Landscape Science Consultancy Ltd

PROPOSED BATTERY SITES

INDIAN QUEENS SUB-STATION, CORNWALL

ECOLOGICAL ASSESSMENT

For

DALTON WARNER DAVIS LLP

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1.0 Introduction

Landscape Science Consultancy (LSC) Ltd was commissioned by DWD LLP to conduct an Ecological Assessment at the National Grid Sub-Station Site, Indian Queens, Cornwall – the 'Survey Site'.

The 'Proposed Development' is for the construction and operation of a battery energy storage system (BESS) with a total import capacity of 100 megawatts (MW), within part of the Survey Site (see submitted plans). The design of the battery is split into two separate 50MW battery sites each comprising approximately half of the total site area. The battery site contains a range of equipment including the battery units themselves (these are generally containerised but a specific model will not be known until post-consent) typically set out in uniform rows throughout the site, as well as electrical transformer units, acoustic fencing and CCTV cameras. The development will also include a planting buffer of approximately 15m on all boundaries apart from the south. All site access (construction and operational) will be via an existing, purpose-built access track that connects to the National Grid substation track and eventually Domellick Hill (B3279).

A desk-top study was undertaken, and biological records have been gathered, to determine presence of designated sites and protected species within 2km of the Survey Site. An Extended Phase 1 Habitat Survey was also carried out to identify and classify habitats present within the Survey Site and, where appropriate, the Zone of Influence. A preliminary assessment for protected, notable and invasive species was conducted during the site visit. This included an assessment of the potential suitability of the onsite habitats and landscape setting to support protected and notable species. A badger survey was additionally undertaken concurrently with the Phase 1 survey, as well as an eDNA water sampling survey of a nearby lake in respect of great crested newts.

The aim of this Ecological Assessment is to describe designated sites, habitats and ecological receptors within and adjacent to the Survey Site, assess their ecological value and identify potential effects resulting from the Proposed Development.

Recommendations are outlined for mitigation measures and working practises which are required in respect of designated sites, habitats and protected species to ensure compliance to relevant statutory legislation and current best practice methods. A Biodiversity Net Gain assessment in DEFRA Metric 3.0 has been carried out for the Proposed Development and submitted with an accompanying separate report.

2.0 Site Description

2.1 Site Location

The Proposed Development is to be located within part of the National Grid Sub-Station Site (the 'Survey Site') which lies approximately 1.7km to the east of the village of Indian Queens, Cornwall. The limits of the Survey Site are shown on Map 01 below and **Figure 01** (Site Boundary) appended to this report. The Survey Site is understood to form the current landownership for the National Grid Sub-Station Site, all of which was assessed and surveyed (apart from the existing built development Operational Area) to gather a comprehensive baseline and determine constraints and opportunities affecting the Proposed Development.

Map 1: Aerial map showing the Survey Site indicated *approximately* by the red line. Reproduced under Google's Fair Use Policy.

2.2 Survey Site Habitats

The central area of the Survey Site comprises the existing buildings, infrastructure and hardstanding associated with the Operational Area of the National Grid Sub-Station Site. Surrounding the Operational Area is improved pasture fields and established habitats such as plantation woodland, scrub, willow carr, scattered trees and a lake. A disused railway line stands on, and adjacent to, the eastern Survey Site boundary. The established boundary habitats to the Operational Area and wider Survey Site, particularly the willow carr elements, phase into the wider off-site habitats as described below.

2.3 Off-Site Habitats

The Survey Site is directly surrounded by habitats associated with three designated sites, which also encapsulate internal boundary habitats within the Survey Site to varying degrees (**Figure 2a** & **Figure 2b**). These designated sites are:

- Brenley Common & Goss and Tregoss Moors Special Area of Conservation
- Mid Cornwell Moors Special Site of Scientific Interest
- Gos Moor National Nature Reserve

Habitats present within the wider off-site designated sites include a mosaic of willow carr, scrub, heathland, species-rich grasslands, mire and fen. An off-site pasture field is located directly to the south-west of the Survey Site which is not within the boundaries of the designated sites. Specific details of the designated sites are provided in **Section 5.0.**

The River Fal flows from northeast to southwest, passing within 10m of the western Survey Site boundary. Within the wider landscape, farmsteads, villages and mine workings are abundant to the south and east.

3.0 Legislation and Policy

3.1 Statutory Legislation

A summary of potentially relevant legislation is outlined in **Appendix 3**.

3.2 Planning Policy

3.2.1 National Planning Policy Framework

The National Planning Policy Framework ('NPPF') (MoHCLG, 2021) sets out the Government's planning policies for England and how these are expected to be applied. With respect to habitats and biodiversity, Section 15 of the NPPF requires local planning authorities, plans and policies to protect and enhance sites of biodiversity in paragraph 179(a) and to minimise impacts on and provide measurable net gains for biodiversity in paragraph 179(b).

When determining planning applications, the NPPF requires local planning authorities to apply the following principles in paragraph 180(a)-(d):

a) If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

b) Development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

c) Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

d) Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

The NPPF also states in paragraph 181(a)-(c) that the following should be given the same protection as habitats sites:

a) potential Special Protection Areas and possible Special Areas of Conservation;

b) listed or proposed Ramsar sites; and

c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

The NPPF concludes in paragraph 182 that 'the presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site'.

3.2.2 Local Planning Policy

The Survey Site lies within the jurisdiction of Cornwall Council.

The Cornwall Local Plan, adopted in November 2016, identifies the following planning policies in respect of biodiversity:

Policy 23: Natural Environment

1. Development proposals will need to sustain local distinctiveness and character and protect and where possible enhance Cornwall's natural environment and assets according to their international, national and local significance.

2. Cornish Landscapes
Development should be of an appropriate scale, mass and design that recognises and respects landscape character of both designated and un-designated landscapes. Development must take into account and respect the sensitivity and capacity of the landscape asset, considering cumulative impact and the wish to maintain dark skies and tranquillity in areas that are relatively undisturbed, using guidance from the Cornwall Landscape Character Assessment and supported by the descriptions of Areas of Great Landscape Value. In areas of undeveloped coast, outside main settlements, only development requiring a coastal location and that cannot be achieved elsewhere, will be acceptable.

2(a). The Cornwall and Tamar Valley Area of Outstanding Natural Beauty
Great weight will be given to conserving the landscape and scenic beauty within or affecting the setting of the AONB. Proposals must conserve and enhance the landscape character and natural beauty of the AONB and provide only for an identified local need and be appropriately located to address the AONB's sensitivity and capacity. Proposals should be informed by and assist the delivery of the objectives of the Cornwall and Tamar Valley AONB Management Plans including the interests of those who live and / or work in them. Major development in the AONB will be refused subject to the tests of exceptional circumstances and where it can be demonstrated that the development is in the public interest as set out in national policy.

2(b) The Heritage Coast and Areas of Great Landscape Value
Development within the Heritage Coast and / or Areas of Great Landscape Value should maintain the character and distinctive landscape qualities of such areas.

3. Biodiversity and Geodiversity
Development should conserve, protect and where possible enhance biodiversity and geodiversity interests and soils commensurate with their status and giving appropriate weight to their importance. All development must ensure that the importance of habitats and designated sites are taken into account and consider opportunities for the creation of a local and county-wide biodiversity network of wildlife corridors which link County Wildlife Sites and other areas of biodiversity importance, helping to deliver the actions set out in the Cornwall Biodiversity Action Plan.

3 (a). European Sites
The highest level of protection will be given to potential and existing Special Protection Areas, candidate and existing Special Areas of Conservation and listed or proposed Ramsar sites. Proposals having an adverse impact on the integrity of such areas that cannot be avoided or adequately mitigated to remove any adverse effect will not be permitted other than in exceptional circumstances. These circumstances will only apply where there are: a) no suitable alternatives; b) imperative reasons of overriding public interest; and c) necessary compensatory provision can be secured to ensure that the overall coherence of the Natura 2000 network of European sites is protected. Development will only be permitted where the Council is satisfied that any necessary mitigation is included such that, in combination with other development, there will be no adverse effects on the integrity of European Nature Conservation Sites.

3(b). National Sites
Development proposals within or outside an SSSI or Marine Conservation Zone which would be likely to adversely affect the site (either individually or in combination with other developments) will not be permitted unless the benefits of the development, at this site, clearly outweigh both the adverse impacts on the site and any adverse impacts on the wider network of SSSIs and Marine Conservation Zones.

3 (c). Local Sites
Development likely to adversely affect locally designated sites, their features or their function as part of the ecological network, including County Wildlife Sites, Local Geological Sites and sites supporting Biodiversity Action Plan habitats and species, will only be permitted where the need and benefits of the development clearly outweigh the loss and the coherence of the local ecological network is maintained.

3(d). Priority species and habitats
Adverse impacts on European and UK protected species and Biodiversity Action Plan habitats and species must be avoided wherever possible (i) subject to the legal tests afforded to them, where applicable (ii) otherwise, unless the need for and benefits clearly outweigh the loss.

3(e). Ancient woodland and veteran trees
Development must avoid the loss or deterioration of ancient woodland and veteran trees, unless the need for, or benefits of, development on that site clearly outweigh the loss.

4. Avoidance, mitigation and compensation for landscape, biodiversity and geodiversity impacts
Development should avoid adverse impact on existing features as a first principle and enable net gains by designing in landscape and biodiversity features and enhancements, and opportunities for geological conservation alongside new development. Where adverse impacts are unavoidable they must be adequately and proportionately mitigated. If full mitigation cannot be provided, compensation will be required as a last resort.

Policy 25: Green Infrastructure
The existing green infrastructure network in Cornwall, which is important to recreation, leisure, community use, townscape and landscape quality and visual amenity will be protected and enhanced. Development proposals should contribute to an enhanced connected and functional network of habitat, open spaces and waterscapes by:

1. Retaining and enhancing the most important environmental infrastructure assets and connections that contribute to the functionality of networks of ecosystems and our Strategic Environmental Infrastructure Network in their existing location; and

2. Demonstrating that all the functional environmental infrastructure and connections have been taken into account in the design of the scheme or site layout, including impacts on ecosystem services; biodiversity; coastal processes and recreation within and near to the application site and show how this understanding has positively contributed to place making and influenced the proposal; and

3. Providing appropriate buffers to natural spaces that have community, biodiversity and heritage significance; and

4. Restoring or enhancing connectivity for nature and people through the site and linking to adjacent sites or green routes, helping to provide better links between urban and rural landscapes and coastal areas, creating accessible and attractive places for communities to make regular contact with the natural environment; and

5. Providing accessible and good quality open space and where applicable improved access to coastal space; and

6. Providing clear arrangements for the long-term maintenance and management and/or enhancement of the green infrastructure assets. In exceptional circumstances where retention of the most important green infrastructure assets and connections is outweighed by the benefits arising from the development proposals and they cannot be retained on site, the loss resulting from the proposed development should be replaced by equivalent or better provision in terms of quantity and quality of ecological or open space value in a suitable location.

3.3 Biodiversity Action Plans

The UK Biodiversity Action Plan has been replaced by national biodiversity strategies for England, Wales and Scotland. Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services (DEFRA, 2011) has moved away from the habitat and species-based approach and clearly defined targets of a biodiversity action plan and concentrates instead on landscape-scale conservation with an overall target of halting biodiversity loss by 2020. Guidance on national priority habitats and species now comes from the list of Habitats and Species of Principal Importance in England, identified under Section 41 of the Natural Environment & Rural Communities Act 2006.

The 'UK Post-2010 Biodiversity Framework' was published in 2012 (JNCC, 2012). Whilst the UK BAP partnership no longer operates, many of the tools developed under UK BAP remain of use and the lists of priority species and habitats agreed under UK BAP still form the basis of local biodiversity protection and enhancement.

Cornwall's Biodiversity Action Plan (Local BAP) lists the local priority habitats for which conservation targets have been developed. Priority habitats of potential relevance to the Survey Site include wet woodland, lowland mixed deciduous woodland and standing open water. Priority species which may occur within the Survey Site include birds, bats, otter, water vole, reptiles and invertebrate species and dormouse.

4.0 Survey Methodology

4.1 Desktop Study

The Multi Agency Geographical Information for the Countryside (MAGIC) website was accessed on 22nd June 2021 for locations of statutory nature conservation sites within 2km of the Survey Site.

The Environmental Records Centre for Cornwall and Isles of Scilly (ERCCIS) was contacted on 24th May 2021 for records of non-statutory nature conservation sites and protected/notable species within 2km of the Survey Site.

4.2 Field Surveys

4.2.1 Extended Phase 1 Habitat Survey Methodology

Methodology

A detailed walkover of the Survey Site was undertaken on 13th May 2021 by LSC ecologist Ian Stephens MSc ACIEEM to identify macro-habitats present and record target notes of interest, broadly following the 'Extended Phase 1' methodology as set out in CIEEM Guidelines for Preliminary Ecological Appraisal (2017) and the JNCC Handbook for Phase 1 Habitat Survey (2010) guidelines.

Surveyor Competence

The Phase 1 survey was undertaken by Ian Stephens MSc ACIEEM. Ian has over 10 years' experience in undertaking a range of ecological surveys and assessing the factors that affect ecology in relation to construction and the built environment. Ian also holds a Natural England survey licence for bats (Class Licence WML-CL17 Level 1) and great crested newts (WML-CL08 Level 1).

Habitat Classification

Habitats were classified following the JNCC guidelines where possible and species lists for the broad habitat areas were compiled. Plant nomenclature follows Stace (2019). The UK priority species/Red Data book/locally important species lists were used to establish the status of any rarer plants, animals or invertebrates, if recorded during the survey.

The Phase 1 survey considered relevant aspects of ecology in order to provide sufficient detail to:

- Identify and assess the overall habitat pattern of the Survey Site and associated linkages relevant to the proposals, highlighting the terrestrial habitats present
- Assess the current ecological status and sensitivity, particularly in relation to any statutory or non-statutory designations where appropriate

- Undertake a preliminary assessment for the presence or possible presence of protected species (dedicated surveys were not within the scope of the Phase 1 survey)
- Undertake an *initial assessment* for commonly encountered invasive species such as Japanese knotweed, giant hogweed and Himalayan balsam or notifiable floral species (a detailed survey would not be within the scope of the phase 1 survey)
- Provide recommendations for further survey and/or mitigation measures, if necessary

Period of Validity

The Phase 1 survey results are considered valid for 18 months following the completion, provided there is no significant change in management regime on the Survey Site. This is an estimate based on the ecological character of the Survey Site and the habitats present. Individual Local Planning Authorities (LPAs) and Statutory Bodies may apply their own criteria to the period of time for which a survey remains valid.

4.2.2 Preliminary Protected Species Survey

The Phase 1 survey was used to assess the potential of the Survey Site and, where appropriate, the surrounding landscape, to support a range of protected species, based on the suitability of the habitats present. Species would potentially include:

- Bats
- Breeding birds
- Dormouse
- Great crested newts
- Reptiles
- Otter
- Water vole
- White-clawed crayfish

4.2.3 [redacted]

[redacted]

4.2.4 Great Crested Newt (GCN) Habitat Suitability Index (HSI) Assessment and eDNA Surveys

The HSI and eDNA surveys were undertaken on 13th May 2021 by licenced GCN worker (WML-08 Level 1) Ian Stephens (Class Reference 2020-44802-CLS-CLS).

The aim of the GCN surveys was to:

- Determine presence/absence of GCN in the onsite lake using the eDNA survey method
- Assess the general suitability and condition of accessible ponds for GCN using the Habitat Suitability Index survey method

The survey methodology, limitations and data are provided in **Appendix 4**.

4.3 Assessment of Ecological Value

Where sufficient evidence was gathered during the site surveys, the value of ecological receptors is determined using standardised methodology based on guidance provided by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018) and Assessment Criteria guidance published within The Design Manual for Roads and Bridges (DMRB, 2020).

Table 01. The criteria used for determining the ecological value of site receptors, based on a geographical form of reference (Source: CIEEM 2018 and DMRB, 2020).

Ecological Value	Frame of Reference
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.

Ecological Value	Frame of Reference
Negligible	Very low importance and rarity, local scale.

4.4 Zone of Influence (ZOI)

The Zone of Influence (ZOI) is the area within which the ecological impacts arising from a development are likely to be significant. Due to the nature of the Proposed Development, the Key ZOI for the Survey Site is identified as the site and the habitats which immediately bound it.

The sensitivity and value of offsite statutory and non-statutory sites mean that the potential for impacts arising from the Proposed Development should be considered within a wider ZOI. However, scoping for direct and indirect impacts to designated sites is conducted within a ZOI of 2km of the Survey Site.

4.5 Limitations

The Phase 1 survey was undertaken on 13th May 2021. Sufficient data was obtained to confidently describe the broad habitat associations present within the Survey Site.

The presence of livestock within areas of the improved pasture fields surrounding the Operational Area of the Survey Site limited the assessment of the surrounding off-site scrub habitats.

The dense, unmanaged, and sometimes water-logged nature of the willow carr habitats within the Survey Site limited direct access. Consequently, descriptions of the habitats and their species composition are based on those areas that were accessible and/or visible.

5.0 Baseline Results

5.1 Desktop Study

5.1.1 Statutory Nature Conservation Sites

The Survey Site is directly surrounded by habitats associated with three designated sites, which also encapsulate internal boundary habitats within the Survey Site, to varying degrees.

The extent of all combined designated sites in relation to the Survey Site is illustrated on **Figure 2a.** The extent of individual designated sites in relation to the Survey Site is illustrated on **Figure 2b**. The majority of the designated site boundaries overlap, as illustrated on Figure 2b.

Both plans show the extent of the Survey Site, as illustrated by the red line boundary (Site Boundary), which is understood to form the current landownership for the National Grid Sub-Station Site.

The designation type, site name and qualifying habitats and species for each designated site, as illustrated on both plans, is detailed in Table 02, below.

Table 02: Statutory Designated Sites within 2km

Designation	Site Name	Qualifying Habitats and Species
Special Area of Conservation (SAC)	Breney Common and Goss & Tregoss Moors	HABITATS • North Atlantic wet heaths • European dry heaths • Transition mire and quaking bogs SPECIES • Marsh fritillary butterfly *Euphydryas aurinia*
Site of Special Scientific Interest (SSSI)	Mid-Cornwall Moors	HABITATS • Wet and dry lowland heathland • Lowland fens (including habitats often referred to as mires, swamps and bogs) • Wet and dry broad-leaved woodlands • Species-rich neutral grasslands SPECIES • An assemblage of nationally rare and nationally scarce flowering plants and ferns • Populations of Cornish eyebright *Euphrasia vigursii*, coral-necklace *Illecebrum verticillatum*, chamomile *Chamaemelum nobile*, lesser butterfly-

Designation	Site Name	Qualifying Habitats and Species
		orchid *Platanthera bifolia*, chaffweed *Centunculus minimus*, lesser water-plantain *Baldellia ranunculoides* and allseed *Radiola linoides* • Marsh fritillary butterfly *Euphydryas aurinia* • Assemblage of invertebrates chiefly associated with scrub heath and moorland • Populations of the water beetle *Hydrochus nitidicollis* and the mud snail *Omphiscola glabra* • Breeding willow tit *Poecile montanus* • Geological features that demonstrate the mineralisation which occurs at the latest stage of granitic emplacement
National Nature Reserve (NNR)	Goss Moor	Dry and wet heath, mire, fen and open water, and a diverse mix of wildlife habitats, as per the SSSI qualifying features

5.1.2 Non-Statutory Nature Conservation Sites

No non-statutory wildlife sites are located within, or adjacent to, the Survey Site.

Seven non-statutory sites are located within 2km of the Survey Site, details of which are provided in Table 03 below.

Table 03: Non-Statutory Designated Sites within 2km

Designation	Site Name	Distance/Direction
County Wildlife Site (CWS)	Ennis Worgey	1.4km N
Roadside Bio	115 Biological	800m NW
Roadside Bio	116 Biological	800m NW
Roadside Bio	184 Biological	900m N
Roadside Bio	185 Biological	1.3km NE
Roadside Bio	257 Biological	1.3km NE
Roadside Bio	275 Biological	1.3km NE

5.1.3 Protected and Notable Species

Protected and notable species records returned by ERCCIS are detailed in Section 5.3.

5.2 Survey Site Habitat Audit

An audit of Survey Site habitats is provided below using the Extended Phase 1 Habitat Survey methodology.

Figure 01 illustrates the location of habitats within the Survey Site only. The Target Notes are included within **Appendix 1**. Latin nomenclature is provided in Appendix 1 and not included with the text below, to enhance readability. Site Photographs are provided in **Appendix 2**.

The extent of all combined designated sites in relation to the Survey Site is illustrated on **Figure 2a.** The extent of individual designated sites in relation to the Survey Site is illustrated on **Figure 2b**.

SURVEY SITE HABITATS

5.2.1 Built Habitats (TN1)

The centre of the Survey Site is occupied by the Operational Area of the National Grid Sub-Station Site. Habitats present within the Operational Area include occupied and actively used buildings, infrastructure and hardstanding including the access road to the south.

The built habitats within the Survey Site, TN1, are not located within the boundaries of the identified designated sites.

5.2.2 Improved Grassland (Pasture) Fields (TN2)

Four linked agriculturally improved pasture fields surround the Operational Area. At the time of the survey, the fields were of a similar habitat structure with an even sward grazed by livestock to approximately 5-10cm in height.

Perennial rye grass was abundant but not dominant within the swards, with sweet vernal grass, meadow grasses and Yorkshire fog also recorded. To the north, tussocks of soft rush occurred along with occasional cuckoo flower. Elsewhere, the herbaceous component of the sward was restricted to an assemblage of ruderal and agricultural species including common nettle, docks, clover and creeping buttercup.

The improved pasture fields within the Survey Site, TN2, are directly adjacent to, but not located within, the boundaries of the identified designated sites.

5.2.3 Dense Continuous Scrub (TN3)

Unmanaged mixed willow and gorse scrub occurs to the south of the Operational Area, below power lines which cross the Survey Site. The habitat fringes into dense willow carr to the east, south and west. The scrub is dense in places with more open areas occurring between establishing bramble where marsh thistle, burnet saxifrage, wild strawberry and soft rush were recorded.

The dense continuous scrub habitats within the Survey Site, TN3, are partly located within the identified designated sites, comprising a thin corridor off the southern Survey Site boundary and a more expansive area to the eastern Survey Site corner.

5.2.4 Plantation Broadleaf Woodland (TN4)

Plantation broadleaf woodland stands to the south of the Operational Area on either side of the access road, with a stand of plantation woodland also located directly to the east of the Operational Area.

The plantation woodland to the east of the access road and east of the Operational Area has an estimated canopy height of 20m with individual trees displaying trunk diameters at breast height (DBH) of approximately 0.30m DBH. Sycamore was abundant within the canopy, with alder also recorded and occasional elm. Non-native pines were present but were estimated to comprise below 10% of the canopy. Many of the canopy trees supported a significant amount of ivy cover. The woodland understorey was absent, and the field layer was dominated by bramble, nettle and cleavers with honeysuckle occasionally present.

The plantation woodland to the west of the access road is of a similar age and height to that to the east. The woodland was dominated by hybrid poplar with occasional sycamore and non-native pines also present and supported a field layer dominated by bramble.

The plantation broadleaf woodland within the Survey Site, TN4, is directly adjacent to, but not located within, the boundaries of the identified designated sites.

5.2.5 Plantation Broadleaf Woodland (TN5)

Located to the north-eastern boundary of the Survey Site is a further stand of plantation broadleaf woodland. Sycamore was abundant with occasional alder forming the canopy which had an estimated height of 25m. No significant woodland understorey was present. The field layer was dominated by bramble with wood avens and cleavers also recorded, along with occasional ferns. A bare earth cycle track had been created within the woodland.

The plantation broadleaf woodland within the Survey Site, TN5, is partly located within the boundaries of the identified designated sites, comprising a thin

corridor along the eastern Survey Site boundary.

5.2.6 Dense Continuous Scrub – Willow Carr (TN6)

Extensive areas of unmanaged dense willow carr, dominated by grey willow, lies towards the south-eastern, eastern and western boundaries of the Survey Site.

Where accessible, the willow carr was growing predominantly on wet ground to the southeast of the Survey Site and adjacent to the River Fal to the west, but also extending on to higher and drier ground to the west in closer proximity to the improved pasture fields (TN2). Occasional scattered mature willow trees up to 15m in height occurred within the willow carr.

To the south-east and east of the Survey Site no distinct understorey was recorded within the willow carr. To the west of the Survey Site areas of taller willow carr occurred where an understorey, including coppiced hazel and occasional hawthorn and blackthorn shrubs, was recorded.

The field layer of the willow carr was diverse to the west, with herb Robert, lesser celandine, wild celery, sheep's sorrel, wood avens, meadow sweet, cuckooflower, red campion, English bluebell as well as ferns, with hart's tongue, hard fern and male fern, being recorded. Bracken was locally dominant in one area to the east. In wetter locations, horsetail was seen to be locally abundant, with ferns and rushes also present.

The willow carr habitats within the Survey Site, TN6, are partly located within the boundaries of the designated sites. This comprises all of this habitat type to the west and a large proportion of this habitat type to the south-east and east.

5.2.7 Standing Water (TN7)

A lake is located towards the west of the Survey Site, apparently occupying former mine workings. To the west, the lake extends towards the River Fal with low ground supporting dense willow scrub. The ground rises towards the east of the lake to form scrub covered cliffs which extend to the water's edge. The depth of the lake could not be determined at the time of survey.

Only a minor amount of aquatic vegetation could be seen within the lake at the time of the survey comprising a limited area of water lily pads recorded at the southwest corner of the lake. No emergent vegetation was identified. The lake is actively used for fishing and is likely to be stocked with fish for this purpose.

The lake within the Survey Site, TN7, is wholly located within the boundaries of the identified designated sites.

5.2.8 Plantation Mixed Woodland (TN8)

Minor stands of mixed plantation woodland are located around the cliff top to the east and south of the lake (TN7). Non-native pines, sycamore and ash were

recorded forming the canopy which was estimated to be up to 20m in height. Where accessible, the understorey was seen to be sparse and comprised hazel, blackthorn and hawthorn with bramble and ivy abundant below. Harts tongue fern was occasionally present.

The plantation mixed woodland within the Survey Site, TN8, is wholly located within the boundaries of the identified designated sites.

5.2.9 Disused Railway Line (TN9)

A disused railway line aligned approximately north to south, lies in proximity to the eastern Survey Site boundary. A well-used footpath follows the track bed which is raised above the surrounding habitats on an embankment. Occasional mature trees and scrub stand at the crest of the embankment on either side of the path. Species recorded included sycamore, willow, hazel, blackthorn, hawthorn. The field layer comprised ruderal herbs including docks, cleavers, nettle, hogweed and ivy. Pendulous sedge was locally abundant.

The disused railway line within the Survey Site, TN9, is wholly located within the boundaries of the identified designated sites.

5.3 Off-Site Habitats

5.3.1 River Fal

The River Fal flows approximately 10m to the west of the Survey Site. The channel was approximately 4m wide with an estimated depth of 60cm. The banks were of variable height and slope with some vertical sections up to 60cm high. The channel was heavily shaded by adjacent scrub/trees and no aquatic vegetation was observed. The substrate included silt with occasional stones also visible.

The River Fal where in proximity to the Survey Site, TN9, is located within the boundaries of the identified designated sites.

5.3.2 Other Habitats

Where off-site habitats directly surrounding the Survey Site could be observed, these appeared to be continuous to the willow carr habitats within the Survey Site. As previously described, these surrounding off-site habitats are located within the boundaries of the identified designated sites.

To the southeast of the Survey Site is a pasture field which is not located within the boundaries of the identified designated sites.

5.4 Preliminary Protected Species Survey

5.4.1 [redacted]

5.4.2 Bats

Background Records

ERCCIS provided 25 records of bat roosts within 2km of the Survey Site, none of which specifically relate to the Survey Site itself.

Roosting Opportunities – Trees

No trees within the Survey Site were, at the time of survey, obviously seen to support Potential Roost Features (PRFs) such as lifting bark, knot holes and splits. The trees within the stands of plantation woodland were generally in good condition with narrow trunks and were considered unlikely to support PRF's. A detailed assessment of individual trees was not within the scope of the current assessment, as no trees are currently proposed for removal to facilitate the Proposed Development.

Roosting Opportunities – Buildings

Buildings within the Survey Site are limited to those within the Operational Area of the National Grid Sub-Station Site which could not be accessed during the

survey; however, these buildings would not be directly affected by the Proposed Development.

Foraging and Commuting Habitat

The woodlands, scrub and lake habitats within the Survey Site provide an abundance of potential foraging habitat for bats and provide connectivity to the surrounding landscape which includes more extensive areas of suitable foraging habitat and potential for roost locations.

5.4.3 Great Crested Newts

Background Records

ERCCIS provided no records of great crested newts (GCN) *Triturus cristatus* within 2km of the Survey Site.

Waterbodies within the Survey Site

There is one waterbody within the Survey Site, the lake TN7 (**Figure 01**).

The lake was subject to a HSI assessment on 13th May 2021 with an eDNA survey undertaken during the same site visit.

The results of the HSI assessment for the lake is provided in Table 04, below, which indicates that the waterbody is of poor suitably for GCN, principally due to the presence of fish stocks.

Table 04. GCN HSI assessment results

Pond Reference	HSI Score	Relationship to the Survey Site
TN7	0.32 (Poor)	Onsite

The analysis of the eDNA samples in May 2021 for the lake provided a negative result **indicating an absence of GCN within the waterbody**.

Full results relating to the HSI assessment and eDNA surveys for the lake is provided in **Appendix 4**.

Ponds within 250m of the Survey Site

Reference to current Ordnance Survey mapping indicates that there are no ponds within 250m of the Survey Site.

Suitability of Terrestrial Habitats within the Survey Site

The woodland and scrub habitats within the Survey Site would provide suitable terrestrial habitat for GCN; however, given the negative eDNA result for the on-site lake, the lack of ponds within 250m and the lack of GCN records within 2km,

GCN are considered highly likely to be absent from the Survey Site habitats.

GCN are determined to not be a constraint to the Proposed Development and are not considered any further within this report.

5.4.4 Reptiles

Background Records

ERCCIS returned 18 records of reptiles within 2km of the Survey Site including all four of the UK common reptile species: adder *Vipera berus*, grass snake *Natrix natrix*, common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*.

Habitat Assessment

Within the Survey Site, habitat interfaces between improved pasture fields and woodland/scrub habitats, along with clearings within woodlands and scrub, provide suitable areas for reptiles to bask. The woodland and scrub habitats also provide suitable foraging and shelter opportunities for reptiles. Reptiles are less likely to be present within the improved pasture fields other than towards the margins, as the prevailing sward is species-poor and the structure homogenous; without tussocks or a well-developed thatch. However, individual or very low numbers of reptiles may be present within improved pasture fields on an infrequent transitory or exploratory basis.

5.4.5 Birds

Habitat Assessment

Woodland and scrub habitats within the Survey Site provide abundant foraging and nesting opportunities for a range of bird species, which may include more specialist species such as nesting willow tit *Poecile montanus*, which are known to occur within the willow carr habitats of the identified designated sites.

The lake provides potential foraging habitat for kingfisher *Alcedo atthis* and other piscivorous species.

There may be the potential for ground nesting birds such as skylark *Alauda arvensis* and meadow pipit *Anthus pratensis* to nest within the improved pasture fields, although the proximity of established boundary woodlands and scrub may be a limiting factor, due to the potential for such habitats to harbour predators.

5.4.6 Water Vole

Background Records

ERCCIS provided no records for water vole *Arvicola amphibius* for within 2km of the Survey Site.

Habitat Assessment

Potential water vole habitat within the Survey Site is limited to the lake. However, little bankside vegetation and no aquatic vegetation was recorded within the lake at the time of survey. Consequently, the available foraging resources for water vole within the lake are limited. The banks and substrate of the lake were stony and thus sub-optimal for burrow creation by water vole.

The banks of the River Fal, located within 10m of the western Survey Site boundary, provide occasional sections of vertical bank which may be suitable for burrow creation by water vole. However, potential foraging resources in the form of aquatic/emergent vegetation is largely absent due to the dense shading the surrounding established woodland and scrub canopy.

5.4.7 Otter

Background Records

ERCCIS provided 26 records of otter *Lutra lutra* within 2km of the Survey Site.

Habitat Assessment

The lake within the Survey Site is likely to be stocked with fish. As such, the lake would provide foraging resources for the local otter population as part of a wider territorial range.

The dense and unmanaged scrub habitats within the Survey Site provide suitable habitat for resting otters including potential below-ground holts. However, there was no immediate evidence of such sheltering features at the time of survey, where access could be gained.

The River Fal corridor, located within 10m of the western Survey Site boundary, provides connectivity for otters between the Survey Site and other suitable habitats within the surrounding landscape.

5.4.8 Hazel Dormouse

Background Records

ERCCIS provided 14 records of dormouse *Muscardinus avellanarius* within 2km of the Survey Site, including four records from within, or adjacent to, the Survey Site dating from 2014 to 2019.

Habitat Assessment

The areas of dense continuous scrub which occupies boundary habitats to the Survey Site provides suitable foraging and shelter habitat for hazel dormice. Hazel, a significant foraging resource for the species was seen to be abundant in at least some locations within the areas of dense scrub. The plantation

woodlands also provide habitat for dormice, although these habitats are typically sub-optimal due to the absence of a significant understorey.

The Survey Site is directly connected to extensive areas of potentially suitable dormouse habitat within the surrounding landscape.

5.4.9 White-Clawed Crayfish

Background Records

ERCCIS provided no records for white-clawed crayfish *Austropotamobius pallipes* (WCC).

It is understood from on-line literature that WCC are known to be absent from Cornwall. As such WCC are assumed to be absent from the lake within the Survey Site and the species is not any considered further within this report.

5.4.10 Other Protected Species

Where not waterlogged, the mosaic of habitats within the Survey Site are considered suitable to support hedgehogs *Erinaceus europaeus* of which ERCCIS provided 12 records from within 2km of the Survey Site.

There is the potential that the scrub habitats within the Survey Site, particularly the willow carr, may provide potential for the water beetle *Hydrochus nitidicollis* and the mud snail *Omphiscola glabra* invertebrates which are known to occur within the identified designated sites.

5.5 Invasive Species

No obvious evidence of commonly occurring invasive species, such as giant hogweed *Heracleum mantegazzianum* or Japanese knotweed *Reynoutria japonica*, were identified during the Phase 1 survey. An exhaustive survey was, however, not within the scope of this assessment.

6.0 Impact Assessment and Recommendations

6.1 Proposed Development

The 'Proposed Development' is for the construction and operation of a battery energy storage system (BESS) with a total import capacity of 100 megawatts (MW), within part of the Survey Site (see submitted plans). The design of the battery is split into two separate 50MW battery sites each comprising approximately half of the total site area. The battery site contains a range of equipment including the battery units themselves (these are generally containerised but a specific model will not be known until post-consent), typically set out in uniform rows throughout the site, as well as electrical transformer units, acoustic fencing and CCTV cameras. The development will also include a planting buffer of approximately 15m on all boundaries apart from the south. All site access (construction and operational) will be via an existing, purpose-built access track that connects to the National Grid substation track and eventually Domellick Hill (B3279).

6.2 Designated Sites and Habitats

6.2.1 Summary of Ecological Value of Designated Sites

Sections of peripheral habitats within the Survey Site fall within the boundaries of one or more of the three identified designated sites, as illustrated in **Figures 02a** & **02b**. The ecological value of these designated sites and habitats are described in Table 05 below:

Table 05: Statutory Designated Sites within the Survey Site – Summary of Ecological Value

Designation	Site Name	Geographical Importance	Ecological Value
Special Area of Conservation (SAC)	Breney Common and Goss & Tregoss Moors	International	**VERY HIGH**
Site of Special Scientific Interest (SSSI)	Mid-Cornwall Moors	National	**HIGH**
National Nature Reserve (NNR)	Goss Moor	National	**HIGH**

6.2.2 Mitigation-by-Design – Avoidance of Direct Impacts to Designated Sites

In accordance with the Mitigation Hierarchy and Policy 23 of the Cornwall Local Plan, direct and adverse impacts to adjacent designated sites have been avoided through siting the Proposed Development footprint, to include the BESS, High

Voltage (HV) cable route and access roads, within the existing areas of improved pasture fields and hard standing. These habitats do not fall within the boundaries of the adjacent designated sites as identified within Table 05 and illustrated in **Figures 02a** & **02b**.

The Proposed Development, will therefore, not require any direct net loss of SAC, NNR or SSSI habitats to facilitate its construction and implementation.

In addition, a 15m development buffer zone will be located between the BESS and the adjacent designated sites, along the north-western, northern and north-eastern development boundaries (see submitted plans). No further buffer zones are required, as all other boundaries to the BESS will border the existing Operational Area of the National Grid Sub-Station Site.

The landscaping treatment of the 15m buffer zone is described in Section 6.2.4.

6.2.3 Consideration of Potential Indirect Impacts to Designated Sites

Construction Phase

The submitted Transport Statement indicates the construction phase will last approximately 16-24 weeks, with a total of 38 vehicular movements per day. Traffic will, however, utilise existing access roads within the National Grid Sub-Station Site and the new access road identified within the Proposed Development.

In the absence of mitigation, there is the potential for indirect adverse impacts to adjacent designated sites arising during the construction phase of the Proposed Development. Such impacts may include:

- Accidental ingress of machinery and workers into designated site habitats, causing damage and disturbance;
- Damage to tree roots associated with excavation works;
- Pollution incidents such as the spillage of chemicals into designated habitats causing damage;
- Disturbance to designated habitats and species as a result of general construction works (i.e. noise, vibrations, lighting, accumulation of discarded waste materials).

It is considered that the above impacts can be suitably mitigated through the production and subsequent implementation of a site-wide Construction Ecological Management Plan (CEMP). Further broad details of the CEMP requirements are provided in Section 6.2.5.

Potential impacts to tree roots should be mitigated through the production and subsequent implementation of an Arboricultural Method Statement (AMS) and Tree Protection Plan (TPP) during the construction phase.

If the CEMP, AMS & TPP is fully implemented during the construction phase of the Proposed Development, no likely significant effects to adjacent designated sites are predicted.

Operational Phase

Loss of Improved Pasture Fields and Hard Standing Habitats

The Proposed Development and associated Landscaping Proposals will directly affect existing improved pasture fields and hard standing habitats located outside of the boundaries of adjacent designated sites.

The improved pasture habitats are considered to be of low ecological value due to the dominance of agricultural grasses and low diversity of common herb species resulting in a species-poor sward, as well as the poor structural diversity of the sward as a result of frequent grazing. The hard standing habitats are sealed surfaces in good structural condition and are therefore considered to be of negligible ecological value.

The improved pasture and hard standing habitats directly affected by the Proposed Development are not typical resource components of the adjacent designated sites, which in comparison support species-rich neutral grasslands and heathland habitats of significantly higher ecological value. Furthermore, the improved pasture and hard standing habitats would not provide suitable resources for the various qualifying features (species) the designated sites support, such as marsh fritillary butterfly, breeding willow tit and aquatic invertebrates.

No likely significant impacts are, therefore, predicted to adjacent designated sites, as a result of the permanent removal of the existing improved pasture and hard standing habitats, to facilitate the Proposed Development.

Artificial Lighting

It is understood that no artificial lighting is proposed; therefore, impacts to designated sites, habitats and associated species as a result of artificial light spill will not occur.

Noise

It is understood that noise impacts emitted from the Proposed Development will be below the existing background levels of the current Operational Area of the National Grid Sub-Station Site. No noise impacts to protected species are therefore predicted for designated sites.

Other Operations

The submitted Transport Statement indicates that traffic movements within the Proposed Development during the operational phase will be minimal, restricted

to two per day on two occasions per months. Traffic will use the existing access roads within the National Grid Sub-Station Site and those identified within the Proposed Development. General operations would be restricted to the proposed BESS area and access roads only and are not expected to have any direct or indirect impacts to designated sites and habitats.

6.2.4 Landscaping Proposals

The submitted Landscaping Proposals allow for the planting of mixed native scrub compartments within the 15m buffer zone of the Proposed Development, which would be bounded by margins of wildflower meadow over the existing improved grassland sward. A similar area of landscaping is proposed to the south-west of the Survey Site which is located within the Application Boundary of the Proposed Development.

The submitted Landscaping Proposals aim to strengthen the existing Green Infrastructure resource within the Survey Site and associated mosaic habitats present within the surrounding designated sites.

A Biodiversity Net Gain assessment in DEFRA Metric 3.0 has been carried out for the Proposed Development and submitted with an accompanying separate report, which provides further justification for the Landscape Proposals and outline habitat implementation and management measures.

6.2.5 Recommendations

The following recommendations are provided:

Methodology or Compliance Recommendation: The following recommendations are provided for designated and non-designated habitats within, and adjacent to, the Survey Site during the construction phase of the Proposed Development.

1. The production of a site-wide **Construction Ecological Management Plan** (CEMP) to include:

- A risk assessment of potentially damaging construction activities to habitats;
- The identification of 'biodiversity protection zones' and specifications for protective fencing, barriers and warning signs as appropriate;
- Practical measures to avoid or reduce impacts to habitats during construction;
- The location and timing of works to avoid harm to sensitive habitats;
- Appropriate measures to control construction lighting, noise, plant movement, run-off, waste and the potential for contaminants;

2. The production of an **Arboricultural Method Statement** and **Tree Protection Plan** in accordance with BS 5837:2012 to protect trees and tree roots during the construction phase.

3. The production of a **Landscape and Biodiversity Management Plan** to ensure the successful establishment and long-term management of all enhanced and created habitats.

It is recommended that the above documents are secured through a suitably worded planning condition or similar.

6.2.6 Summary of Impacts to Designated Sites and Consideration of Habitat Regulations Assessment

The Proposed Development will not require any direct net loss of adjacent designated sites. A 15m vegetated buffer zone is to be created between the key battery site installation and adjacent designated sites.

Recommendation measures have been provided for avoidance, and mitigation measures, which, if appropriately enacted during the construction phase, would protect adjacent designated sites from direct and indirect effects. No likely significant effects to designated sites arising from the construction phase of the Proposed Development are predicted.

The Proposed Development is for a battery energy storage system. No artificial lighting is proposed, and emitted noise levels would be below the background levels of the existing National Grid Sub-Station Site. All other operations within the Proposed Development would be minimal and restricted to the BESS site and access roads only.

In summary, no likely significant effects are predicted to the identified designated sites as a result of the Proposed Development. Therefore, a detailed Habitat Regulations Assessment in respect of the SAC component of the designated sites, or more detailed assessments of the SSSI/NNR components, are judged not to be required.

6.3 Non-Designated Habitats

6.3.1 Summary of Ecological Value

Survey Site habitats located outside of the adjacent designated site boundaries comprise:

- The Operational Area (TN1, **Figure 01**)
- The improved pasture fields (TN2)
- The plantation woodlands (TN4)

Sections of peripheral habitats to the south and east of the Survey Site, comprising scrub, willow carr and other plantation woodland (TN3, TN6, TN5 &

TN9) are located both within and outside of the identified designated sites to varying degrees, as illustrated in **Figures 02a** & **02b**.

The non-designated Operational Area TN1 (including all areas of hard standing) comprises actively-used built development and is therefore considered to be of negligible ecological value.

The non-designated improved pasture habitats TN2 support a species-poor assemblage and have been determined to be of low ecological value, as previously described.

The non-designated sections of peripheral scrub, willow carr and plantation woodland habitats TN3, TN6, TN5 & TN9 are not located within the boundaries of adjacent designated sites but share some associated habitat characteristics. Therefore, the non-designated peripheral habitats within the Survey Site are considered to be of moderate ecological value given their established nature and broad association with adjacent designated habitats.

6.3.2 Mitigation-by-Design – Avoidance of Direct Impacts to Non-Designated Habitats

As well as avoiding direct impacts to designated sites, the Proposed Development has also been designed to avoid impacts to non-designated habitats of value within the Survey Site, such as woodlands, scrub and willow carr.

The Proposed Development will only directly affect improved pasture and hard standing habitats which have been determined to be of low and negligible ecological value respectively.

6.3.3 Consideration of Potential Indirect Impacts to Non-Designated Habitats

Construction Phase

As for the designated sites and habitats, in the absence of mitigation, there is the potential for indirect adverse impacts to non-designated habitats arising during the construction phase of the Proposed Development. Such impacts may include:

- Accidental ingress of machinery and workers into designated site habitats, causing damage and disturbance;
- Damage to tree roots associated with excavation works;
- Pollution incidents such as the spillage of chemicals into designated habitats causing damage;
- Disturbance to designated habitats and species as a result of general construction works (i.e. noise, vibrations, lighting, accumulation of discarded waste materials).

It is considered that the above impacts can be suitably mitigated through the production and subsequent implementation of a site-wide CEMP. Broad details of the CEMP requirements have been provided in Section 6.2.5.

Potential impacts to tree roots should be mitigated through the production and implementation of an Arboricultural Method Statement and Tree Protection Plan during the construction phase.

Operational Phase

Artificial Lighting

It is understood that no artificial lighting is proposed therefore impacts to non-designated habitats and associated species as a result of artificial light spill will not occur.

Noise

It is understood that noise impacts emitted from the Proposed Development will be below the existing background levels of the current Operational Area of the National Grid Sub-Station Site. No noise impacts to protected species are therefore predicted within non-designated habitats.

Other Operations

The submitted Transport Statement indicates that traffic movements within the Proposed Development during the operational phase will be minimal, restricted to two per day on two occasions per months. Traffic will use the existing access roads within the National Grid Sub-Station Site and those identified within the Proposed Development. General operations would be restricted to the proposed BESS area and access roads only and are not expected to have any direct or indirect impacts to non-designated habitats.

6.3.4 Recommendations

The recommendation for a CEMP, AMS and TPP as detailed in Section 6.2.5 would include measures to protect both designated and non-designated habitats during construction phase of the proposed development.

6.4 Protected Species

6.4.1

[redacted]

Summary of Ecological Value

[redacted]

Assessment of Potential Impacts

[redacted]

Recommendations

The following recommendations are provided:

[redacted]

6.4.2 Ecological Receptor: Bats

Legislation

Bats are protected under the Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act (1981). These regulations make it an offence to capture, kill, disturb or injure bats; damage or destroy a breeding or resting place; or obstruct access to their resting or sheltering places.

Summary of Ecological Value

Established trees within plantation woodlands and in areas of scrub may support Potential Roosting Features (PRF's) for bats. Boundary woodland, scrub and lake habitats provide suitable foraging and commuting resources for local bat populations.

Assessment of Potential Impacts

The Proposed Development will affect only improved pasture and hard standing habitats and will not, therefore, require the removal of woodland, scrub and trees which provide foraging and potential roosting resources for the local bat population.

It is understood that no artificial lighting is proposed; therefore impacts to bats as a result of artificial light spill will not occur.

Measures provided as part of the Landscape Proposals would enhance the value of site habitats for the local bat population, through the provision of additional commuting and foraging resources.

Recommendations

The following recommendations are provided:

Enhancement Recommendation: Measures should be considered to enhance the value of the Survey Site for bats.

In order to enhance the availability of suitable roosting opportunities for bats post-development, a number of bat boxes should be erected on boundary trees and within woodlands. A plan illustrating the number, location, type and erection specifications of bat boxes should be secured through a suitably worded planning condition.

The bat boxes would assist in providing additional biodiversity net gain enhancements for the Proposed Development.

6.4.3 Ecological Receptor: Reptiles

Legislation

Reptiles are protected from killing and injuring under the Wildlife and Countryside Act 1981.

Summary of Ecological Value

The improved pasture fields within the Survey Site have been determined to be sub-optimal for reptiles due to the species-poor sward and the homogenous habitat structures identified. There would be a greater potential for reptiles to be present within the margins of the improved pasture fields, where these interface with scrub and woodland habitats. It has, however, been determined that individual or very low numbers of reptiles would be present within improved pasture fields on an infrequent transitory or exploratory basis at best.

Built-development and hard standing habitats within the Survey Site are determined to be unsuitable for reptiles due to being sealed surfaces in good structural condition.

The scrub, woodland and lake habitats within the Survey Site, in association with the contiguous habitats which surround the site, would provide suitable resources in which reptiles could forage, bask and shelter.

Assessment of Potential Impacts

The Proposed Development will only directly impact sub-optimal reptile habitat (improved pasture fields) or unsuitable reptile habitat (hard standing) and will not directly impact higher quality scrub, woodland and lake habitats.

Between the north-western, northern and north-eastern limits of the Proposed Development and the established scrub and woodland boundary habitats beyond, a 15m development buffer is proposed. This buffer zone will assist in mitigating impacts to potential reptile species that may be present within the interface between the improved pasture and established boundary habitats.

In the absence of mitigation, there may be the potential for residual adverse impacts, such as killing or injuring, to individual or very low numbers of reptile species during clearance works associated with the improved pasture field components. Where boundary habitats are not adequately protected during the construction phase, there is the potential for adverse impacts to reptile species such as from the accidental ingress of construction plant and machinery.

Measures provided as part of the Landscape Proposals would improve the value of site habitats for reptiles through the creation of improved foraging resources and enhanced connectivity.

Recommendations

The following recommendations are provided:

Methodology or Compliance Recommendation: Mitigation measures should be undertaken to protect reptiles during clearance works and construction operations.

The following measures should be implemented:

- As recommended in Sections 6.1 and 6.2, measures to protect retained boundary habitats should be employed where reptiles and other protected species may be present (such as the use of protection fencing).
- Habitat manipulation should be utilised to minimise the suitability of pasture habitats for reptiles immediately prior to construction through continued cattle grazing and/or targeted and controlled mowing. Where mowing is employed, this should comprise:
  - 1st phase of mowing should be no lower than 250mm with all arisings removed.
  - 2nd phase of mowing should be undertaken no less than 48hrs later to no lower than 150mm with all arisings removed – mowing should be in a directional manner towards areas of retained habitat such as boundary scrub and woodlands.
- Ecologist finger-tip searches/sweeps should be undertaken of the manipulated land prior to construction works where and if appropriate, specifically in any areas of land identified as being sensitive for reptiles by the Ecologist.
- Where excavations are made, 45-degree ramps should be created in the walls of the excavation to allow potentially trapped reptiles to escape. Excavations should also be checked prior to being filled-in and/or being worked on.
- Stored materials and skips should be located on areas of hard standing, bare ground or pallets to avoid these features attracting sheltering reptiles. Waste materials should be immediately removed off-site or placed within skips in designated areas as previously described.
- Contractor training, induction and toolbox talks should be undertaken to ensure awareness and care during the construction phase and prior to works where the Ecologist provides oversight.

The protection measures should be incorporated into the previous recommended **CEMP**.

Residual Impacts

Provided that the identified construction protection measures are implemented, this would result in a neutral impact to reptiles during the construction phase.

The Landscape Proposals would result in a beneficial impact on the local reptile population, post-development.

6.3.4 Ecological Receptor: Birds

Legislation

Under the Wildlife and Countryside Act (1981) it is an offence to intentionally kill, injure or take any wild bird; to intentionally take, damage or destroy the nest of any wild bird whilst it is in use or being built; and to intentionally take or destroy the egg of any wild bird.

Summary of Ecological Value

There may be the potential for ground nesting birds such as skylark and meadow pipit to nest within the improved pasture fields, although the proximity of established boundary woodlands and scrub may be a limiting factor, due to the potential for such habitats to harbour predators.

The scrub, woodland and lake habitats within the Survey Site, in association with the contiguous habitats which surround the site, would provide suitable resources for a wide variety of nesting and foraging bird species.

Assessment of Potential Impacts

The Proposed Development will only directly impact sub-optimal improved pasture habitats for nesting birds and will not directly impact higher quality woodland, scrub and lake habitats.

In the absence of mitigation, there may be the potential for residual adverse impacts to individual or very low numbers of ground nesting birds during clearance works associated with the improved pasture field components. Where boundary habitats are not adequately protected during the construction phase, there is the potential for adverse impacts to nesting birds such as from the accidental ingress of construction plant and machinery.

Measures provided as part of the Landscape Proposals would enhance the value of site habitats for the local bird population, through the provision of additional commuting, nesting and foraging resources.

Recommendations

The following recommendations are provided:

Methodology or Compliance Recommendation: Control measures should be undertaken to protect nesting birds during clearance works and construction operations.

Standard Good Practise to avoid impacts to nesting birds during works should include appropriate timing of clearance works; appropriate clearance methodology; and pre-clearance nesting bird checks if required.

The protection measures should be incorporated into the previously recommended **CEMP**.

Enhancement Recommendation: Measures should be considered to enhance the value of the Survey Site for birds.

In order to enhance the availability of suitable roosting opportunities for bird species post-development, a number of bird boxes should be erected on boundary trees and woodlands. A plan illustrating the number, location, type and erection specifications of bird boxes should be secured through a suitably worded planning condition.

The bird boxes would assist in providing additional biodiversity net gain enhancements for the Proposed Development.

Residual Impacts

Provided that the identified construction protection measures are implemented, this would result in a neutral impact to birds during the construction phase.

The Landscape Proposals would result in a beneficial impact on the local bird population, post-development.

6.4.5 Ecological Receptor: Other Protected Species

Summary of Ecological Value

Potential presence of other protected species such as otter, water vole, hedgehog and hazel dormouse within the Survey Site has been determined to be limited to boundary scrub, woodland and lake habitats which would not be directly impacted as a result of the Proposed Development.

Assessment of Potential Impacts

No significant direct or indirect impacts to protected species such as otter, water vole, hedgehog and hazel dormouse are predicted if existing boundary habitats are retained, protected, enhanced and strengthened as prescribed in previous proposals and recommendations.

Recommendations

No further recommendations are considered to be required for other species, beyond those provided as part of the Mitigation-by-Design principles and Landscape Proposals identified in Sections 6.1 and 6.2.

If minor impacts to boundary habitats are required as part of the construction phase, specific Method Statements may be required for the above species. These should be included as part of the **CEMP** as previously recommended.

Residual Impacts

Provided that the identified construction protection measures are implemented, this would result in a neutral impact to other species during the construction phase.

The Landscape Proposals would result in a beneficial impact on other species, post-development.

6.5 Invasive Species

No obvious evidence of commonly occurring invasive species, such as giant hogweed or Japanese knotweed, were identified during the Phase 1 survey. An exhaustive survey was, however, not within the scope of this assessment.

7.0 Conclusion

7.1 Site and Development Description Summary

Landscape Science Consultancy (LSC) Ltd was commissioned by DWD LLP to conduct an Ecological Assessment at the National Grid Sub-Station, Indian Queens, Cornwall – the 'Survey Site'.

The 'Proposed Development' is for the construction and operation of a battery energy storage system (BESS) with a total import capacity of 100 megawatts (MW), within part of the Survey Site (see submitted plans). The design of the battery is split into two separate 50MW battery sites each comprising approximately half of the total site area. The battery site contains a range of equipment including the battery units themselves (these are generally containerized but a specific model will not be known until post-consent) typically set out in uniform rows throughout the site, as well as electrical transformer units, acoustic fencing and CCTV cameras. The development will also include a planting buffer of approximately 15m on all boundaries apart from the south. All site access (construction and operational) will be via an existing, purpose-built access track that connects to the National Grid substation track and eventually Domellick Hill (B3279).

7.2 Habitat Baseline Summary

The Survey Site is directly surrounded by habitats associated with three Nationally and Internationally designated sites (Special Area of Conservation, Site of Special Scientific Interest and National Nature Reserve) which also encapsulate internal boundary habitats within the Survey Site to varying degrees.

The central area of the Survey Site itself comprises the existing buildings, infrastructure and hardstanding associated with the Operational Area of the National Grid Sub-Station Site. Surrounding the Operation Area are improved pasture fields and established habitats such as plantation woodland, scrub, willow carr, scattered trees and a lake. A disused railway line stands on, and adjacent to, the eastern Survey Site boundary. The established boundary habitats to the Operational Area and wider Survey Site, particularly the willow carr elements, phase into the wider off-site habitats associated with the surrounding designated sites.

7.3 Protected Species Baseline Summary

In respect of Protected Species, the Ecological Assessment has identified the following:

- Potential presence of qualifying features (species) associated with adjacent designated sites to be present within the scrub and willow carr habitats of the Survey Site, such as willow tit and aquatic invertebrates;

- Potential presence of water vole, otter, dormice and hedgehog within boundary scrub, willow carr, woodland and lake habitats present within and adjacent to the Survey Site;
- Potential presence of reptile species within boundary habitats, although the pasture fields have been identified as sub-optimal for this species and the areas of built development associated with the Operational Area identified as unsuitable;
- Likely presence of a variety of farmland and woodland bird species within boundary habitats. Pasture fields provide sub-optimal habitat for ground nesting birds due to the proximity of boundary features;
- No evidence of badger setts has been identified following the site surveys;
- The lake on-site was determined to be absent of great crested newts following an eDNA water sampling survey.

7.4 Impacts Summary

The Proposed Development footprint, to include the BESS, High Voltage (HV) cable route and access roads, will be located only within the existing areas of improved pasture fields and hard standing. A 15m buffer zone is to be created between the Proposed Development and adjacent designated habitats.

There will be no direct loss of designated habitats present within, or adjacent to, the Survey Site, or other more valuable non-designated habitats within the Survey Site such as woodland and scrub.

The submitted Landscaping Proposals allow for the planting of mixed native scrub compartments within the 15m buffer zone, which would be bounded by margins of wildflower meadow over the existing improved grassland sward. A similar area of landscaping is proposed to the south-west of the Survey Site which is located within the Application Boundary of the Proposed Development. The submitted Landscaping Proposals aim to strengthen the existing Green Infrastructure resource within the Survey Site and associated mosaic habitats present within the surrounding designated sites.

Potential indirect construction impacts to designated and non-designated sites have been predicted in the absence of mitigation; however, such impacts have been determined possible to control if appropriate construction mitigation measures are implemented.

No operational phase impacts to designated and non-designated sites have been precited. No artificial lighting is proposed. Other operations would be minimal and limited to within the proposed BESS site and access roads only.

Impacts to protected species are limited to the removal of sub-optimal improved grassland habitats for reptiles and nesting birds. There is the potential that badgers may build setts within, or adjacent to, the works footprint prior to the start of the construction phase, although no badger setts were identified during

the site surveys. There is the potential for indirect impacts to protected species within adjacent designated and non-designated habitats; however, as previously identified, such impacts have been determined possible to control if appropriate construction mitigation measures are implemented.

7.5 Recommendations Summary

Based on the identified ecological impacts of the Proposed Development, the following recommendations have been identified which should be secured through a suitably worded planning condition:

- A **Construction Ecological Management Plan** to ensure the protection of designated and non-designated habitats and associated species during the construction phase;
- The production of an **Arboricultural Method Statement** and **Tree Protection Plan** in accordance with BS 5837:2012 to protect trees and tree roots during the construction phase;
- The production of a **Landscape and Biodiversity Management Plan** to ensure the successful establishment and long-term management of all enhanced and created habitats;
- A scheme for the installation of bat and bird boxes on surrounding trees.

A Biodiversity Net Gain assessment in DEFRA Metric 3.0 has been carried out for the Proposed Development and submitted with an accompanying separate report, which provides further justification for the Landscape Proposals and outline habitat implementation and management measures.

7.6 Summary of Impacts to Designated Sites and Consideration of Habitat Regulations Assessment

The Proposed Development will not require any direct net loss of adjacent designated sites. A 15m vegetated buffer zone is to be created between the key battery site installation and adjacent designated sites.

Recommendation measures have been provided for avoidance and mitigation measures which if appropriately enacted during the construction phase, would protect adjacent designated sites from direct and indirect effects. No likely significant effects to designated sites arising from the construction phase of the Proposed Development have been predicted.

The Proposed Development is for a battery energy storage system. No artificial lighting is proposed, and emitted noise levels would be below the background levels of the existing National Grid Sub-Station Site. All other operations within the Proposed Development would be minimal and restricted to the BESS site and access roads only.

In summary, no likely significant effects have been predicted to the identified designated sites as a result of the Proposed Development. Therefore, a detailed

Habitat Regulations Assessment in respect of the SAC component of the designated sites, or more detailed assessments of the SSSI/NNR components, have been judged not to be required.

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Websites

MAGIC www.magic.gov.uk
Natural England www.naturalengland.org.uk

APPENDIX 1
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TARGET NOTES

Target Note	Description
TN1	**Built Habitats** The centre of the Survey Site is occupied by the operational area of the National Grid Sub-Station. Habitats present include buildings, infrastructure and hardstanding including the access roads beyond the fenced compound to the south and east.
TN2	**Improved Grassland** Improved pasture fields surround the operational area to the north, east and west. At the time of the survey the fields were grazed by cattle. The sward height was between 5 and 10cm. The sward was even, without tussocks or deep thatch. Perennial rye grass (*Lolium perenne*) is abundant but not dominant, with sweet vernal grass (*Anthoxanthum odoratum*), meadow grasses (*Poa* sp.) and Yorkshire fog (*Holcus lanatus*) also recorded. To the north, tussocks of soft rush (*Juncus effusus*) occur along with occasional cuckoo flower (*Cardamine pratensis*). Elsewhere the herbaceous component of the sward is limited a restricted assemblage of rank species including nettle (*Urtica dioica*), docks (*Rumex* sp.), clover (*Trifolium* sp.) and creeping buttercup (*Ranunculus repens*).
TN3	**Dense Continuous Scrub** Unmanaged willow and gorse (*Ulex europaeus*) scrub occurs to the southeast of the operational sub-station below power lines that cross the Survey Site. The habitat fringes into denser willow scrub to the east, south and west. The scrub is predominantly dense with more open areas between where bramble (*Rubus fruticosus agg.*) was establishing and marsh thistle (*Cirsium palustre*), burnet saxifrage (*Pimpinella saxifrage*), wild strawberry (*Fragaria vesca*) and soft rush (*Juncus effusus*) were recorded.
TN4	**Plantation Broadleaf Woodland** Plantation woodland stands to the south of the Survey Site to either side of the access road from the B3279. The canopy has an estimated height of 20m with canopy species having truck diameters of approximately 30cm. Sycamore (*Acer pseudoplatanus*) is abundant within the canopy with alder (*Alnus glutinosa*) also recorded and some elm (*Ulmus* sp.). Non-native pines are present but are estimated to comprise <10% of the canopy. Many of the trees support a significant amount of ivy (*Hedera helix*) cover. The understorey is absent with the field layer dominated by bramble, nettle and cleavers (*Galium aparine*) with honeysuckle (*Lonicera periclymenum*) occasionally present. A third section of woodland of similar age and height stands to the west of the operational area. This section of woodland is dominated by hybrid poplar with some sycamore and non-native pines also present and has a field layer dominated by bramble.
TN5	**Plantation Broadleaf Woodland** Set to the east of the Survey Site with a disused railway line (TN9) adjacent to the east, stands a section of plantation woodland. Sycamore is abundant with occasional alder forming the canopy which has an estimated height of 25m. No significant understorey is present. The field layer is dominated by bramble with wood avens (*Geum urbanum*) and cleavers also recorded along with occasional ferns. A bare earth cycle track has been created within the woodland.
TN6	**Dense Continuous Scrub** Unmanaged dense scrub, dominated by grey willow (*Salix cinerea*) lies towards the southeast, north and west of the survey site. Where accessible, the scrub was seen to be growing predominantly on wet ground to the south east of the site and adjacent to the River Fal to the west but also extending on to drier ground in closer proximity to the grassland fields (TN2). Scattered mature willow trees (*Salix* sp.) up to 115m in height occur towards the west of the Survey Site adjacent to the lake (TN7).

Target Note	Description
	To the south and east no distinct understorey was recorded. To the west of the Survey Site areas of taller scrub occurred where an understorey including coppiced hazel (*Corylus avellana*) and occasional hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*) shrubs was recorded. The field layer was diverse to the west with herb Robert (*Geranium robertianum*), lesser celandine (*Ficaria verna*), wild celery (*Apium graveolens*), sheep's sorrel (*Rumex acetosella*), wood avens, meadow sweet (*Filipendula ulmaria*), cuckooflower, red campion (*Silene dioica*), blue bell (*Hyacinthoides non-scripta*) and ferns, with hart's tongue (*Asplenium scolopendrium*), hard fern (*Blenchnum spicant*) and male fern (*Dryopteris felix-mas*) being recorded. Bracken (*Pteridium aquilinum*) was locally dominant in one area under scrub to the east of the survey site. In wetter locations to the southeast, horsetail (*Equisetum* sp.) was seen to be locally abundant with ferns and rushes (*Juncus* sp.) also present. A large patch of dense bramble scrub abuts the grassland field to the east.
TN7	**Standing Water** A lake is located towards the west of the survey site, apparently occupying former mine workings. To the west the lake extends towards the River Fal with low ground supporting dense willow scrub, intervening. The ground rises towards the east of the lake to form scrub covered cliffs which extend to the water's edge. The depth of the lake could not be estimated. Only a very small amount of aquatic vegetation could be seen at the time of the survey (a small area of water lily (*Nymphaea sp.*) pads recorded at the southwest corner of the lake). No emergent vegetation was observed. The lake is actively used for fishing and is likely to be stocked with fish for this purpose.
TN8	**Plantation Mixed Woodland** Small sections of mixed plantation woodland stand around the cliff top to the east and south above the lake (TN7). Non-native pines, sycamore and ash were recorded forming the canopy which was estimated to be up to 20m in height. Where accessible, the understorey was seen to be sparse and comprised hazel, blackthorn and hawthorn with bramble and ivy abundant below. Harts tongue fern was occasionally present.
TN9	**Disused Railway Line** A disused railway line, aligned approximately north-south, lies within the eastern site boundary. A well-used footpath follows the track bed which is raised above the surrounding habitats on an embankment. Occasional mature trees and scrub stand at the tops of the embankment to either side of the path. Species recorded include sycamore, willow, hazel, blackthorn, hawthorn. The field layer comprises ruderals including docks (*Rumex* sp.), cleavers, nettle, hogweed (*Heracleum sphondylium)* and ivy. Pendulous sedge (*Carex pendula*) is locally abundant.
TN10	**River Fal (Offsite)** The River Fal flows approximately 10m to the west of the Survey Site. The channel is approximately 4m wide with an estimated depth of 60cm. The banks were of variable height and slope with some vertical sections up to 60cm high. The channel is heavily shaded by adjacent scrub/trees and no aquatic vegetation was observed. The substrate included both silt and some stones also visible.

APPENDIX 2
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SITE PHOTOGRAPHS

Photograph 1: Willow scrub with coppiced hazel understorey to the west of the Survey Site (TN6)

Photograph 2: Wet willow scrub with horsetail to the south of the Survey Site (TN6)

Photograph 3: Willow and gorse scrub to the south of the operational area of the substation (TN3).

Photograph 4: Plantation broadleaved woodland to the southwest of the Survey Site (TN4)

Photograph 5: Plantation broadleaved woodland to the west of the Survey Site (TN5) with improved grassland pasture in the foreground (TN2)

Photograph 6: Sections of mixed plantation woodland (TN8) adjacent to the lake (TN7)

Photograph 7: The disused railway line with associated trees/scrub located to the east of the Survey Site (TN9)	**Photograph 8:** River Fal (TN10) to the west of the Survey Site

APPENDIX 3
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SUMMARY OF POTENTIALLY RELEVANT STATUTORY LEGISLATION

The Habitat Regulations 2017 (as amended)

The Conservation of Habitats and Species Regulations 2017 (as amended) or the 'Habitat Regulations 2017 (as amended)', ensures wild animals of a European Protected Species and their breeding sites or resting places are protected under Regulation 43. Such wild animals of a European Protected Species include great crested newts, otters, dormice and all species of bat. It is an offence to deliberately capture, injure or kill any such wild animal and in the case of great crested newts, deliberately take or destroy their eggs. It is also an offence to deliberately damage or destroy a breeding site or resting place of any such wild animal.

Wild animals of a European Protected Species are also protected from disturbance under Regulation 43. Disturbance of such wild animals includes in particular any disturbance which is likely:

(a) To 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.

The Wildlife and Countryside Act 1981 (as amended) and Countryside and Right of Way Act (CRoW) Act 2000 (as amended)

The Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000 (as amended) afford protection to wild birds in England and Wales under Part 1. It is an offence to intentionally kill, injure or take any wild bird. It is also an offence to intentionally take, damage or destroy the nest of any wild bird whilst it is in use or being built, or intentionally take or destroy their eggs. If the wild bird is included on the Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), it is additionally an offence to intentionally or recklessly disturb the wild bird whilst on the nest during the breeding season.

Certain species of animal, such as the water vole, are offered 'full protection' under the Wildlife and Countryside Act 1981 (as amended) and the CRoW Act 2000 (as amended) by being included in Schedule 5 in respect of certain offences under Section 9. Such offences include:

9(1) Intentional killing, injuring or taking of a Schedule 5 animal;

9(4a) Intentional or reckless damage to, destruction of or obstruction of any structure or place used by a Schedule 5 animal for shelter or protection;

9(4b) Intentional or reckless disturbance of a Schedule 5 animal occupying such a structure or place.

Widespread species of native reptiles occurring within England and Wales such as the adder or common lizard are protected against intentional killing and injuring under the Wildlife and Countryside Act 1981 (as amended) only. Animals of a European Protected Species are now only protected under offences 9(4a) and 9(4b) of Section 9, the main legislative tool covering such animals is under the Habitats Regulations 2017 (as amended).

The Protection of Badgers Act 1992

Badgers are primarily protected by The Protection of Badgers Act 1992, under which it is an offence to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so, and to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it.

The Hedgerow Regulations 1997

Under the Hedgerow Regulations 1997 it is an offence to remove most hedgerows without the issuing of a Hedgerow Removal Notice from the Local Planning Authority. 'Important' hedgerows are those protected under the 1997 Regulations if they are over 30 years old and satisfy one of the criteria under Part II, Schedule 1, based on archaeology and history or wildlife and landscape.

In the case of 'Important' hedgerows, the Local Planning Authority will only issue a Hedgerow Removal Notice if there are sufficient circumstances to justify its removal. If sufficient circumstances do not exist then the Local Planning Authority will issue a Hedgerow Retention Notice and the 'Important' hedgerow will be protected under the 1997 Regulations. Unauthorised removal of the 'Important' hedgerow may result in a fine and/or a requirement for the hedgerow to be replaced.

Natural Environment and Rural Communities Act 2006

The Natural Environment and Rural Communities (NERC) Act came into force on 1st October 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.

The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 41 of the Natural Environment and Rural Communities Act 2006 to have regard to the conservation of biodiversity in England when carrying out their normal functions.

Fifty-six habitats of principal importance and 943 species of principal importance are included on the S41 list. The habitats and species on the S41 list are included within the UK Biodiversity Action Plan (UK BAP) as requiring conservation action. The requirement for action continues to be regarded as a conservation priority in the subsequent UK Post 2010 Biodiversity Framework. At a local level the actions and targets are still referred to as BAPs.

The Wild Mammals (Protection) Act 1996

Under the Wild Mammals (Protection) Act 1996 it is an offence if he or she mutilates, kicks, beats, nails or otherwise impales, stabs, burns, stones, crushes, drowns, drags or asphyxiates a wild mammal.

APPENDIX 4
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GCN eDNA AND HSI SURVEY METHODS & DATA

Survey Dates

The eDNA and HSI surveys were undertaken on 13th May 2021.

Surveyor Competence

The HSI assessment and eDNA was undertaken by licenced GCN worker (WML-08 Level 1) Ian Stephens (Class Reference 2020-44802-CLS-CLS).

Survey Methods – eDNA Survey

eDNA survey is used to determine presence/absence of GCN within a lake by extracting environmental DNA (eDNA) from water samples. The survey technique and protocol are authorised by DEFRA and Natural England (Biggs et al, 2014).

The survey protocol consisted of undertaking x20 water samples at the lake, evenly spread around all accessible banks, using the supplied sterile 30ml sampling ladle. The ladle was gently swirled near to the lake bottom to increase the chances of collecting GCN eDNA. Water under 10cm in depth was not sampled.

All 20 water samples were poured into the supplied sterile Whirl-Pak bag and shaken for 10 seconds. Following a change of sterile gloves, the six supplied test tubes were filled each with 15ml of water from the Whirl-Pak bag using the supplied sterile pipette and shaken for 10 seconds. Each test tube was labelled and dated accordingly.

The test tubes were returned to the laboratory in the original boxed packaging within a few days of the survey(s) being undertaken. The samples were stored in ambient conditions of 2 – 4°C before being dispatched to the laboratory. An approved laboratory was used through SureScreen Scientifics who supplied the testing kits and analysed the water samples.

Survey Methods – HSI Survey

The HSI surveys followed standard methodology as devised by Oldham *et al*, 2000.

The HSI provides a means of evaluating pond habitat quality for GCN using a scoring system of ten habitat suitability indices, all of which are factors considered to affect GCN abundance and distribution:

1. Geographical Location
2. Pond Area
3. Pond Permanence
4. Water Quality
5. Percentage of Shading
6. Presence of Water Fowl

7. Presence of Fish
8. Presence of Other Ponds (within 1km)
9. Surrounding Terrestrial Habitats
10. Percentage of Aquatic Vegetation

The HSI score is a geometric mean of the ten suitability indices, providing a numerical index between 0 and 1. 0 indicates unsuitable GCN habitat and 1 indicates optimal habitat (Table 01).

Table 01. Ascertaining pond suitability for GCN from the HSI score.

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

Limitations

No limitations to the surveys were identified.

SITE NAME: National Grid Sub-Station Site, Indian Queens				**LSC JOB NUMBER: D78.21**	
Pond Ref	**Grid Ref**	**HSI**	**eDNA Sample Ref & Date Taken**	**Pond Description /Comments**	**eDNA Result & Date Returned**
TN7	SW 93760 59006	Location: C Size: 2000m² Drying: Never Water Quality: Moderate % Shade: 10 Fowl: Absent Fish: Major No of Ponds: 7 Habitat: Good Macrophytes: Nil **SCORE: 0.32** **SUITABILITY: Poor**	13/05/21	The lake is set within an excavated hollow with approximately 20m high vertical banks to the east reducing to level ground to the west adjacent to the River Fal. The lake is surrounded by unmanaged willow scrub to the north, south and west with plantation woodland standing at the top of the high banks to the east.	Negative eDNA result 03/06/21

SureScreen Scientifics

Folio No: E10596
Report No: 1
Purchase Order: d77.21
Client: LANDSCAPE SCIENCE CONSULTANCY
Contact: Ian Stephens

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 26/05/2021
Date Reported: 03/06/2021
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
3509	Pond 1	SW 93760 59006	Pass	Pass	Pass	Negative	0

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chris Troth **Approved by:** Chris Troth

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SureScreen Scientifics

METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result: **Presence of GCN eDNA** [Positive/Negative/Inconclusive]
Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.
Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.
Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.

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