses and ditches creating a rolling landscape. Some wetter areas with features such as ditch margins had scattered patches of Soft-rush (*Juncus effusus*).

3.2.6 The majority of species records were recorded within or adjacent to this habitat indicating its ecological value. Mammal pathways ran throughout the entire habitat for a variety of mammalian species likely including badgers, deer, rabbit (*Oryctolagus cuniculus*) and red fox (*Vulpes vulpes*). Furthermore, two dark-bellied brent geese (*Branta bernicla bernicla*) were recorded using the field to the west of the holiday park (*Target Note 2*). Other bird records included skylark (*Alauda arvensis*) to the north (*Target Note 3*) as well as Cetti's warbler (*Cettia* cetti) and stonechat (*Saxicola torquata*) adjacent to the grassland habitat to the east (*Target Note 4 and 5*).

Lolium-Cynosurus neutral grassland (g3c6)

3.2.7 To the north and west the grasslands were typically stock-fenced fields managed for grazing or as leys. In such places the vegetation communities looked intermediate between g3c5 *Arrhenatherum elatius* grassland and g3c6 *Lolium - Cynosurus* grassland. During the survey it was noted there were yellow meadow ant (*Lasius flavius*) anthills (*Target Note 6*) which are known for close association with Chalkhill blue butterfly (*Polyommatus coridon*) and good quality grassland habitat.

Holcus-Juncus neutral grassland (g3c8)

3.2.8 An area of g3c8 Holcus-Juncus neutral grassland was found near the western site margin (*Photograph 3*). This area was identified to potentially be reasonably diverse, and had a few plants of the IUCN Red List GB Vulnerable species Divided Sedge (*Carex divisa*) at the time of survey (*Target Note 7*).

Modified grassland (g4)

3.2.9 Within the holiday park are extensive areas of modified grassland (g4) used for amenity purposes (*Photograph 4*). The uniform sward was dominated by Perennial Rye-grass, with patches of Early Meadow-grass (*Poa infirma*), Annual Meadow-grass (*Poa annua*), occasional Blinks (*Montia fontana*) and Common Mouse-ear (*Cerastium fontanum*) and areas of bare ground colonized by the Lesser Bird's-claw Beard-moss (*Streblotrichum convolutum*) and various small species of Bryum moss.

Line of trees (w1g6)

3.2.10 A line of mature non-native Tamarisks (*Tamarix gallica*) formed a windbreak near the western edge of the Site (*Photograph 5*). It included Monterrey Cypress (*Cupressus*

macrocarpa), Holm Oak (*Quercus ilex*) and Cabbage-palm (*Cordyline australis*), which formed the northern boundary of the holiday park.

Other broadleaved woodland (w1g7)

3.2.11 A 0.25 ha area of secondary woodland on the northwest edge of the holiday park was largely comprised of old pollards of hybrid crack willow (*Salix* × *rubens forma basfordiana*) with extensive suckers of Grey Poplar (*Populus* × *canescens*). Other species present included Sycamore (*Acer pseudoplatanus*) and Ivy (*Hedera helix*) (*Photograph 6*).

Hedgerow priority habitat (h2a)

3.2.12 Field boundary features within and around the Site were mostly unmanaged belts of scrub, with the inclusion of Grey Willow (*Salix cinerea*), Hybrid Willow (*Salix* × *reichardtii*) and planted Cherry Laurel (*Prunus laurocerasus*) in hedges surrounding the northernmost field (*Photograph 7*). Also present were hedges containing some Red-osier Dogwood (*Cornus sericea*) to the west of the holiday park and a few bushes of Broad-leaved Oleaster (*Eleagnus macrophylla*) to the east of the park. Hedges were generally in good condition with few gaps, or damage, although many lacked marginal strips of undisturbed vegetation. This classification of hedgerow is a priority habitat, listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

Blackthorn scrub (h3a)

3.2.13 A small parcel of Blackthorn (*Prunus spinosa*) scrub was recorded in the western corner of the Site adjacent to g3c8 and g3c grassland. This habitat formed a small stand surrounded by the more dominant bramble scrub habitat which composed the majority of scrub habitat within the Site.

Bramble scrub (h3d)

3.2.14 Almost all scrub was distributed to the east and the west of the survey area adjacent to grassland and urban habitat was formed in dense single species blocks of Bramble with Gorse, Dewberry and Blackthorn generally interspersed within these areas (*Photograph 8*). Much of this scrub habitat lacked either variety in age structure or diversity of marginal species, grading suddenly into grassland.

Gorse Scrub (h3e)

3.2.15 An area of Gorse (*Ulex europeaus*) scrub was identified in the western corner of the Site, adjacent to g3c, g3c8, and h3d habitats. This habitat was dominated by Gorse, lacking variety in age structure and community, and was divided into smaller areas by the ditches present in the western corner (*Photograph 9*).

Built-up areas and gardens (u1)

3.2.16 The most dominant urban habitat across the Site was primarily parcellated in the center of the survey area and composed the existing holiday park within the survey area. The habitat denotes the existing holiday home units, pathways and hard standing within the holiday

park which fell adjacent to the g3c grassland with a stretch of tree lines along the western edge of the holiday park (*Photograph 4*).

3.2.17 A refuse dump lied to the east of the survey area. Bramble scrub encompassed the habitat with areas of other neutral grassland similarly adjoining to the habitat.

Coastal vegetated shingle (s3b)

3.2.18 The red-line boundary includes an area of shingle bank on the southern margin, inhabited by a community of plants including Sea Kale (*Crambe maritima*), Yellow Horned-poppy and Sea Beet (*Beta vulgaris*), with Bird's-foot Clover (*Trifolium ornithopodioides*) present at the landward base of the bank. Costal vegetated shingle is classified as priority habitat, listed under Section 41 of the NERC Act 2006.

Canals (r1e)

3.2.19 Ditches were common throughout the survey area. A single large ditch traversed the southern portion of the Site. This had been dredged regularly, with vegetation and silt deposited on the landward side. Common Reed was dominant on the margins for long stretches of this ditch, with few other plants present. Narrower ditches elsewhere were unmanaged, and the vegetation diversity was consequently higher, with Sea Club-rush (*Bolboschoenus maritimus*) and Sea Rush (*Juncus maritimus*) found in brackish areas near the sea, and Bulrush (*Typha latifolia*), Lesser Bulrush (*Typha angustifolia*), Common Water-starwort (*Callitriche stagnalis*), Creeping Bent (*Agrostis stolonifera*) and Hairy Willowherb (*Epilobium hirsutum*) were seen elsewhere. To the east of the Site was a ditch with water vole potential (Target Note 8).

Eutrophic standing waters (r1a)

3.2.20 A single pond was recorded during the survey to the west of the Site surrounded by scrub, grassland and ditches (*Photograph 10*). At the time of survey this pond was eutrophicated with duckweed (*Lemna minor*) growth but provided suitable reedbed habitat composed of common reed and bulrush (*Typha latifola)* with soft and hard rush (*Juncus inflexus*).

Beach (t2h)

3.2.21 A small area of beach on the southern margin is mostly comprised of bare sand, with some patches of Sea Beet and Curled Dock (*Rumex crispus*).

Invasive non-native species

3.2.22 A stand of plants in the Japanese Knotweed aggregate (including Japanese Knotweed (*Reynoutria japonica*), Giant Knotweed (*Reynoutria sachalinensis*) and Hybrid Knotweed (*Reynoutria × bohemica*) was found in bramble scrub on building rubble on the southern margin of the holiday park adjacent to the tennis courts, but could not be differentiated because of the absence of leaves.

3.2 Badger survey results

Background data search

ABPmer 2019 surveys

3.3.1 The assessment of the Site for badger was undertaken by ABPmer in 2019. The surveys concluded no badger setts were recorded in accessible areas of the Site during the field surveys. Badger footprints and snuffle marks were identified close to scrub habitats to the south-west. Grassland and hedgerow habitats within the Site at the time of the 2019 survey provided habitat for foraging and commuting by badgers.

Sussex Biological Records Centre

3.3.2 Records from the SxBRC returned no instances of badger within 2 km of the Site.

Survey results

3.3.3 A systematic survey for badgers was conducted on 23rd February 2023. This survey identified a small number of evidential features that confirm the presence of badgers within the Site boundary. Mammal pathways were recorded along many of the field edges along the southern, western and northern field sections within the Site. Some of these were likely for other mammalian species including deer, rabbits and fox. Along many of the mammal pathways were numerous evidence of fresh badger latrines (*Photograph 11*) within the southern and eastern fields, with none recorded in the northern fields. Other field signs included snuffle marks and fresh badger bedding.

3.3.4 No badger setts were recorded during the survey period.

2.2 Water vole survey results

Background data search

Sussex Biological Records Centre

3.4.1 Records from the SxBRC of water vole were identified within 2 km of the Site.

Survey results

3.4.2 Initial habitat suitability assessments of the watercourses within the Site identified two ditches as having ‘optimal’ habitat for water voles, five as having ‘good’ habitat, ten as having ‘suitable but poor’, and two as ‘negligible’ (Figure 5). One additional waterbody was inaccessible for survey. Surveyors observed burrows, feeding signs, latrines, and footprints (Table 7; Photograph 13). Sightings of water vole were also recorded in two water features (Photograph 14). A number of recordings were additionally noted along the main rife running through the developed area of the holiday park. In areas with better foraging opportunities and cover, such as the ditches towards the south-east where reeds were in higher abundance, latrines and burrow density increased.

3.4.3 Using predictive equations describing the relationship between water voles and latrine numbers in the breeding season (Morris *et al*. 1998), the metapopulation across the Site can be assessed as being of a high density (Figure 6)

3.4.4 Water voles are a species of high conservation importance in the UK, where populations have undergone a rapid decline during the past century due to habitat loss and predation by feral American mink (*Neovison vison*) (Barreto et al., 1998; Strachan et al., 2000). In Sussex, the decline in water voles has been particularly pronounced, with populations being lost from 99% of historical sites (Smith, 2009). The current distribution of water voles within Sussex shows three large viable populations, including one population within the Chichester Coastal Plain (Baker et al., 2015). With connectivity along watercourses to areas outside of the Site, it is likely that the water vole population within the Site forms a larger metapopulation associated with the Chichester Coastal Plain.

Table 7. Water vole survey results summary.

Feature Number	Water vole evidence						
	Sightings	Latrines	Burrows	Footprints	Pathways	Feeding Remains	Habitat assessment
1	7	7	7	-	-	7	Water body with shallow banks and food sources (Good habitat).
2	-	-	7	-	-	-	Disturbed ditch close to road (Suitable but Poor habitat).
3	-	-	7	-	-	-	Ditch with shaded banks with limited foraging resources (Suitable but Poor habitat).
4	-	7	7	-	-	7	Ditch with well maintained vegetated banks (Optimal habitat)
5	7	7	7	7	-	7	Stretches of ditch were optimal to the south, with <good= and <suitable but poor= areas to the north.
6	-	7	7	7	-	7	Steep-banked ditch with limited access (Good habitat).
7	-	-	-	-	-	-	Ditch with low water levels and limited food (Suitable but Poor habitat).
8	-	-	-	-	-	-	Eutrophic and polluted ditch with no food and exposed banks (Suitable but Poor habitat).
9	-	-	-	-	-	-	Heavily shaded ditch with low food, likely dries regularly (Negligible).
10	-	7	7	-	-	7	Eutrophic ditch with one bank densely shaded (Good habitat).

Feature Number	Water vole evidence						
	Sightings	Latrines	Burrows	Footprints	Pathways	Feeding Remains	Habitat assessment
11	-	7	7	7	-	7	Ditch with good cover and foraging opportunities, but largely inaccessible due to dense vegetation (Good habitat).
12	-	-	-	-	-	-	Shallow isolated ditch that is unlikely to remain wet all year round (Suitable but poor habitat).
13	-	-	-	-	-	-	Shallow isolated ditch that is unlikely to remain wet all year round (Suitable but poor habitat).
14	-	-	-	-	-	-	Heavily shaded ditch varying in water depth, dries regularly with limited foraging resources (Suitable but poor habitat).
15	-	-	-	-	-	-	Heavily shaded ditch, dries regularly with limited foraging resources (Suitable but poor habitat).
16	-	-	-	-	-	-	Isolated ditch with heavily shaded banks, likely to dry out regularly (Negligible).
17	-	-	-	-	-	-	Pond with bare banks shaded by gorse, some foraging resources (Suitable but poor habitat).
18	-	-	-	-	-	-	Inaccessible for survey.
Key		Water vole present		Access restricted		No access	

3.2 Great crested newt survey results

Background data search

Previous surveys 2022

3.5.1 Previous great crested newt surveys were conducted in 2022 by RPS following the identification of an adult in one of the ditches during a site walkover. This survey identified a single adult great crested newt, alongside numerous efts (juveniles). The presence of these efts would suggest that this species was breeding on the Site.

Sussex Biological Records Centre

3.5.2 Records from the SxBRC of great crested newt were identified within 2 km of the Site.

Habitat Suitability Index

3.5.3 A total of 38 water features suitable for GCN breeding were identified from maps and aerial photographs within 500m of the Site. This included 18 water features within the red line boundary, with the rest within 500 m of the Site. Four water features were dry and/or proved inaccessible due to dense vegetation or due to them being present on private land and so could not be surveyed. Owing to this, the other 34 water features were assessed using the Habitat Suitability Index, with results presented in Table 8 and Figure 7.

Table 8. Results of the Habitat Suitability Index assessment.

Water Feature Reference	HSI Score	GCN Suitability	eDNA survey carried out?
1	0.60	Average	Yes
1a (se)	0.41	Poor	Yes
2	0.48	Poor	Yes
2a (e)	0.60	Average	Yes
3	0.50	Poor	Yes
4	0.65	Average	Yes
5	0.83	Excellent	Yes
6	0.74	Good	Yes
6a (e)	0.85	Excellent	Yes
7	0.61	Average	Yes
8	0.57	Below average	Yes
9	0.50	Below average	No
10	0.80	Good	Yes
11	0.83	Excellent	Yes
12	0.55	Below average	Yes
13	0.60	Below average	Yes
14	0.58	Below average	Yes
15	0.58	Below average	Yes
15a (n)	0.55	Below average	No
16	0.46	Poor	No
17	0.93	Excellent	Yes
18	N/A	N/A	No
19	0.51	Below average	No
20	0.73	Good	Yes
21	0.78	Good	Yes
22	0.58	Below average	No
23	0.55	Below average	No
24	0.92	Excellent	Yes
25	N/A	N/A	No

Water Feature Reference	HSI Score	GCN Suitability	eDNA survey carried out?
26	0.85	Excellent	Yes
27	0.85	Excellent	Yes
28	0.67	Average	No
29	N/A	N/A	No
30	0.44	Poor	No
31	0.43	Poor	No
32	0.43	Poor	No
33	0.47	Poor	No
34	N/A	N/A	No

Environmental DNA analysis

3.5.4 Following the HSI assessments, water samples were collected from water features: 23 of the 38 features were sampled based on those where an accurate representation of the pond could be gathered i.e., where the whole circumference of the pond was accessible. Water features marked as 8N/A9in Table 8 were either dry at the point of survey and are thought to now remain dry throughout most of the year (and most definitely during the GCN breeding season) or were too dangerous to survey due to dense vegetation or steep banks.

3.5.5 All of the sampled ponds returned negative results for great crested newt presence. Therefore, no further traditional population size-class surveys were necessary. The lack of a positive eDNA result in ponds within 500 m of Site (i.e., within the Medmerry Reserve) indicates the likely absence or very low and infrequent use of the area by this species. Suitable habitat pertaining to great crested newts is present throughout the Site and further into the Medmerry Reserve, in the form of ditches, ponds, rough and rank grassland, scrub, hedgerows, and small pockets of woodland. It is possible that great crested newts could occupy the Site on an infrequent basis for breeding, foraging, and hibernating, in the future.

3.5.6 *Annex G* provides a full account of the eDNA results.

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FIGURES

481200 481400 481600 481800 482000 482200 482400 482600

96400 96200 96000 95800 95600 95400 95200

Bracklesham

Earnley Rife

Drove Lane

Earnley Rife

Broad Rife

Broad Rife

Legend:

- Site Boundary
- Off-site Enhancement Area

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 1:

Site Layout

0 60 120 180
Metres
SCALE: 1:5,000 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.1 - Site Boundary and Enhancement Area.aprx

470000 472000 474000 476000 478000 480000 482000 484000 486000 488000 490000 492000 494000

106000 104000 102000 100000 98000 96000 94000 92000 90000 88000 86000

Chichester and Langstone Harbours Ramsar

Solent Maritime SAC

Chichester and Langstone Harbours SPA

Bracklesham Bay SSSI

Pagham Harbour SPA

Pagham Harbour Ramsar

Solent and Dorset Coast SPA

Selsey Bill and the Hounds MCZ

South Wight Maritime SAC

Legend:

- Site Boundary
- Off-site Enhancement Area
- 2km Site Buffer
- 10km Site Buffer
- Special Protection Areas
- Special Areas of Conservation
- Ramsar
- Sites of Special Scientific Interest
- Marine Conservation Zones
- Medmerry RSPB Reserve

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 2:

International and Nationally Designated Sites within 10 and 2km

0 1,000 2,000 3,000
Metres
SCALE: 1:80,000 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.2 - Designated Sites.aprx

481000 481200 481400 481600 481800 482000 482200 482400 482600 482800 483000

96600 96400 96200 96000 95800 95600 95400 95200 95000

Legend:

- Site Boundary
- Off-site Enhancement Area
- 250m Site Buffer

Natural England Priority Habitats

- Coastal and floodplain grazing marsh
- Coastal vegetated shingle
- Lowland meadows
- Maritime cliff and slope

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 3:

Priority Habitats within 250m

0 80 160 240
Metres
SCALE: 1:6,500 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.3 - Priority Habitats.aprx

481400 481500 481600 481700 481800 481900 482000 482100 482200 482300 482400 482500

96100 96000 95900 95800 95700 95600 95500 95400 95300

Legend:

- Site Boundary
- Off-site Enhancement Area

UKHab Habitats

- Other Neutral Grassland
- Lolium-cynosurus Neutral Grassland
- Holcus-juncus Neutral Grassland
- Modified Grassland
- Other Blackthorn Scrub
- Bramble Scrub
- Gorse Scrub
- Eutrophic Standing Water
- Coastal Vegetated Shingle
- Littoral Sediment
- Built-up Areas and Gardens
- Buildings
- Developed Land, Sealed Surface
- Other Woodland, Broadleaved
- Hedgerow (Priority Habitat)
- Other Hedgerow
- Ditch
- Line of Trees
- Botanical Target Note
- Animal Target Note

Rev	Date	Description	Drn	Chk	App
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Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 4:

UKHab Habitats Map

0 40 80 120
Metres
SCALE: 1:3,500 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.4 - UKHab Habitats.aprx

481400 481500 481600 481700 481800 481900 482000 482100 482200 482300 482400 482500

96100 96000 95900 95800 95700 95600 95500 95400 95300 95200

Legend:

- Site Boundary
- Off-site Enhancement Area

Watercourse Suitability for Water Vole

- Optimal
- Good
- Suitable but Poor
- Negligible

Water Vole Field Sign

- Burrow
- Dropping (single)
- Feeding signs
- Footprint
- Latrine
- Observation
- Other (use notes)

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 5:

Water Vole Survey Results

0 40 80 120
Metres
SCALE: 1:3,500 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.6 - Water Vole Survey Results.aprx

481400 481500 481600 481700 481800 481900 482000 482100 482200 482300 482400 482500

96100 96000 95900 95800 95700 95600 95500 95400 95300 95200

Legend:

- Site Boundary
- Off-site Enhancement Area

Relative Population Density

- High
- Medium
- Low
- No evidence found
- No access / unsurveyed

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 6:

Water Vole Relative Latrine Density

0 40 80 120
Metres
SCALE: 1:3,500 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.6b - Watercourse Latrine Density.aprx

481500 481600 481700 481800 481900 482000 482100 482200 482300 482400

96100 96000 95900 95800 95700 95600 95500 95400

Legend:

- Site Boundary
- Off-site Enhancement Area

HSI Category

- Excellent
- Good
- Average
- Below Average
- Poor
- No access / unsafe to survey

Rev	Date	Description	Drn	Chk	App
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Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 7:

Great Crested Newt Survey Results
Page 1 of 4

0 30 60 90
Metres
SCALE: 1:3,000 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.5 - GCN Survey Results.aprx

480800 481000 481200 481400 481600 481800 482000 482200 482400

97200 97000 96800 96600 96400 96200 96000

Legend:

- Site Boundary
- Off-site Enhancement Area

HSI Category

- Excellent
- Good
- Average
- Below Average
- Poor
- No access / unsafe to survey

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 7:

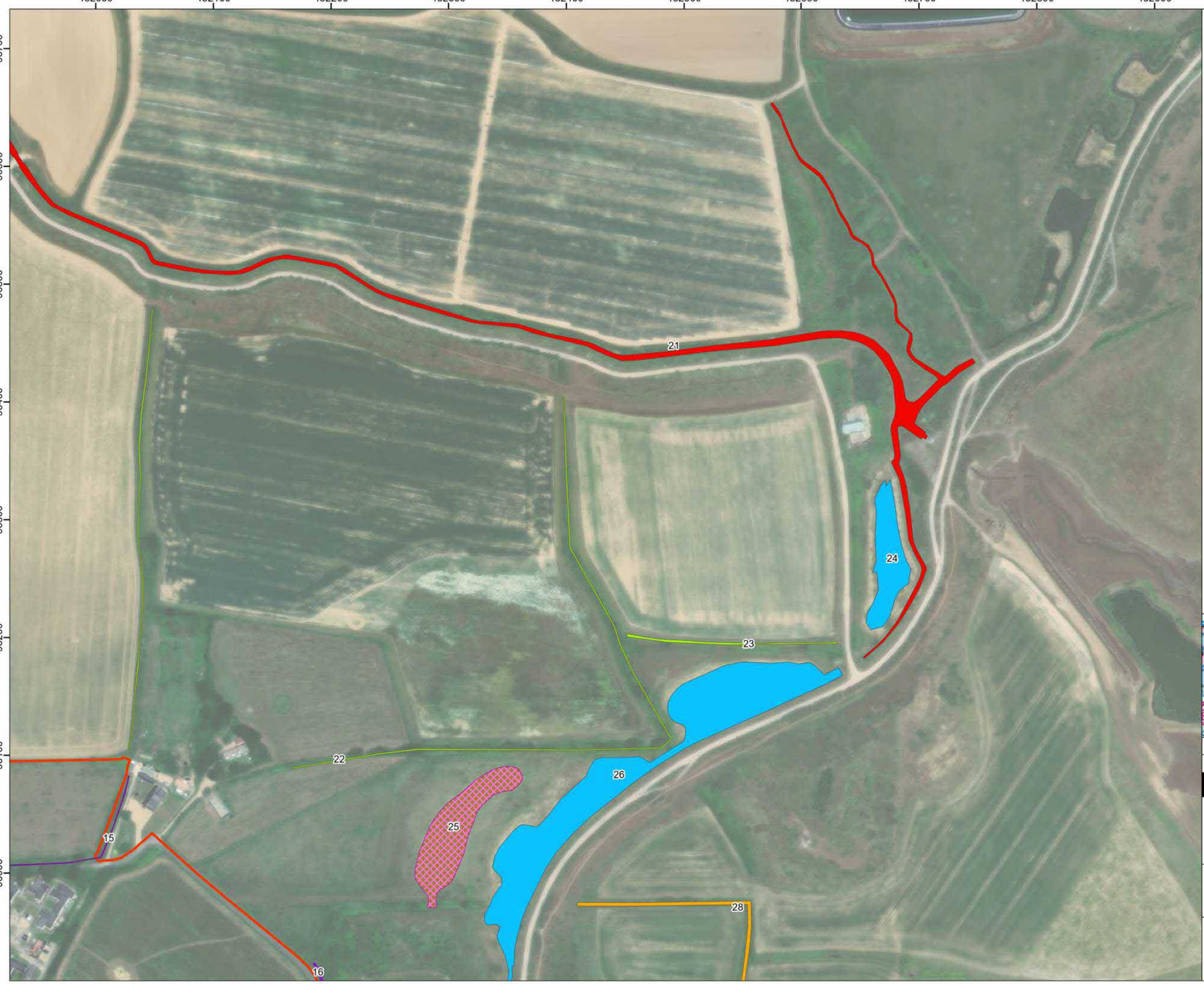
Great Crested Newt Survey Results
Page 2 of 4

0 60 120 180
Metres
SCALE: 1:5,000 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.5 - GCN Survey Results.aprx



Legend:

- Site Boundary
- Off-site Enhancement Area

HSI Category

- Excellent
- Good
- Average
- Below Average
- Poor
- No access / unsafe to survey

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 7:

Great Crested Newt Survey Results
Page 3 of 4

0 30 60 90
Metres
SCALE: 1:3,000 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.5 - GCN Survey Results.aprx

481900 482000 482100 482200 482300 482400 482500 482600 482700 482800 482900 483000 483100 483200

95900 95800 95700 95600 95500 95400 95300 95200 95100 95000 94900

Legend:

- Site Boundary
- Off-site Enhancement Area

HSI Category

- Excellent
- Good
- Average
- Below Average
- Poor
- No access / unsafe to survey

Rev	Date	Description	Drn	Chk	App
00	06/11/2023	2485083	TG	SP	TW

Medmerry Holiday Park

RSK biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 7:

Great Crested Newt Survey Results
Page 4 of 4

0 50 100 150
Metres
SCALE: 1:4,000 @ A3

N W E S

REV 00

Document Path: C:\OneDrive\RSK Group\RSK Biocensus - 06 GIS - 2485083 - PEA EIA Medmerry Holiday Park Earnley\03 - APRX\2485083 - Medmerry Holiday Park - Figure 6.5 - GCN Survey Results.aprx

Annex A 3 Target notes

Target Note 1: Reptile mat left from previous surveys within the Site in northern field.

Target Note 2: Dark-bellied brent geese foraging on field adjacent to holiday park.

Target Note 3: Skylark recorded calling in northern arable field outside of survey area.

Target Note 4: Cetti's warbler recorded singing within scrub outside of survey area to the east of the holiday park.

Target Note 5: Stonechat recorded perched on scrub outside of survey area to the east of the holiday park.

Target Note 6: Yellow meadow ant anthills in g3c6 grassland.

Target Note 7: Divided sedge in g3c8 grassland.

Target Note 8: Ditch with water vole potential, possible sighting of water vole during survey.

Target Note 9: Stand of Japanese Knotweed aggregate located in bramble scrub on building rubble

Annex B - Legislation and Guidance

International Legislation

The following international conventions and directives apply to biodiversity protection in the UK. Post-8Brexit9, even though European Union (EU) directives no longer directly apply to the UK, the provisions therein are enshrined in both domestic legislation and international agreements. Legislation has been enacted to ensure the regulations derived from these remain in force[1].

The Convention on Biological Diversity 1992 *et seq.*

This multilateral treaty (https://www.cbd.int/doc/legal/cbd-en.pdf), signed by 150 government leaders at the 1992 Rio Earth Summit, has three main goals, of which one is the conservation of biological diversity. Article 6 requires countries to develop national biodiversity strategies, plans or programmes. In response, the UK developed the UK Biodiversity Action Plan (BAP) 1994 (https://jncc.gov.uk/our-work/uk-bap/) as well as county-specific BAPs. Subsequent to this, parties of the convention agreed the supplementary Nagoya Protocol 2010 (available at https://www.cbd.int/abs/doc/protocol/nagoya-protocol-en.pdf), adopting the Strategic Plan for Biodiversity 2011-2020. The purpose of this Strategic Plan was to provide a framework for establishing national and regional biodiversity targets (https://www.cbd.int/doc/strategic-plan/2011-2020/Aichi-Targets-EN.pdf).

Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) 1992
https://www.legislation.gov.uk/eudr/1992/43

The Habitats Directive 1992 requires EU MSs to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest, which are listed under Annex I, II, IV and/or V. Species listed under Annex IV are known as 8European Protected Species9(EPS), and have retained their protected status in UK domestic legislation post-Brexit.

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979
Accessible via: https://jncc.gov.uk/our-work/the-convention-on-the-conservation-of-migratory-species-of-wild-animals/#convention-summary

The Bonn Convention was adopted in 1979 and came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix I of the Convention), concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix II), and by undertaking cooperative research activities. The UK Government ratified the Bonn Convention in 1985. The current legally-binding Agreements under the Convention include EUROBATS[2].

[1] Further information relating to England and Wales can be found here: https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017.

[2] More information available at https://jncc.gov.uk/our-work/agreement-on-the-conservation-of-populations-of-european-bats-eurobats

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979
https://www.coe.int/en/web/bern-convention

The principal aims of the Bern Convention 1979 are to ensure the conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix III. To this end, the Bern Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1,000 wild animal species. The UK Government ratified the Bern Convention in 1982.

National Legislation

The following pieces of domestic legislation apply to biodiversity protection in the UK.

The Wildlife and Countryside Act (WCA) 1981
https://www.legislation.gov.uk/ukpga/1981/69

The Wildlife and Countryside Act 1981 (as amended) is the primary piece of legislation relating to nature conservation in the UK, though it has been adapted in different ways in the devolved administrations.

The act is supplemented by provisions in the Countryside and Rights of Way (CRoW) Act 2000 and the Natural Environment and Rural Communities (NERC) Act 2006. The WCA provides protection for species listed in Schedules 1 (birds), 5 (other animals) and 8 (plants) of the Act. It provides for the notification and confirmation of Sites of Special Scientific Interest (SSSIs) in England and Wales. It also sets out, in other schedules, important and invasive species which are legally protected or require management.

All species of bird are protected under the WCA. The legislation makes it an offence to intentionally:

a) kill, injure or take any wild bird;
b) take, damage, or destroy the nest of any wild bird while that nest is in use or being built; or
c) take or destroy an egg of any wild bird.

Those species of birds listed on Schedule 1 of the WCA are afforded additional protection, which deems it an offence to intentionally or recklessly:

a) disturb any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young; or
b) disturb dependent young of such a bird.

Under Section 9 of the WCA, for animals listed on Schedule 5, it is an offence in England and Wales to intentionally or recklessly:

" kill, injure or take any wild animal listed on Schedule 5*;
" possess or control any live or dead those wild animals or anything derived from it*;
" damage or destroy any structure or place which wild animals listed on Schedule 5 uses for shelter or protection*;
" disturb any such animal while it is occupying a structure or place of shelter or protection;

- obstruct access to any structure or place used by any such animal for shelter or protection; and
- sell, offer or expose for sale, or have in their possession or transports for the purpose of sale, any live or dead wild animal listed on Schedule 5 or any part of, or anything derived from such an animal.

The three clauses marked with asterisks do not apply to EPS in England and Wales, as these offences are included in the 'Habitats Regulations' (see below).

In addition to EPS, species commonly found on development sites include water voles (*Arvicola amphibius*) and widespread species of reptiles: common lizard (*Zootoca vivipara*); slow-worm (*Anguis fragilis*); grass snake (*Natrix helvetica*); and adder (*Vipera berus*). These four reptile species receive partial protection, which prevents the intentional or deliberate killing and injuring of reptiles or offering them for sale.

Section 14(2) states that it is an offence to plant or otherwise cause to grow any plant in the wild at a place outside its native range.

Section 16(i) of the Act makes provision for derogation licences to be issued "*for the purposes of preserving public health or public & safety*". For confirmation of this, it would be appropriate to consult Natural England.

Until recently, there has been no provision within the Act for derogation licences to be issued for the purposes of development, although Section 10 provides a defence in cases that may be considered to be: "*the incidental result of a lawful operation and could not reasonably have been avoided*" if certain conditions are met.

As a result of the Environment Act 2021, the introduction of the 'overriding public interest' ('OPI') test was added to the licensing purposes in the WCA, from October 2022, though this only applies in England.

The Conservation of Habitats and Species Regulations (Habitat Regulations) 2017
https://www.legislation.gov.uk/uksi/2017/1012 England and Wales

The Habitats Regulations 2017 consolidated the various amendments made to the 1994 Habitat Regulations, which were developed to implement the Birds Directive and Habitats Directive at a national level, though this consolidation only applies in England and Wales.

The Regulations (as amended) provide for the designation and protection of the national site network (formerly 'Natura 2000 sites'), the adaptation of planning and other controls for those sites, and the protection of EPS (listed on Schedules 2 and 5).

The 2017 Regulations (England and Wales, Reg. 43) deems it an offence to:

a) deliberately capture, injure or kill a wild animal of a EPS,
b) deliberately disturb wild animals of any such species,
c) deliberately take or destroy the eggs of such an animal, or
d) damage or destroy a breeding site or resting place of such an animal.

For the purposes of paragraph (b), disturbance of animals includes in particular any disturbance which is likely to:

a) impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or
b) to affect significantly the local distribution or abundance of the species to which they belong.

There are also restrictions on transport, possession and sale.

It is possible to obtain a derogation licence from Natural England to permit activities which would otherwise contravene the regulations above, including for development purposes, when certain conditions are met. Failure to satisfy the Regulations and obtain a licence where required could result in prosecution and lead to fines and possible imprisonment.

Currently, all EPS are also listed on Schedule 5 of the WCA (outlined above), as it applies in England and Wales, though only some clauses of the WCA apply (Section 9 4(b), (c) and 5). EPS often encountered on development sites include great crested newts (*Triturus cristatus*), all species of bats, dormice (*Muscardinus avellanarius*) and otters (*Lutra lutra*).

Countryside and Rights of Way Act 2000
https://www.legislation.gov.uk/ukpga/2000/37

The Countryside and Rights of Way (CRoW) Act 2000 provides for public access on foot to certain land types, amends the law for public rights of way, increases protection for SSSIs, and strengthens wildlife enforcement legislation. It applies only in England and Wales.

The Hedgerows Regulations 1997
https://www.legislation.gov.uk/uksi/1997/1160/made

The Hedgerows Regulations 1997 provide protection for 8important9hedgerows for which replanting is not a substitute. The 8importance9of a hedgerow depends upon several archaeological, wildlife and landscape criteria (which are outlined in the Regulations). The regulations deem it an offence to remove an 8important hedgerow9without prior notification to the relevant local planning authority.

Protection of Badgers Act 1992
https://www.legislation.gov.uk/ukpga/1992/51

Badgers and their setts are protected under the Protection of Badgers Act 1992 (England, Wales and Scotland). The key part of this legislation in relation to the proposed development are in Section 3, which deems it an offence to:

a) damage a badger sett or any part of it;
b) destroy a badger sett;
c) obstruct access to, or any entrance of, a badger sett;
d) disturb a badger when it is occupying a badger sett,
e) intend to do any of those things or be reckless as to whether those actions would have any of the consequences listed above.

Derogation licences may be obtained from the relevant SNCB**Error! Bookmark not defined.** under S ection 10 of the Act for the purpose of development, to permit activities which would otherwise be unlawful.

Note: there are additional provisions relating to badgers under the WCA Section 11 (Prohibition of certain methods of killing or taking wild animals).

The Wild Mammals (Protection) Act 1996
https://www.legislation.gov.uk/ukpga/1996/3

All wild mammals are protected by The Wild Mammals (Protection) Act 1996 (as amended). This makes it an offence to mutilate, kick, beat, nail, or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal.

Invasive Alien Species (Enforcement and Permitting) Order 2019
(https://www.legislation.gov.uk/uksi/2019/527/contents/made)

The Invasive Alien Species (Enforcement and Permitting) Order applies principally in England and Wales and the UK's offshore marine area, but also controls imports and exports from the UK (including Scotland and Northern Ireland). It lists species of concern which cannot be imported, kept, bred/grown, transported, sold, used, allowed to reproduce, or released into the environment. This Order replaces some elements relating to invasive species in the Wildlife and Countryside Act 1981 (as amended).

Annex C 3 Species Records

Table 9 displays noteworthy species records that are located within 2 km of the Site boundary. These species records were obtained from Sussex Biological Records Centre. The scientific and common names for species are given as well as their level of designation. A glossary defining abbreviations used in the table is given in **Table 10**, **Annex D**. If a species is not included in the table below it does not necessarily mean the species is absent from the search area, but that data-holding organizations do not have records of it in these locations.

Table 9: Noteworthy species records within 2 km of the Site boundary

Scientific name	Common name	Designation	Most Recent	Within 100m	Within 1km
Lichen					
Halecania viridescens	A Lichen	NS			
Plants					
Hyacinthoides non-scripta	Bluebell	WCA8			
Puccinellia fasciculata	Borrer's Saltmarsh-grass	S41, NS			
Cichorium intybus	Chicory	GB RDB(VU), ENG BSBI RDB(VU)			
Petrorhagia nanteuilii	Childing Pink	WCA8, GB RDB(VU), ENG BSBI RDB(VU), NR	**2015**		
Spergula arvensis	Corn Spurrey	GB RDB(VU), ENG BSBI RDB(VU)			
Parapholis incurva	Curved Hard-grass	NS			
Carex divisa	Divided Sedge	S41, GB RDB(VU), NS			
Euphorbia exigua	Dwarf Spurge	GB RDB(VU), ENG BSBI RDB(VU)			
Poa infirma	Early Meadow-grass	NS			
Inula crithmoides	Golden-samphire	NS			
Orobanche rapum-genistae	Greater Broomrape	GB RDB(VU), ENG BSBI RDB(VU), NS			
Anacamptis morio	Green-winged Orchid	GB RDB(VU), ENG BSBI RDB(VU)			
Sarcocornia perennis	Perennial Glasswort	NS			
Bromus secalinus	Rye Brome	NS			
Hordeum marinum	Sea Barley	S41, GB RDB(VU), ENG BSBI RDB(VU), NS			
Calystegia soldanella	Sea Bindweed	GB RDB(VU), ENG BSBI RDB(VU)			
Trifolium squamosum	Sea Clover	NS			
Frankenia laevis	Sea-heath	NS			
Bupleurum tenuissimum	Slender Hare's-ear	S41, GB RDB(VU), ENG BSBI RDB(VU), NS			
Puccinellia rupestris	Stiff Saltmarsh-grass	NS			
Trifolium fragiferum	Strawberry Clover	GB RDB(VU), ENG BSBI RDB(VU)			
Hyacinthoides non-scripta	Bluebell	WCA8			
Puccinellia fasciculata	Borrer's Saltmarsh-grass	S41, NS			
Cichorium intybus	Chicory	GB RDB(VU), ENG BSBI RDB(VU)			

Scientific name	Common name	Designation	Most Recent	Within 100m	Within 1km
Spergula arvensis	Corn Spurrey	GB RDB(VU), ENG BSBI RDB(VU)			
Parapholis incurva	Curved Hard-grass	NS			
Carex divisa	Divided Sedge	S41, GB RDB(VU), NS			
Euphorbia exigua	Dwarf Spurge	GB RDB(VU), ENG BSBI RDB(VU)			
Poa infirma	Early Meadow-grass	NS			
Inula crithmoides	Golden-samphire	NS			

Annex D 3 Abbreviations

Table 10 displays abbreviations of protected species legislation.

Table 10: Glossary of abbreviations used in this report

Code	Full Title	Explanation
Amber	Amber list	Amber listed species have a population status in the UK of medium conservation concern.
BAP	Biodiversity action plan	A plan that identifies threats to significantly important species and habitats, and sets out targets and actions to enhance or maintain biodiversity.
ENG BSBI RDB	A Vascular Plant Red List for England	A list published in 2014 by the Botanical Society of Britain and Ireland of the red list status of plants in England. Measured against standardised IUCN criteria.
ENG BSBI RDB(CR)	Critically endangered	A BSBI Red List designation for species at an extremely high risk of extinction.
ENG BSBI RDB(EN)	Endangered	A BSBI Red List designation for species at a very high risk of extinction.
ENG BSBI RDB(VU)	Vulnerable	A BSBI Red List designation for species at high risk of extinction.
GB RDB	Red data book species	Species identified in one of the UK Red Data 2001.
GB RDB(CR)	Critically endangered	An IUCN Red List designation for species at an extremely high risk of extinction.
GB RDB(EN)	Endangered	An IUCN Red List designation for species at a very high risk of extinction.
GB RDB(VU)	Vulnerable	An IUCN Red List designation for species at high risk of extinction.
IUCN	International Union for Conservation of Nature and Natural Resources	A worldwide partnership and conservation network to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.
LBAP	Local biodiversity action plan	A plan that identifies threats to locally important species and habitats, and sets out targets and actions in Species Action Plans and Habitat Action Plans to enhance or maintain biodiversity at the county or regional level.
Red	Red list	Red listed species have a population status in the UK with high conservation concern.
S41	Species of principal importance	Species of Principal Importance in England under The Natural Environment and Rural Communities (NERC) Act (2006)
UKBAP	UK biodiversity action plan	A plan that identifies threats to locally important species and habitats, and sets out targets and actions in species action plans and habitat action plans to enhance or maintain biodiversity in the UK.
WCA	The Wildlife and Countryside Act 1981 (as amended)	Containing 4 Parts and 17 Schedules, the Act covers protection of wildlife (birds, and some animals and plants), the countryside, National Parks, and the designation of protected areas, and public rights of way. All wild plants in Britain are protected from intentional uprooting by an unauthorized person, but land owners, land occupiers, persons authorized by either of these or persons authorized in writing by the local authority for the area are exempt. Protection for some species may be limited to certain Sections of the Act (*e.g.* S13(2).
WCA8	Schedule 8 of The Wildlife and Countryside Act 1981 (as amended)	Plants and fungi protected from intentional picking, uprooting, destroying, trading (including parts or derivatives), *etc*.

Annex E 3 Site photographs

	
Photograph 1. Other Mixed Grassland.	Photograph 2. Lolium-Cynosurus Neutral Grassland.
	
Photograph 3. Holcus-Juncus Neutral Grassland.	Photograph 4. Modified Grassland.
	
Photograph 5. Line of Trees (west).	Photograph 6. Other Broadleaved Woodland.

	
Photograph 7. Hedgerow in north of site.	Photograph 8. Bramble Scrub.
	
Photograph 9. Gorse Scrub.	Photograph 10. Pond in western corner of Application Boundary.
	
Photograph 11. Badger latrine.	Photograph 12. Badger bedding.

	
Photograph 13. Water Vole Latrine.	Photograph 14. Water Vole sighting at Ditch 5.

Annex F 3 Plant species list

Table 11 displays a list of plant species identified during the habitat survey in 2023. Abundance estimates for each species are given using the DAFOR scale.

Table 11. Vascular plant species recorded from the Site and its boundaries on February 2023.

Species	Abundance by habitat		
	Grasslands	**Scrub and woodland**	**Watercourses**
a) Trees, shrubs and woody climbers			
Cordyline australis (Cabbage-palm)		R(P)	
Cornus sericea (Red-osier Dogwood)		LF	
Cupressus macrocarpa (Monterey Cypress)		O(P)	
Eleagnus macrophylla (Broad-leaved Oleaster)		R(P)	
Populus ×canescens (Grey Poplar)		LD	LD
Prunus laurocerasus (Cherry Laurel)		R	
Quercus ilex (Evergreen Oak)		R	
Quercus robur (Pedunculate Oak)		R	
Prunus spinosa (Blackthorn)	R	LA	
Reynoutria c.f. *japonica* (Japanese (or Giant/Hybrid) Knotweed)		R	
Rubus caesius (Dewberry)	O	LD	
Rubus fruticosus agg. (Bramble)		O	
Salix cinerea (Grey Willow)		O	
Salix fragilis (Crack-willow)		R	
Salix ×reichardtii (a Hybrid Willow)		R	
Salix ×rubens forma *basfordiana* (Hybrid Crack-willow)		R	
Tamarix c.f. *gallica* (Tamarisk)		LF	
Ulex europaeus (Gorse)	O	LD	
b) Grasses, sedges, rushes and other graminoids			
Agrostis stolonifera (Creeping Bent)	F/LF		
Alopecurus geniculatus (Marsh Foxtail)	R		
Arrhenatherum elatius (False Oat-grass)	O/LA		
Bolboschoenus maritimus (Sea Club-rush)	R		
Carex divisa (Divided Sedge)	R		
Cortaderia selloana (Pampas-grass)	R		
Dactylis glomerata (Cock's-foot)	F/LA		
Elytrigia atherica (Sea Couch)	R		
Elytrigia repens (Common Couch)	F/LA		
Festuca ovina (Sheep's-fescue)	R		
Festuca rubra (Red Fescue)	O/LA		
Glyceria c.f. *fluitans* (Floating Sweet-grass)			R
Holcus lanatus (Yorkshire-fog)	O/LA		
Juncus effusus (Soft-rush)	O		F
Juncus inflexus (Hard Rush)	R		R
Juncus maritimus (Sea Rush)			R
Lolium perenne (Perennial Rye-grass)	F		

Species	Abundance by habitat		
Phragmites australis (Common Reed)	F/LD		F/LD
Poa annua (Annual Meadow-grass)	O		
Poa infirma (Early Meadow-grass)	R		
Typha angustifolia (Lesser Bulrush)			R
Typha latifolia (Bulrush)			R
c) Herbaceous species			
Alisma plantago-aquatica (Water-plantain)			R
Arctium minus (Lesser Burdock)	R		
Artemisia vulgaris (Mugwort)	O		
Ballota nigra (Black Horehound)	R		
Barbarea vulgaris (Winter-cress)	R		
Bellis perennis (Daisy)	O		
Beta vulgaris subsp. *maritima* (Sea Beet)	LF		
Callitriche stagnalis (Common Water-starwort)	LF		
Capsella bursa-pastoris (Shepherd's-purse)	R		
Cardamine flexuosa (Wavy Bitter-cress)	R		
Centaurea debeauxii (Chalk knapweed)	R		
Cerastium fontanum (Common Mouse-ear)	R		
Cerastium glomeratum (Sticky Mouse-ear)	R		
Cirsium arvense (Creeping Thistle)	O		
Cirsium vulgare (Spear Thistle)	R		
Crambe maritima (Sea-kale)	R		
Daucus carota (Wild Carrot)	O		
Dipsacus fullonum (Teasel)	R		
Epilobium hirsutum (Great Willowherb)	R		
Epilobium obscurum (Short-fruited Willowherb)	R		
Ficaria verna (Lesser Celandine)	R		
Galium aparine (Cleavers)	O		
Galium palustre (Common Marsh-bedstraw)	R		
Geranium dissectum (Cut-leaved Crane's-bill)	F		
Geranium molle (Dove's-foot Crane's-bill)	O		
Glaucium flavum (Yellow Horned-poppy)	R		
Glebionis segetum (Corn Marigold)	R		
Helminthotheca echioides (Bristly Oxtongue)	O		
Hyacinthus orientalis (Hyacinth)	R		
Iris foetidissima (Stinking Iris)	R		
Jacobaea vulgaris (Common Ragwort)	R		
Lamium album (White Dead-nettle)	R		
Lamium purpureum (Red Dead-nettle)	R		
Lapsana communis (Nipplewort)	R		
Lemna minor (Common Duckweed)			R
Lepidium draba (Hoary Cress)	O		
Leucanthemum vulgare (Oxeye Daisy)	R		
Leucojum aestivum (Summer Snowflake)	R(P)		
Linaria vulgaris (Common Toadflax)	R		

Species	Abundance by habitat		
Lotus corniculatus (Common Bird's-foot-trefoil)	R		
Malva arborea (Tree-mallow)	LF		
Malva sylvestris (Common Mallow)	R		
Matricaria discoidea (Pineappleweed)	R		
Medicago arabica (Spotted Medick)	R		
Melilotus sp. (a Melilot)	R		
Mercurialis annua (Annual Mercury)	R		
Montia fontana (Blinks)	R		
Narcissus pseudonarcissus (Daffodil)	R(P)		
Nasturtium officinale (Water-cress)	R		
Oenanthe crocata (Hemlock Water-dropwort)	O		F
Oxalis sp. (a Wood-sorrel)	R		
Plantago coronopus (Buck's-horn Plantain)	LF		
Plantago lanceolata (Ribwort Plantain)	R		
Potentilla reptans (Creeping Cinquefoil)	R		
Ranunculus repens (Creeping Buttercup)	R		
Rumex conglomeratus (Clustered Dock)	O		
Rumex crispus (Curled Dock)	R		
Rumex obtusifolius (Broad-leaved Dock)	O		
Rumex sanguineus (Wood Dock)	R		
Sagina procumbens (Procumbent Pearlwort)	R		
Scrophularia auriculata (Water Figwort)	R		R
Sinapis arvensis (Charlock)	R		
Sisymbrium officinale (Hedge Mustard)	LF		
Sonchus oleraceus (Smooth Sow-thistle)	R		
Stellaria media (Common Chickweed)	R		
Taraxacum sect. *Taraxacum* (Common Dandelion)	R		
Trifolium ornithopodioides (Bird's-foot Clover)	R		
Trifolium repens (White Clover)	R		
Tripleurospermum maritimum (Sea Mayweed)	R		
Urtica dioica (Common Nettle)	LF		
Veronica beccabunga (Brooklime)			O
Veronica persica (Common Field-speedwell)	R		
Vinca major (Greater Periwinkle)	R		
d) Ferns and horsetails			
e) Bryophytes			
Brachythecium rutabulum (Rough-stalked Feather-moss)	O		
Bryum argenteum (Silver-moss)	R		
Bryum capillare (Capillary Thread-moss)	R		
Bryum dichotomum (Bicoloured Bryum)	R		
Bryum rubens (Crimson-tuber Thread-moss)	R		
Calliergonella cuspidata (Pointed Spear-moss)	R		R
Hypnum cupressiforme (Cypress-leaved Plait-moss)	R	O	
Kindbergia praelonga (Common Feather-moss)	O	O	
Oxyrhynchium hians (Swatzs Feather-moss)	R		

Species	Abundance by habitat		
Polytrichum juniperinum (Juniper Haircap)	R		
Streblotrichum convolutum (Lesser Bird's-claw Beard-moss)	R		
Trichostomum crispulum (Curly Crisp-moss)	R		
f) Other (e.g. lichens, stoneworts, algae, fungi)			
Oxyporus populinus (Poplar Bracket)		R	
Trametes pubescens (a bracket fungus)		R	

Annex G 3 eDNA Survey Results

Client: Thomas Webb,
RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-470	Condition on Receipt: Medium Sediment	Volume: Passed
Client Identifier: Pond 16	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	0 of 2	Real Time PCR	26/04/2023
Degradation Control§	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)#	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

§ No degradation is expected within time frame of kit preparation, sample collection and analysis.

#Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-471	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 14	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
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Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-472	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 13	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-473	Condition on Receipt: Medium Sediment	Volume: Passed
Client Identifier: Pond 15	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-474	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 7	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control§	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)#	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
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Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-475	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 12	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-476	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 9	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
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Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-477	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 8	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control§	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
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Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-478	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 11	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-479	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 5	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control§	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
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Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-480	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 4	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

* If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.

Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Thomas Webb,
RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-481	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 6	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control§	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)#	4 of 4	Real Time PCR	As above for GCN
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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-482	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 3	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/04/2023	Date of issue:	27/04/2023

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[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-483	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 1	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
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[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Thomas Webb,
RSK Biocensus

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 229249
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-484	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 2	Description: pond water samples in preservative	
Date of Receipt: 24/04/2023	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control	2 of 2	Real Time PCR	26/04/2023
Degradation Control[§]	Within Limits	Real Time PCR	26/04/2023
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/04/2023
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
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Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)