Appendix: Introduction and EIA Methodology

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Culham Storage – Environmental Impact Assessment Scoping Opinion Request Report

Introduction

Statera Energy Limited (hereinafter referred to as the 'Applicant') is seeking planning permission for the development of a Battery Energy Storage System ('BESS'), comprising a 500 megawatt (MW) battery storage facility with associated infrastructure, access and landscaping (the 'Proposed Development') in South Oxfordshire, north of Culham Science Centre and near Clifton Hampden (the 'site'). The site covers a total area of approximately 29 hectares (ha) and is located within the administrative boundary of South Oxfordshire District Council (the 'SODC').

The planning application, which the Applicant intends on submitting in early 2023 to the SODC, will be a full (detailed) application.

This EIA Scoping Opinion Request Report ('EIA Scoping Report') has been prepared on the basis that an Environmental Impact Assessment (EIA) will be required for the Proposed Development. This is because the Applicant considers the Proposed Development to constitute 'EIA development' given that it exceeds the threshold set within Schedule 2, 3(a) (Energy industry – Industrial installations for the production of electricity, steam and hot water) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations') with regards to the area of development, and has the potential to result in likely significant effects, as discussed in in this EIA Scoping Report. No formal request for an EIA Screening Opinion shall therefore be submitted to the SODC.

The Site

The site, as shown in **Figure 1** and **Figure 2**, is centred around National Grid Reference SU527965, located to the north-west of Culham Science Centre, and approximately 2.5km to the east of Abingdon.

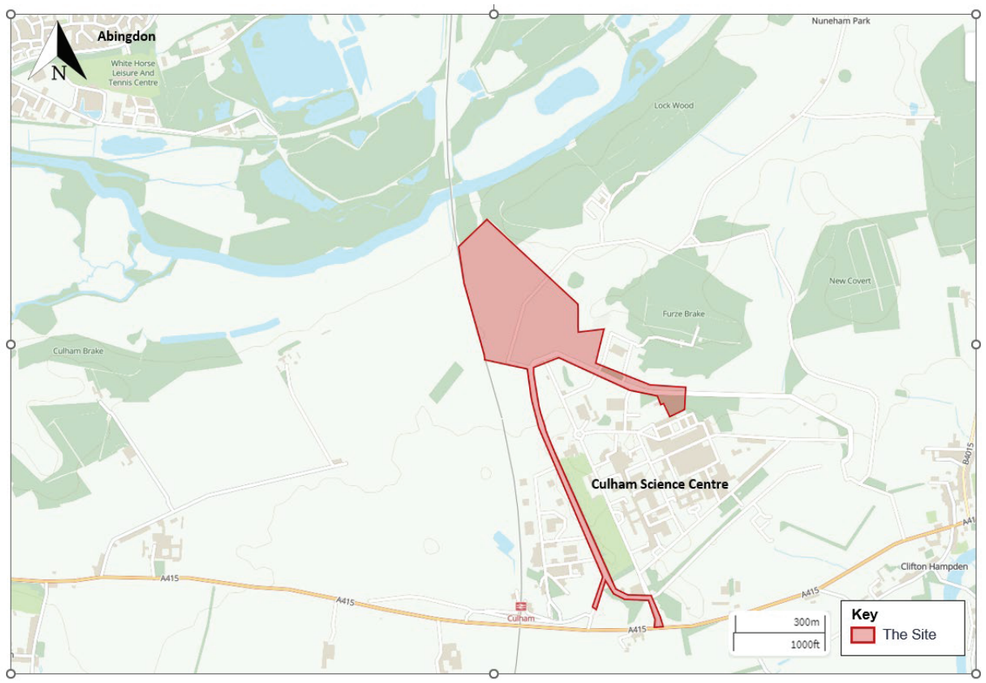
The site currently comprises areas of open fields (currently harvested for hay and silage)and is crossed by a tarmac track (Thame Lane, a non-public highway) and an existing farm track. Footpath 183/1/60 (part of the Oxford Greenbelt Way) Public Rights of Way (PRoW) crosses the railway to the west of the site before passing through the south-western extent of the site. A high voltage overhead transmission line passes through the site north-south, with a second high voltage line passing through the site from the south-east corner to the south-west of the site. The site is broadly irregular in shape and bordered by:

- Woodland to north, beyond which lies the River Thames;
- Agricultural land, an area of woodland, and Thame Lane to the east;
- Thame Lane to the south of the site, with Culham Science Centre to the south-east, beyond which is Abingdon Road (A415) and Culham Rail Station further south; and
- A railway line to the west (servicing Great Western Railway), adjoined by Oxford Greenbelt Way, beyond which lies agricultural land and Culham Park Mx (off-road race track).

The site is accessed from the east, south-east and south by the Thame Lane, which connects to Abingdon Road to the south.

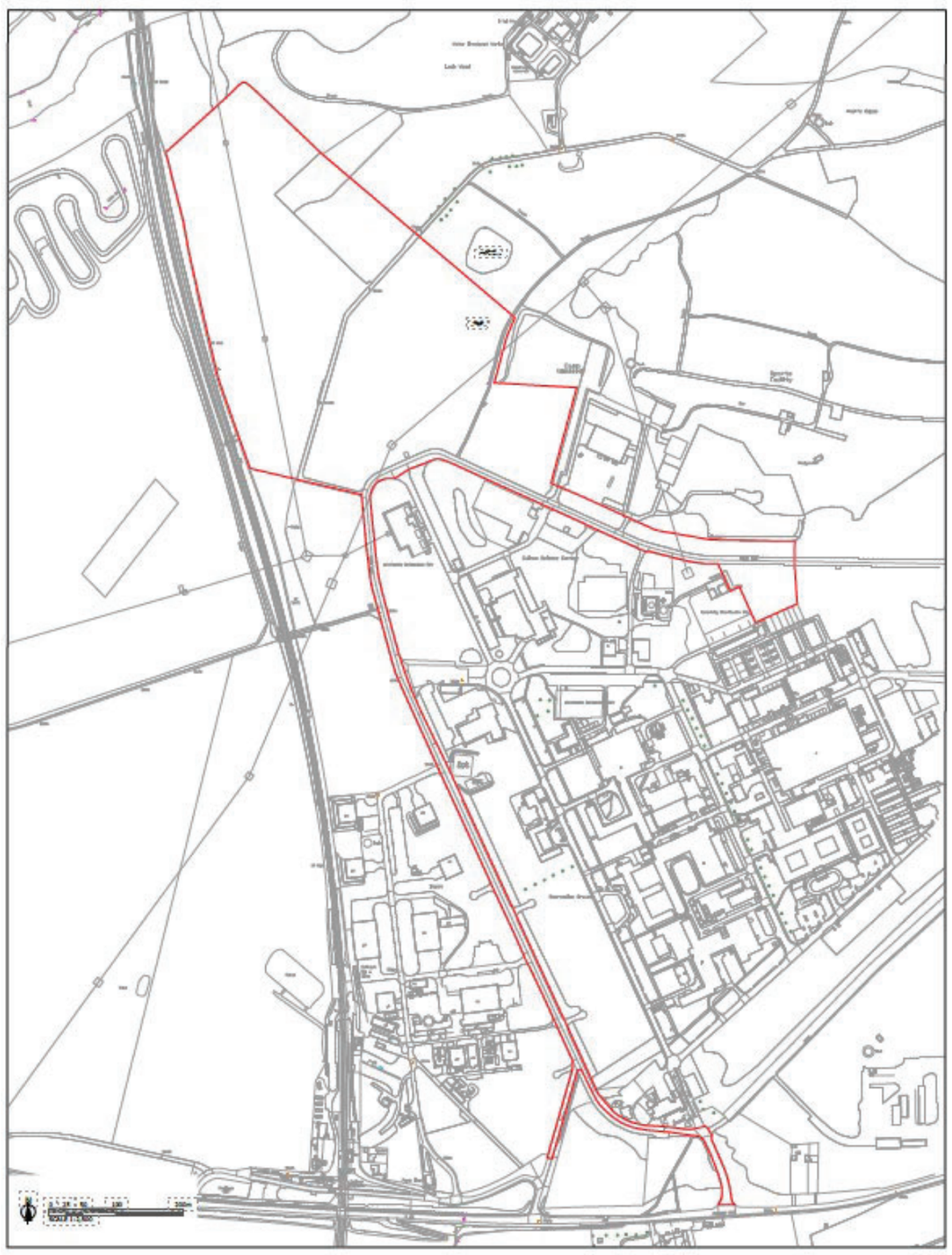
An arboricultural survey undertaken of the site and its immediate surrounds identified 52 trees, 19 groups of trees and 1 hedgerow, with many of the trees located on the boundary of the site running around the perimeter of the fields. Some of the groups are woodland plantings with ecologically and arboriculturally valuable trees. The profile of trees observed on-site during the survey were predominantly *Quercus robur* (English Oak), *Quercus cerris* (Turkey Oak), and some *Fraxinus excelsior* (Ash). Other groups of trees were new plantings with predominantly native trees.

Figure 1 Site Location Plan[1]



[1] *Note: site red line boundary included in this figure is indicative for the purposes of illustrating site location.*

Figure 2 **Indicative Planning Application Redline Boundary**



The Proposed Development

Purpose

BESS facilities provide a means of allowing electricity from the grid to be imported and stored at times of low demand/high generation, which can then be exported back into the grid at times of higher demand / system stress.

System frequency is also a continuously changing variable that is determined and controlled by the second-by-second (real time) balance between system demand and total generation. If demand is greater than generation, the frequency falls while if generation is greater than demand, the frequency rises. If the transmission system is not maintained within the required frequency tolerance system stress can result in widespread power supply issues and damage to network infrastructure.

Battery storage is a key part of the National Grid energy strategy and provides balancing services to help accommodate the increasing level of renewable energy generation.

By importing excess renewable energy from the grid and storing it, batteries can capture energy that would otherwise be lost / unutilised. In respect of their storage ability, batteries offer opportunities to support the intermittent nature of renewables by storing the excess energy they produce and importing it back into the grid when demand requires.

During situations when primary power sources (e.g., traditional power stations) are interrupted, BESSs can bridge the gap in production, thus avoiding potential blackouts. It should be noted that the UK electricity network is wholly interconnected and issues in one geographic location can have far reaching implications on the network. Accordingly, BESSs offer additional capacity to deal with system stress and any variations in grid frequency at both a local and national level.

As has been recognised by National Grid's System Operability Framework (SOF): *"Faster response is more effective and so less response is needed if speed can be increased."* BESSs can respond more rapidly than other types of balancing services, as they have no start-up delays. As such BESSs can balance the real-time requirements of the national grid more efficiently.

The Proposed Culham BESS

The Proposed Development comprises a 500MW battery storage facility, with approximately 568 sound insulated lithium ion battery units housed within standard shipping containers and 37 larger (12m x 9.5m x 4.35m) noise insulated inverter houses (see **Figure 5**) to accommodate the inverters and transformers. Furthermore, the Proposed Development will comprise the following components:

- Vehicle tracks 4.5m wide and vehicle hardstanding areas;
- Loose permeable gravel around the battery units and buildings;
- A weld mesh compound fence (2.5m height with a cranked top 0.5m height supporting three strands of barbed wire) with CCTV security cameras mounted on 4m high posts;
- An electricity substation compound with a seven 33kV switch house/control room (13m x 5.5m x 3.5m), comprising transformers, busbars and other equipment of up to 9m in height (see **Figure 6**);
- Two storm water attenuation lagoons;
- Diversion of existing footpath on-site (Footpath 183/1/60) to the south;
- Removal of the non-public highway track (Thame Lane) within the site, and the upgrading of the existing farm track to a 4.5m wide macadam surface; and
- Extensive landscaping in the form of hedge and woodland planting.

The grid connection for the Proposed Development would be via high voltage underground cable from the National Grid Substation on Thame Lane to the south of the site.

An indicative layout for the Proposed Development is shown in **Figure 3**, with **Figure 4** illustrating the potential setting out of the equipment.

Figure 3 Indicative Proposed Development Layout

Figure 4 Potential Equipment Setting Out

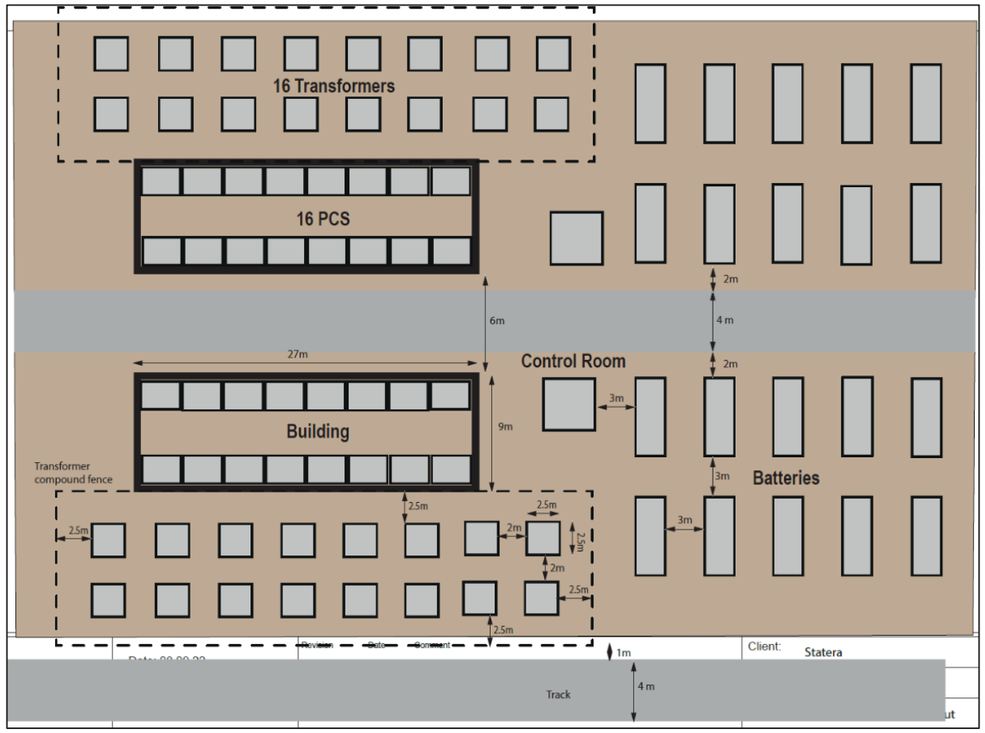


Figure 5 Indicative Inverter Building Plan

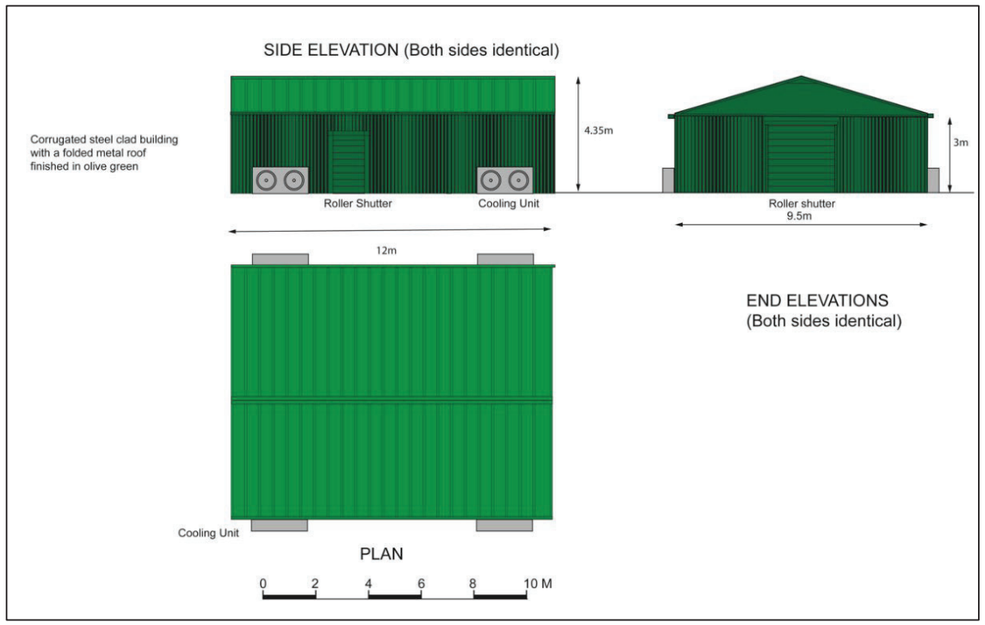
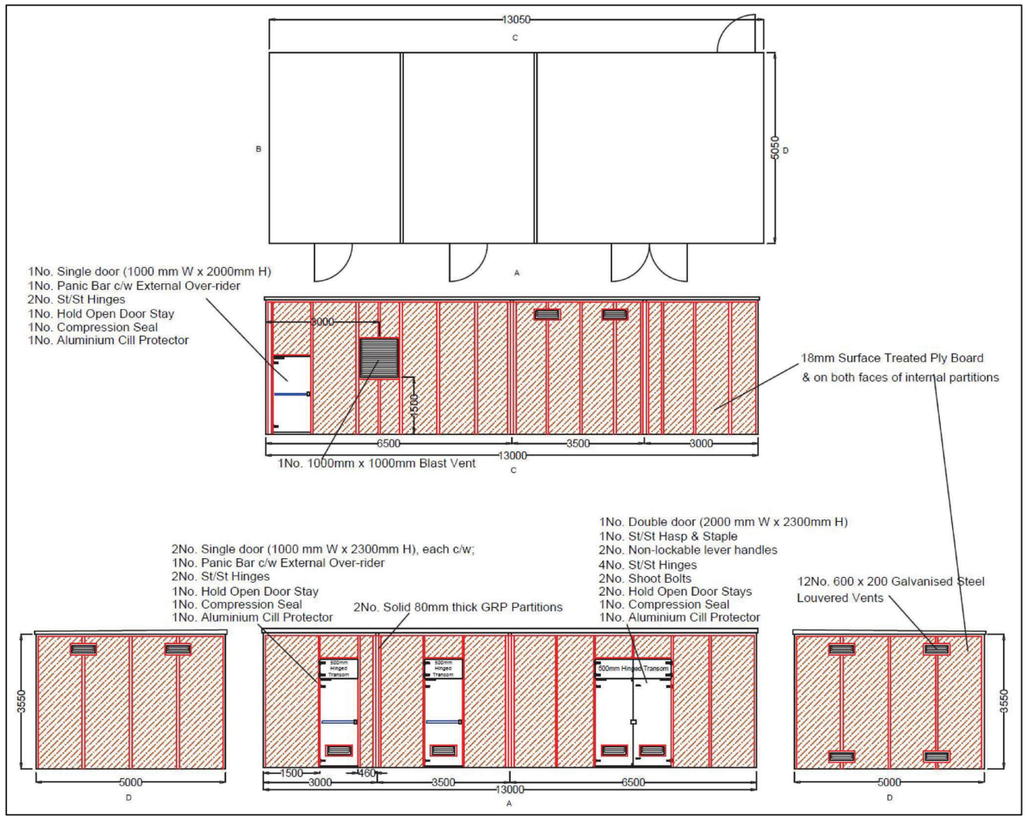


Figure 6 **Indicative Control Room Plan**



Operating Hours and Staff

Due to the nature of the ancillary services provided by the Proposed Development, unlike a traditional power station, the facility needs to respond very rapidly to calls of frequency voltage and reactive power support and peaks in energy demand. It is therefore not possible to forecast any standard hours of operation or operational staff numbers. However, even when in operation, there is minimal on-site activity required during the plant lifecycle. The facility will be unmanned and be remotely controlled / monitored, and operatives will only visit the site on an ad-hoc basis.

Access and Parking

In operation, when staff access is required, this would be from Thame Lane.

Within the site, internal access roads would be provided as shown indicatively in **Figure 3**. A small number of parking spaces will be made available for occasions when personnel attend the site.

Drainage

The existing site comprises undeveloped agricultural land, where the Proposed Development will increase the low permeability area on-site. The battery and substation infrastructure will sit on a porous gravel surface. The indicative layout plan, as shown in **Figure 3**, includes an on-site attenuation basin at the southern extent of the site for drainage attenuation. Surface run off will be controlled at an agreed runoff rate; this will be agreed with the Lead Local Flood Authority (LLFA) / SODC.

Landscaping and Habitat Creation

Landscaping in the form of woodland planting at the northern and eastern extents of the site, and hedge planting along the western, southern and north-eastern boundaries of the site, as shown in **Figure 3**, are proposed as part of the Proposed Development.

The on-site attenuation basin will also be landscaped and managed to enhance biodiversity.

Furthermore, the following ecological enhancements, as set out within the Ecological Impact Assessment provided in **Appendix A** of this EIA Scoping Report, have been embedded within the design of the Proposed Development:

- Two log piles 2m length and width and 1.5m height will be installed on the north of the site, alongside the existing neutral grassland habitat (on the edges of the modified grassland habitat which will be subject to enhancement);
- Three woodcrete / woodstone bat boxes (e.g., 2F Schwegler Bat Box) suitable for crevice-dwelling species will be installed on the scattered trees in the north-east of the site; and
- Three woodcrete / woodstone bird boxes suitable for starlings, woodpeckers and nuthatches (e.g., 3S Schwegler Starling Nest Box) or similar will be installed on the scattered trees in the north-east of the site.

Construction

Construction of the Proposed Development is anticipated to be undertaken over a 9-12 month construction programme.

The construction activities will comprise:

- Enabling works;
- Ground civil works;
- Main civil works;
- Electrical connection works; and
- Commissioning.

Typical construction plant and equipment to be used will include excavators, drilling rigs, graders and haulage vehicles, mobile and tower cranes, heavy and light goods vehicles.

Normal construction working hours will be Monday to Friday 08:00–18:00 and Saturday 08:00–13:00. Construction laydown areas would be located within the site boundary.

Application of the EIA Regulations

The EIA Regulations provide screening criteria and thresholds at which certain types of development projects should be screened to determine whether a project is an 'EIA development'.

Regulation 2 of the EIA Regulations defines 'EIA development' as that which falls either under Schedule 1, where EIA is mandatory, or under Schedule 2, where a development fulfils the relevant criteria and thresholds and importantly, is likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

Schedule 1 Development?

The Proposed Development does not fall under any of the project descriptions within Schedule 1, such as crude-oil refiners, thermal and nuclear power stations, and therefore it is not 'Schedule 1 Development' that would automatically require an EIA.

Schedule 2 Development?

The Proposed Development does fall within the definition under paragraph 3(a) (Energy industry – Industrial installations for the production of electricity, steam and hot water), as listed in Column 1 of Schedule 2. However, for this type of development to be 'Schedule 2 Development', consideration must be given to whether the site is either:

(a) located in a 'sensitive area' (as defined under Regulation 2[2]), or

(b) one where the relevant screening thresholds and criteria for paragraph 3(a) categories of development are met or exceeded, which in this case are that the area of the development exceeds 0.5 hectares.

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[2] *Definition of 'sensitive area' within the EIA Regulations (within Regulation 2 – 'Interpretation') - "sensitive area" means any of the following:*
(a) land notified under section 28(1) (sites of special scientific interest) of the Wildlife and Countryside Act 1981(23);
(b) a National Park within the meaning of the National Parks and Access to the Countryside Act 1949(24);
(c) the Broads (25);
(d) a property appearing on the World Heritage List kept under article 11(2) of the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (26);
(e) a scheduled monument within the meaning of the Ancient Monuments and Archaeological Areas Act 1979(27);
(f) an area of outstanding natural beauty designated as such by an order made by Natural England under section 82(1) (areas of outstanding natural beauty) of the Countryside and Rights of Way Act 2000(28) as confirmed by the Secretary of State;
(g) a European site.

Only if the criteria for at least one of (a) or (b) above are met or exceeded does consideration need to be given to whether significant environmental effects are likely, and whether an EIA is required.

Given that the site area of the Proposed Development is approximately 29ha, the Proposed Development, therefore, exceeds the applicable threshold and criteria of Schedule 2 paragraph 3(a).

Consideration is therefore given to Schedule 3 of the EIA Regulations, which sets out the criteria for screening Schedule 2 development. Schedule 3 includes the characteristics and location of the development and the types and characteristics of the potential impact.

As set out within this EIA Scoping Report, it is considered that the Proposed Development could give rise to likely significant effects with regards to archaeology, heritage, landscape and visual impact, land take and soils (agriculture) and operational climate change effects. The Proposed Development is therefore 'Schedule 2 Development' and constitutes 'EIA development' as per the EIA Regulations.

The Applicant will therefore undertake an EIA of the Proposed Development and submit an Environmental Statement (ES) in support of the planning application.

The Approach to the EIA

EIA is a process carried out which examines available environmental information to ensure that the likely significant environmental effects of certain projects are identified and assessed before a decision is taken on whether a project is granted planning permission. This means environmental issues can be identified at an early stage and projects can then be designed to avoid or to minimise significant adverse environmental effects, and appropriate mitigation and monitoring can be put in place.

Regulation 4 of the EIA Regulations sets out the EIA process. Specifically, Regulation 4(2) states that *"the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors:*

(a) population and human health;

(b) biodiversity;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape;

(e) the interaction between the factors referred to in sub-paragraphs (a) to (d)."

As part of the EIA scoping process, the potential for likely significant effects, during both the enabling and construction works and once the Proposed Development is complete and operational has been considered through review of the following environmental topics:

- Socio-Economics;
- Health;
- Transport;
- Air Quality;
- Noise and Vibration;
- Wind Microclimate;
- Daylight, Sunlight, Overshadowing, Light Intrusion and Solar Glare;
- Landscape and Visual;
- Built Heritage;
- Archaeology (Buried Heritage);
- Geoenvironmental (Land Contamination, Ground Conditions and Groundwater);
- Land Take and Soils (Agriculture);
- Ecology and Biodiversity;
- Water Resources, Drainage and Flood Risk;
- Materials and Waste;
- Climate Change and Carbon / Greenhouse Gas Emissions; and
- Project Vulnerability.

EIA Scoping

EIA Scoping forms one of the first stages of the EIA process. Requesting an EIA Scoping Opinion from a local planning authority, under Regulation 15 of the EIA Regulations, involves the preparation of an EIA Scoping Opinion Request Report (or EIA Scoping Report) and its submission to the local planning authority is part of a formal request for their opinion on the content or 'scope' and approach to the EIA.

The purpose of scoping is to identify:

- The important environmental issues and topics for consideration in the EIA;
- The baseline conditions and assessment methodology to be used for assessment;
- Any potentially sensitive receptors that may be affected by the development being proposed;
- The appropriate space boundaries of the EIA: the site boundary and surrounding environmental context;
- The information necessary for decision-making; and
- The topics of which could result in potential significant effects from the development both during its enabling and construction and operation.

In accordance with the requirements of the Town and Country Planning (Development Management Procedure) Order 2015 (article 18, Schedule 4), this EIA Scoping Report will need to be issued by the local planning authority to the statutory consultees that are considered to have an interest in the EIA of the Proposed Development and should be consulted as part of the EIA Scoping process. It is expected that the local planning authority will also issue the Scoping Report to non-statutory and key, local stakeholders and interest groups who are deemed to similarly have an interest in the EIA of the Proposed Development.

The process of consultation is a key requirement of the EIA process, and the views of statutory consultees and other stakeholders help to identify specific issues, as well as identifying additional information in their possession, or of which they have knowledge, which may be of assistance in progressing the EIA.

The ES will append the EIA Scoping Report (this document) and SODC Scoping Opinion and include a summary of any other consultation undertaken as part of the EIA process.

EIA Methodology

The method behind the EIA process generally takes into account the existing conditions of the area into which the Proposed Development is being introduced (the ***baseline***) and makes reasonable predictions of the likely change (the ***impact*** – in terms of magnitude) that may occur, during both its construction and when the Proposed Development is completed and operating as proposed.

The predicted impact will be considered in terms of key environmental and social aspects (***receptor / resource***) found within the surrounding area and will be based on their sensitivity to change, and based on their sensitivity to change, the resulting ***effect*** is then determined. Any mitigation measures required to reduce or eliminate adverse effects are then considered and assessed, with the residual effect being determined as significant or not. The likely significant effects are then reported (within an ***environmental statement***) for consideration by SODC when considering whether to grant planning permission for a development.

The evolved baseline (i.e., consideration of the site conditions in the future if the Proposed Development were to not come forward), effect interactions (i.e., where one or more identified residual effects may combine to result in a significant effect), cumulative effects (i.e., where the Proposed Development residual effects may combine with potential effects arising from other local schemes) and alternatives and design evolution (i.e., setting out how the design has evolved in response to constraints and opportunities) will be considered as relevant within the ES.

Planning Policy / EIA Guidance

The ES will have regard to the National Planning Policy Framework (NPPF). The ES will also have regard to the following key regional and local planning documents. Any additional regional and local planning policy and guidance documents considered relevant to the technical assessments which are covered by the EIA will also be considered:

- The Oxfordshire Plan 2050[3] - comprises a joint statement from the leaders of South Oxfordshire District Council, Vale of White Horse District Council, Cherwell District Council, Oxford City Council, and West Oxfordshire District Council. The Oxfordshire Plan 2050 provides an integrated strategic planning framework and evidence base to support sustainable growth across the county to 2050, including the planned delivery of new homes and economic development, and the anticipated supporting infrastructure needed. As part of the plan, the authorities are committed to ensuring

[3] *Oxfordshire Plan 2050. Available at: https://oxfordshireplan.org/*

there will be early, proportionate and meaningful engagement between plan makers and communities, local organisations, businesses, infrastructure providers and statutory bodies.

- The South Oxfordshire Local Plan[4] - (adopted December 2020) indicates that the whole of the site lies within the Oxfordshire Green Belt (Policy STRAT6) and part of the site lies within Nuneham Courtenay Grade 1 Registered Park and Garden (covered by Policy ENV10). The site lies adjacent to the Nuneham Courtenay Conservation Area (ENV8). The Culham Science Centre lies to the south-east of the site (STRAT8) and an urban expansion area lies immediately to the to the west of the site (STRAT 9). The STRAT9 strategic allocation is for 217 ha to be developed to deliver approximately 3,500 new homes, with approximately 2,100 homes within the plan period, a net increase of at least 7.3 ha of employment land in combination with the adjacent Science Centre and supporting services and facilities. Relevant policies of the South Oxfordshire Local Plan include:
  - Policy ENV1: Landscape and Countryside;
  - Policy ENV2: Biodiversity – Designated Sites, Priority Habitats and Species;
  - Policy ENV3: Biodiversity;
  - Policy ENV6: Historic Environment;
  - Policy ENV10 (Registered Parks and Gardens and Historic Landscapes);
  - Policy DES1 - Delivering High Quality Development);
  - Policy DES2 - Enhancing Local Character;
  - Policy DES4 - Masterplans for Major Development;
  - Policy DES7 - Efficient Use of Resources;
  - Policy DES9 - Renewable and Low Carbon Energy;
  - Policy STRAT1 - Overall Strategy;
  - Policy STRAT6 (Green Belt) and Policy STRAT1 (Overall Strategy).
- A Neighbourhood Plan[5] is being prepared for the Parish of Culham; it is currently at the Draft Pre-Submission Stage. There is no Neighbourhood Plan for Nuneham Courtenay.

In addition, where relevant to the assessment, the technical chapters of the ES will also present a summary of any pertinent recognised industry guidance documents.

Topics where there is the Potential for Likely Significant Effects

Based on the understanding of the emerging Proposed Development, it is currently envisaged that the EIA will include assessments for the following technical aspects on the basis that there is the potential for likely significant effects:

Archaeology and Heritage

The terrace gravels located to the north and south of the site are rich in archaeological remains, especially those of Iron Age and Roman date. A recent geophysical survey undertaken in August 2022 demonstrates that Iron Age and Roman settlement activity identified immediately to the east of the is likely to continue into the site. As such, the Proposed Development is considered to have the potential to impact on archaeological assets as a result of construction.

Archaeology and Built Heritage will therefore be 'scoped in' to (i.e., included) the EIA, with a Cultural Heritage ES chapter prepared, with a supporting Desk Based Assessment (to be appended to the ES).

A report on the Geophysical Survey for the site will also be prepared and submitted with the planning application. The results of the Cultural Heritage ES chapter and Geophysical Survey will be used to inform the scope of pre-determination archaeological investigation, the extent of which will be outlined in a Written Scheme of Investigation to be produced by a Chartered Institute of Archaeology Registered Organisation and approved by the Archaeological Advisor to SODC.

[4] *South Oxfordshire District Council. (2020). The South Oxfordshire Local Plan 2011-2035. Available at: https://www.southoxon.gov.uk/south-oxfordshire-district-council/planning-and-development/local-plan-and-planning-policies/local-plan-2035/adopted-local-plan-2035/*

[5] *South Oxfordshire District Council. (2022). Culham Neighbourhood Plan. Available at: https://www.southoxon.gov.uk/south-oxfordshire-district-council/planning-and-development/local-plan-and-planning-policies/neighbourhood-plans/emerging-neighbourhood-plans/culham/*

Landscape and Visual Effects

The site lies within the Oxford Green Belt, with part of the site located within the Nuneham Courtenay Registered Park and Garden, with Nuneham Courtenay Conservation Area to the north of the site. The Proposed Development will be visible from a short section of the Oxford Green Belt Way, whereby to the north and east the site benefits from visual enclosure provided by Lock Wood and rising ground. The Proposed Development will not be visible from within the Thames valley. The Culham Science Centre and the proposed urban expansion area will provide enclosure to the south and west. The railway to the west passes the site in a cutting and so the Proposed Development will not be visible to rail users. No dwellings overlook the site apart from Warren Farm to the west which lies in the centre of a proposed urban expansion area (STRAT9 of the South Oxfordshire Local Plan).

The Proposed Development therefore has the potential to result in likely significant landscape and visual given the loss of rural character to the site, and location of the site partly within the Registered Park and Garden. It should be noted however that there will be no built development within the Registered Park and Garden, with works within this area associated with the Proposed Development only comprising landscaping and the upgrading of the existing farm track. The Proposed Development design has been an iterative process, responding to site constraints and stakeholder feedback to inform the scheme evolution. For example, the landscaping has been designed to compensate for the loss of rural character by providing enhancement to the setting of the higher quality Park and Garden that will remain. The highest quality area of the Park and Garden is defined by the Nuneham Courtenay Conservation Area. This area will be unaffected by the Proposed Development in terms of any direct effects or visual effects on its setting.

Landscape and Visual Effects will therefore be 'scoped in' to the EIA, with a Landscape and Visual Effects Assessment (LVIA) presented as Volume 2 of the ES.

Land Take and Soils (Agriculture)

The site is currently managed by a tenant farmer, harvested for hay and silage. An Agricultural Land Classification (ALC) survey of the site will be undertaken.

As the Proposed Development has the potential to result in the loss of agricultural land, and the potential loss of and damage to soil resources, Land Take and Soils will be 'scoped in' to the EIA, with a Land Take and Soils ES chapter prepared with a supporting ALC Survey Report (to be appended to the ES).

Climate Change

The purpose of the Proposed Development is to provide short term storage for the national electricity network and, in doing so, assist in the transition to Net Zero. The consequent reduction in fossil burning technologies due to added capability to store primarily renewable energy that the Proposed Development would provide is considered to be a beneficial climate change effect during operation.

In construction, greenhouse gas (GHG) emissions will be caused by construction traffic and plant and embodied in the materials and products consumed. However, on a lifecycle basis these are expected to be minor relative to the GHG reduction benefits of the Proposed Development, and as such construction phase effects are not considered likely to be significant, and are therefore scoped out of the EIA.

One of the main impacts of climate change in the UK is likely to be flooding, but as discussed below, the site is at low risk of flooding. The Flood Risk Assessment submitted in support of the planning application will consider the implications of climate change upon future flood risk potential and will identify any measures that need to be taken to render residual effects associated with flood risk insignificant.

In summary, no significant construction phase GHG emission or climate risk effects are considered likely. The beneficial indirect operational GHG emissions effect is likely to be significant,, and as such, Climate Change will therefore be 'scoped in' to the EIA, with a Climate Change ES chapter prepared to consider the potential operational climate change effects of the Proposed Development.

Topics Where Likely Significant Effects are Not Anticipated

The EIA Regulations promote early assessment work and the ability to rely on standard mitigation controls / environmental management measures that can be secured through the planning process as a way of streamlining EIAs. Based on a preliminary consideration of the potential for environmental effects as a result of the Proposed Development, no likely significant residual (i.e., post mitigation / management) environmental effects are envisaged in relation to the following technical aspects:

Water Resources, Drainage and Flood Risk

The site is located within Flood Zone 1 (low risk of flooding) and the risk of surface water flooding is low. The River Thames is located approximately 130m north of the site. Culham Brake Special Scientific Interest (SSSI) is located approximately 1.8km to the west of the site and Little Wittenham SSSI and SAC is located approximately 4.7km to the south-west of the site.

Given the distance of the statutory designated sites for nature conservation from the site, the potential impact of the Proposed Development to the water quality of the SSSIs is negligible. Furthermore, because of the low risk of surface water flooding and the location of the site within Flood Zone 1, flood risk and resulting effects are also negligible.

As the site exceeds 1 ha in size, the planning application will be supported by a Flood Risk Assessment (FRA) and supporting Conceptual Drainage Strategy. These documents will set out any required design commitments or additional mitigation to avoid significant adverse effects to flood risk and drainage. The FRA and Conceptual Drainage Strategy will be summarised within the ES and any required design commitments, or additional mitigation will be presented within the ES.

Standard water resources and drainage related management measures shall be implemented throughout the construction works. These management measures will mitigate the potential for significant adverse effects to water resources and drainage throughout the construction works, for example in relation to any potential contaminated surface water run-off into the River Thames. It is anticipated that these management measures will presented within a Construction Environmental Management Plan (CEMP) or equivalent, the requirement for which would be secured by the SODC through a planning condition.

Therefore, in respect of water resources, drainage and flood risk considerations, it is considered that no significant residual effects to water resources, drainage and flood risk are anticipated. As such, it is proposed that these topics be 'scoped out' of (i.e., excluded from) the EIA.

Ecology and Biodiversity

The site is not located within any local, national or international designated sites for nature conservation. Two internationally designated sites of nature conservation importance are located within 7km of the site; Little Wittenham Special Area of Conservation (SAC) and SSSI located approximately 4.7km to the south-west of the site and Cothill fen SAC located approximately 7km to the north-west of the site. Culham Brake SSSI is the closest national designation to the site, located approximately 1.8km to the west of the site. Lastly, there are three local non-statutory sites within 2km of the site; Furze Brake Local Wildlife Site (LWS) located approximately 760m to the north-east, Radley Gravel Pits LWS located approximately 850m to the north-west and Abbey Fishponds Local Nature Reserve located approximately 1.65km to the north-west of the site.

Ecological site surveys were undertaken between July to November 2022 (habitat survey, daytime tree assessments for bats and monitoring of potential badger setts). Following the surveys, an Ecological Impact Assessment (EcIA) has been prepared to identify the potential ecological impacts, mitigation, compensation and enhancement measures for the Proposed Development, as presented in **Appendix A**.

Results from the surveys identified that the site includes four fields containing modified grassland, two areas and margins of other neutral grassland, bare ground, hardstanding, scattered trees and scattered scrub. No ponds or waterbodies were identified within the site or within 500m of the site (aside from north of the River Thames which is located approximately 130m north of the site). The following protected and priority species were recorded as present or potentially present within the site:

- Badger setts at five or six locations and four latrines;
- Brown hare within the grassland habitats;
- Potential for common species of reptiles on the site boundaries and within the other neutral grassland habitat;
- Potential for foraging and commuting bats on the site boundaries with no opportunities for roosting within the site;
- Opportunities for nesting birds within the scattered trees and scrub; and
- Negligible opportunities for other protected or priority species.

Habitats within the site are of negligible intrinsic ecological interest due to being common and widespread, however, they are of biodiversity value, having a baseline value of 84.14 habitat units[6]. In the absence of mitigation, habitat loss to accommodate the Proposed Development would result in a loss of biodiversity habitat units and potentially reduce suitability of the site for badger, brown hare and reptiles. A CEMP will be produced (to be secured by condition) to identify measures to be adopted to ensure protection of valued features during the construction of the Proposed Development. Furthermore, a Landscape Environmental Management Plan (LEMP) will be produced (to be secured via condition) to ensure the appropriate design and long-term management of mitigation measures to protect and enhance the landscape character and biodiversity.

Mitigation measures and enhancements implemented by the Proposed Development include:

- The Defra 3.1 metric has been used to identify the baseline habitat value and inform the scheme design to deliver a gain of 19.53 habitat units (i.e., a 23.21% increase over the baseline), and 4.22 hedgerow units (i.e., a 100% increase);
- Habitats of value to wildlife potentially present within the local landscape will be created, including woodland, species-rich grassland and attenuation ponds. These habitats will represent enhancements for badger, nesting birds, reptiles and brown hare;

[6] *In line with the Defra 3.1 metric – Natural England (2022) Biodiversity Metric 3.1.*

- Two log piles will be installed in the north of the site for reptiles and invertebrates; and
- Features for nesting birds and roosting bats will be installed on mature scattered trees.

Given the implementation of the mitigation measures and enhancements proposed, it is considered unlikely that significant adverse ecological effects will be generated as a result of the Proposed Development and therefore it is proposed that this topic be scoped out of the EIA.

The EcIA is provided as **Appendix A** of this EIA Scoping Report, and will also be submitted in support of the planning application.

Following an arboricultural survey of the site in November 2022, the arboricultural impact of the Proposed Development is assessed to be 'low' when considering the implementation of mitigation measures, such as the provision of tree protection barriers for the retained trees during the construction phase, technical design considerations (routing and installation of utility apparatus and management of the potential for subsidence and heave) and the planting of new trees within the site.

An Arboricultural Impact Assessment and Biodiversity Impact Assessment of the Proposed Development will be submitted in support of the planning application. As demonstrated above, the Proposed Development delivers over 10% of Net Gain in line with the requirements of the Environment Act 2021[7]. The results of the Arboricultural Impact Assessment and Biodiversity Impact Assessment, along with a description of the ecological enhancements associated with the Proposed Development, shall be provided within the ES.

Geoenvironmental Conditions (Land Contamination, Ground Conditions and Groundwater)

The site is currently undeveloped agricultural land. The potential for any existing ground contamination during the construction phase of the Proposed Development is low. Furthermore, good practice measures for runoff management and materials storage to avoid spillages would be implemented through a CEMP. Therefore, significant effects on or due to ground contamination are unlikely during the construction phase.

The Proposed Development would not have any process discharges to land, surface or groundwater other than clean rainwater runoff during the operational phase and therefore, there is no potential for significant effects on hydrogeology or ground contamination in operation.

Lastly, there are no extant mineral operations, areas safeguarded for minerals or areas designated for geological interest on-site, thus there is no potential for significant effects on geological resources.

In summary, no significant effects on geology, hydrogeology or ground conditions during construction or operation are considered likely and therefore it is proposed that this topic be scoped out of the EIA.

Traffic and Transport

The presence of construction vehicles on the local highway network is expected during the construction of the Proposed Development associated with the delivery of the batteries, inverters and general civil and electrical engineering materials to the site. Most of these deliveries will consist of medium sized Heavy Goods Vehicles (HGVs) using the local highway during the construction period, taking access from Thames Lane. If the development is built through a continuous phase, it is anticipated that construction will last approximately 9-12 months.

The planning application will be accompanied by a Construction Traffic Management Plan (CTMP) developed in conjunction with the SODC's Highway Team to minimise construction phase impacts to local receptors, an Access Note, and an Abnormal Indivisible Load (AIL) Report.

The operational site will be unmanned and only occasional visits for inspection or maintenance will be required.

A Transport Assessment and an Abnormal Loads Assessment Report will also be prepared and submitted in support of the planning application.

It is therefore considered unlikely that significant adverse effects will be generated as a result of the Proposed Development and therefore it is proposed that this topic be scoped out of the EIA.

Noise

The existing noise sensitive receptors relevant to the site and Proposed Development include:

- Warren Farm, a residential receptor, located at approximately 830m to the west of the site boundary;

[7] *The Environmental Act 2021 will make Biodiversity Net Gain (BNG) mandatory, meaning developments will need to deliver at least 10% net gain increase in biodiversity .*

- Thame Lane, a residential receptor, located at approximately 750m to the south-west of the site boundary;
- OAS Offices of the Culham Science Centre, an office receptor, located at approximately 320m to the south of the site boundary; and
- RACE Offices of the Culham Science Centre, an office receptor, located at approximately 90m to the south of the site boundary.

The prevailing noise climate on-site and within the surrounding areas are expected to be dominated by road traffic noise on Abingdon Road (A415) and Oxford Road (B4015) to the south and south-east of the site respectively, railway noise related to the Great Western Railway (GWR) trains operating on the railway line to the west of the site and operational noise from the Culham Science Centre located to the south of the site.

The main noise sources associated with the Proposed Development would primarily be cooling units for the battery containers, inverter buildings and cooling units (air inlets and outlets) for the inverter buildings, inverter transformers and a substation including a grid transformer.

Construction phase noise and vibration activities (including construction traffic) will be temporary and controlled through good practice measures implemented as part of a CEMP (to be secured by condition), and no significant impacts during construction are therefore considered likely.

It is considered that there is no potential for operational vibration impacts due to the nature of the Proposed Development.

Operational road traffic for the Proposed Development is expected to be minor given the proposed use of the site (as set out above). Considering that the access to the site will be via busy A roads and through the Culham Science Centre, noise levels from the operational road traffic related to the Proposed Development are not considered to have a significant impact at local receptors.

Without mitigation, there could be the potential for significant adverse noise effects to sensitive receptors during the operation of the Proposed Development. The site will operate on a 24/7 basis, whereby the cooling fans of the battery storage units will most likely operate 24/7, but limited operation will be expected during night-time when temperatures and background noise levels are lower. The inverters within the inverter buildings and the inverter transformers are also expected to operate 24/7, but with a 50% on-time during daytime and 14.4% on-time during night-time. The Applicant has experience in a wide range of noise mitigation measures for BESS facilities. Therefore, whether it be via sound insultation to the containers, mechanical louvres, landscaped bunds or a combination of these and other mitigation measures, the Proposed Development will be designed so that the increase in background noise levels in night-time conditions shall be no more than 5dB.

Overall, significant effects arising from construction and operational noise and/or vibration are not considered likely. Therefore, it is proposed to scope noise and vibration out of the EIA.

Air Quality

Dust from construction work is not expected to cause any significant effects on the site's surrounding area and will be managed via controls presented within a CEMP, to be secured via planning condition. Furthermore, the operational phase of the Proposed Development is not anticipated to result in any adverse effects upon air quality given the minor number of operational vehicles (as noted above) and the nature of the Proposed Development (i.e., energy storage system).

As such, no significant effects are expected on air quality during both the construction and operational phase of the Proposed Development, and it is therefore proposed that this topic be scoped out of the EIA.

Waste and Materials

Waste generated during the construction of the Proposed Development will be re-used and recycled where possible. The overall objective would be to reduce the amount of waste generated during construction and to sustainably manage any waste that is generated using waste management facilities in closest proximity to the site where possible. Furthermore, measures will be implemented to reduce the quantity of materials used during the construction of the Proposed Development.

Appropriate waste handling, storage and disposal measures to avoid significant adverse effects in terms of waste and recycling during the construction, including appropriate management of any potential (unexpected) contamination identified on-site, will be set out within the CEMP to be secured by the SODC via a planning condition.

The Proposed Development would not generate any waste during operational phase and the materials anticipated to be required during this phase are expected to be limited to maintenance only, therefore significant adverse effects during operational phase would be unlikely.

Based on appropriate waste handling, storage and disposal design and management measures, no significant effects associated with waste and material are anticipated and, on this basis, it is proposed that this topic be scoped out of the EIA.

Project Vulnerability

In line with the EIA Regulations, likely significant effects on the environment or the project arising from the vulnerability of the Proposed Development to major accidents or disasters need to be considered.

Fire risk is the only potentially relevant accident or disaster for the Proposed Development. The spacing of containers will be based on National Fire Protection Association standard NFPA855 (standard for the installation of stationary energy storage systems) which requires a 10ft separation between containers. NFPA855 is a commonly applied and well-respected standard for batteries in the UK.

The likely battery technologies have also been tested to UL9540A to rack level and the Lithium Iron Phosphate chemistry does not exhibit thermal runaway until temperatures are in the region of 150-200 degrees C, which is well above all thermal cut outs, and almost certainly never to be seen in operation. The batteries themselves also have overtemperature protection and fire suppression initiation.

Given the design of the Proposed Development in line with the relevant industry guidance, significant effects are unlikely, and it is therefore proposed that this topic be scoped out of the EIA.

Socio-Economics and Health

During construction, the temporary employment opportunities and local supply chain spending can have a beneficial effect on socio-economic health pathways, but this is considered to be minor and not significant; and similarly, the small number of long-term specialist operator and maintenance jobs created in operation are not likely to have significant population or health effects.

Furthermore, the Proposed Development will not affect access to green space or recreation. The footpath crossing the southern extent of the site (which forms part to the Oxford Greenbelt Way), will be redirected, although subject to separate agreements.

Human health effects with regards to other technical assessments (e.g., transport, air quality, noise, etc.) are not considered to be significant, as set out above.

In summary, no significant effects on relevant socio-economic or health attributes are considered likely during construction or operational phases of the Proposed Development. Therefore, it is proposed this topic be scoped out of the EIA.

Other Technical Topics

Given the scale and nature of the Proposed Development, other environmental topics such as daylight, sunlight, overshadowing, and solar glare and wind microclimate are not considered to be relevant, and therefore are scoped out of the EIA.

Cumulative Effects

The EIA Regulations require that, in assessing the effects of a particular development proposal, consideration should also be given to the likely significant effects arising from the *"cumulation with other existing and/or approved projects"* (Schedule 4, 5l).

Cumulative effects can occur as interactions between the effects associated with several projects in an area (referred to as 'cumulative schemes') which may, on an individual basis be insignificant, but together (i.e., cumulatively), result in a significant effect.

Generally, the cumulative schemes are based on the information available on the local authorities planning register, whereby those included within the cumulative effects assessment fall under one (or more) of the following criteria:

- Schemes that will produce an uplift of more than 10,000m^2 (Gross External Area (GEA) of mixed-use floorspace), or over 150 residential units, whereby they:
  - have full planning permission, a resolution to grant permission; or
  - have been submitted (but not yet permitted), where considered appropriate.

These parameters have been set to allow all the schemes coming forward within the area of the site to be subject to an initial screening exercise to determine the schemes that, based on the scale of redevelopment (amount and mix of uses), could potentially have a cumulative effect with the Proposed Development and should be considered further within the cumulative effects assessment of the EIA. By applying these parameters, the cumulative effects assessment of the EIA is able to be more focused on relevant schemes (i.e., those with the potential to interact in a cumulative manner).

Applying the above parameters to the site, no relevant cumulative schemes have been identified for consideration within the EIA. However, as noted previously in this EIA Scoping Report, an urban expansion area lies immediately to the west of the site (STRAT 9 of the South Oxfordshire Local Plan). The STRAT9 strategic allocation is for 217ha to be developed to deliver approximately 3,500 new homes, a net increase of at least 7.3ha of employment land in combination with the adjacent Science Centre and supporting services and facilities. As a formal planning application (or applications) for development in relation to this strategic allocation has not yet been submitted, it is not possible to undertake a quantitative cumulative impact assessment of the Proposed Development in combination with any future development within this area (for example in relation to the

potential visual cumulative impact) as part of the EIA. As such, it is proposed that the ES includes qualitative consideration of the strategic allocation to assess the potential for any likely significant future cumulative effects, although noting that this will be subject to future design and permissions sought within the strategic allocation area.

It should be noted that for the topics scoped out of the EIA, as set out above, the potential for significant cumulative effects when considering the strategic allocation has been taken into account, whereby no scoped out technical topics anticipate any significant cumulative effects.

Format and Content of the ES

The proposed scope and structure of the ES is as follows:

- **ES Volume 1: Main ES** – a document which forms the main body of the ES and which comprises several non-technical and technical chapters;
- **ES Volume 2: Landscape and Visual Impact Assessment** – a separate assessment document that will be accompanied by a full set of views, as agreed with SODC as part of the EIA Scoping process;
- **ES Volume 3: Appendices** – comprises relevant background data, technical reports, tables, figures and surveys;
- **ES Non-Technical Summary (NTS)** - this will be a separate document providing a concise description of the Proposed Development, the alternatives considered, any identified mitigation measures and the residual likely significant environmental effects.

Formal Request for an EIA Scoping Opinion

This EIA Scoping Report requests a Scoping Opinion of the SODC pursuant to Regulation 15 of the EIA Regulations.

This EIA Scoping Report suggests a comprehensive scope of work based on the previous experience of the assembled team of specialists and knowledge of the site. The SODC and consultees are invited to consider the contents of this EIA Scoping Report and comment accordingly within the five-week period prescribed by the EIA Regulations.

APPENDIX A – DRAFT ECOLOGICAL IMPACT ASSESSMENT REPORT

Ecological Impact Assessment (non-EIA)

ecologybydesign

Culham Battery Storage

On behalf of Statera Energy

December 2022

Ecology by Design Ltd,

Hampden House, Monument Park, Chalgrove, Oxon OX44 7RW.

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Registered in England and Wales No. 9318075.

Project Code	Title	Date of Issue
EBD02513	Culham Battery Storage	08 December 2022

	Name	Date
Prepared by	Laura Grant BSc (Hons), MCIEEM	21 November 2022
Checked by	Ben Gardner BSc (Hons), MCIEEM, CEnv	22 November 2022
Updated by	Laura Grant BSc (Hons), MCIEEM	08 December 2022

Contents

1 Executive Summary

Report purpose	This report identifies the potential ecological impacts, mitigation, compensation and enhancement measures for installation of a 568 unit battery storage facility.
Date and methods of survey	Surveys of the site were conducted throughout July-November 2022 including: • An extended habitat survey; • Daytime tree assessments for bats; and • Monitoring of potential badger setts.
Key findings	The site, situated north of Culham Science Centre is c. 27.85ha in extent and includes four fields containing modified grassland, two areas and margins of other neutral grassland, bare ground, hardstanding, scattered trees and scattered scrub. There are no ponds within the site or 500m of the site (aside from north of the River Thames which is 130m north of the site). Protected and priority species present or potentially present include: • Badger setts at five or six locations and four latrines; • Brown hare within the grassland habitats; • Potential for common species of reptiles on the site boundaries and within the other neutral grassland habitat; • Potential for foraging and commuting bats on the site boundaries (there are no opportunities for roosting within the site); • Opportunities for nesting birds within the scattered trees and scrub; and • Negligible opportunities for other protected or priority species.
Potential impacts	Habitats within the site are of negligible intrinsic ecological interest due to being common and widespread, however, they are of biodiversity value, having a baseline value of 84.14 habitat units. In the absence of mitigation, habitat loss to accommodate the proposals would result in a loss of biodiversity habitat units and potentially reduce suitability of the site for badger, brown hare and reptiles.
Measures to avoid and/or reduce impacts and deliver biodiversity enhancements	• The Defra 3.1 metric has been used to identify the baseline habitat value and inform the design scheme to deliver a gain of 19.53 habitat units i.e. 23.21% increase and 4.22 hedgerow units i.e. 100% increase; • Habitats of value to wildlife potentially present within the local landscape will be created including woodland, scrub, species-rich grassland and attenuation ponds. These habitats will represent enhancements for badger, nesting birds, reptiles and brown hare; • Two log piles will be installed in the north of the site for reptiles and invertebrates; and • Features for nesting birds and roosting bats will be installed on mature scattered trees.

2 Introduction

2.1 Background and Site Description

2.1.1 Ecology by Design Ltd was commissioned by Statera Energy to undertake a Preliminary Ecological Appraisal (PEA) of a potential battery storage facility north of Culham Science Centre Thames Lane, Culham, OX14 3ES at approximate central grid reference SU 52879 96551.

2.1.2 The site is c. 27.85ha in extent and comprises four large fields used for non-cereal crops (permanent modified grasslands harvested for hay and silage) and two areas of other neutral grassland. The fields had been mown when the survey was conducted in July 2022, with small strips on the field margins remaining unmown. There are occasional scattered trees and scrub within the site.

2.1.3 In the wider landscape, there is mixed woodland immediately north of the site, the River Thames runs from east to west 130m north of the site, there are additional non-cereal fields to the north and south-west and Culham Science Centre to the south-east.

2.2 Proposed Works

2.2.1 The proposal includes the creation of a battery storage facility to include 568 batteries with internal infrastructure (Statera Energy Dwg No. SL254_L_X_GA_1). The batteries will sit on concrete plinths with gravel separating the units. There will be a compound fence surrounding the batteries for security, comprising propriety weld mesh fence 2.5m height with a cranked top 0.5m height supporting three strands of barbed wire. A hedgerow will also be included on the western and southern boundary. Woodland and scrub will be planted outside the boundaries of the compound and the existing grasslands outside the construction zones will be enhanced to deliver neutral grassland. Two attenuation basins will be created in the south.

2.3 Aims of Report

2.3.1 This report is an Ecological Impact Assessment which presents the approach and findings of the assessment of the potential ecological impacts of the proposed development works in accordance with industry standard guidance (CIEEM, 2019; BSI Standards Limited, 2013). It has been produced following a Preliminary Ecological Appraisal and further surveys for badger in order to be confident in the potential impacts of the proposals and how these could be mitigated. The development does not require an Environmental Impact Assessment (EIA), therefore 'non-EIA' has been included on the title page.

2.3.2 This report will be submitted to South Oxfordshire District Council to inform the planning application.

2.4 Personnel

2.4.1 The site survey was conducted, and report was prepared by Associate Ecologist Laura Grant BSc (Hons) MCIEEM. Laura has been an ecological consultant for 15 years and routinely conducts assessments for sites of this scale.

2.4.2 Review of the report was conducted by Director Ben Gardner who has 17 years experience in ecological consultancy.

3 Methods

3.1 Desk Study

3.1.1 A desk study was carried out to identify:

- internationally protected sites within the potential zone of influence of the site (7km)
- nationally protected sites within 5km of the site
- non-statutory designated sites and records of protected or priority species within 2km of the site

3.1.2 A 2km search radius for species and non-statutory designated sites is justified as an industry standard due to the small-scale category of development proposed at the site. It is thought highly unlikely that species or non-statutory sites outside of the search zone would be negatively impacted by the scale and type of development proposed at the site. A larger search radius is applied for internationally and nationally designated sites as these sites are protected to a higher level and can often be more sensitive to impacts. These search distances are also based on industry standard guidance and exceed the minimum distances recommended for international designated sites.

3.1.3 Sources consulted include:

- Thames Valley Environmental Records Centre (TVERC) (Received: 11 July 2022)
- MAGIC (www.magic.gov.uk) (last accessed 16 November 2022)
- publicly accessible data from Natural England
- local planning policy documents

3.2 Preliminary Ecological Appraisal

3.2.1 A Preliminary Ecological Appraisal (PEA) was conducted on 12 July 2022 by Ecology by Design Associate Ecologist Laura Grant BSc MCIEEM using standard techniques and methodologies (CIEEM, 2017) and the nomenclature of Stace (2019). Weather conditions during the survey were warm (23°C), breezy (wind 2 on the Beaufort scale[1]) and overcast (cloud 8/8[2]).

3.2.2 There was a small extension to the red line boundary proposed in the south of the site, encompassing an area of other neutral grassland, therefore this area was subject to survey by Laura on 16 November 2022. Weather conditions during the further survey were cool (10°C), calm (wind 1 on the Beaufort scale[3]) and bright (cloud 3/8[4]).

3.2.3 The PEA includes a survey of the habitats utilising the UK Habitat Classification System (Butcher *et al*, 2020). The DAFOR scale was used to provide a quick estimate of the relative abundance of plant species in a given area, where Dominant equates to >75% cover, Abundant is 51-75%, Frequent is 26-50%, Occasional is 11-25% and Rare is 1-10%. Species counts within a specific area were made where required to assess habitat condition. Photographs of the site are given in Appendix 1 and a UKHab habitat map is included in Appendix 2.

3.2.4 Opportunities for or evidence of protected and priority species were also identified. Where potential impacts on features of ecological interest are identified, the PEA is extended to include an assessment of impact. Any further surveys required are outlined and recommendations are made for appropriate avoidance, mitigation, compensation and enhancement measures.

3.3 Ecological Impact Assessment (non-EIA)

3.3.1 Wherever potential impacts as a result of the proposals were identified, an Ecological Impact Assessment (EcIA) was undertaken. The function of the EcIA was to identify, quantify and evaluate the potential effects of the proposed development on designated sites, notable/protected habitats and species. The EcIA was informed by the desk study, PEA, a ground level tree assessment and badger survey detailed in Section 3.4 undertaken with reference to best practice guidelines (CIEEM, 2019) whereby:

- the scope of the EcIA was informed by a desk study and initial site survey;
- importance of ecological features within the site was established and ecological importance identified with reference to known criteria and geographic context where appropriate and available;
- assessment of potential impacts of the proposed development was made with reference to their significance and geographic context; and
- avoidance, mitigation, compensation and enhancement measures were identified and recommended as appropriate.

[1] The Beaufort scale is an empirical measure from 0-12 which relates wind speed to observed conditions. 0- Calm, 1- Light air, 2- Light breeze, 3- Gentle breeze, 4- Moderate breeze, 5- Fresh breeze etc.
[2] Cloud cover is measured using the system called oktas. The visible sky is divided into eight and cloud presence is determined within each section. A value of one to eight is then assigned (1 okta being cloudless to 8 oktas being total cloud cover).

[3] The Beaufort scale is an empirical measure from 0-12 which relates wind speed to observed conditions. 0- Calm, 1- Light air, 2- Light breeze, 3- Gentle breeze, 4- Moderate breeze, 5- Fresh breeze etc.
[4] Cloud cover is measured using the system called oktas. The visible sky is divided into eight and cloud presence is determined within each section. A value of one to eight is then assigned (1 okta being cloudless to 8 oktas being total cloud cover).

3.4 Ground Level Tree Assessment

3.4.1 A ground level tree assessment was conducted by Laura Grant (Natural England Licence 2015-10871-CLS-CLS) whilst conducting the habitat surveys. Laura has held a Level 2 bat licence since 2012 and an Earned Recognition licence since 2022.

3.4.2 The surveyor used a high-power torch (LEDLenser Lamp) and 10x42mm binoculars to identify features of interest. Where possible, each aspect of the tree was inspected to identify features with potential to support roosting bats such as woodpecker holes, rot holes, splits, cracks, flaking bark and/or ivy cover. Where any evidence of use by bats such as droppings, staining or scratches around such features were present this was noted.

3.4.3 Each tree or cluster of trees was identified as having high, medium, low or negligible suitability for roosting bats. Collins (2016) categorizes the suitability of trees for roosting bats as follows:

- Negligible = Negligible habitat features likely to be used by roosting bats.
- Low = A tree of sufficient size and age to contain potential roosting features but with none seen from the ground or features seen with only very limited roosting suitability.
- Medium = A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
- High = A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

3.5 Badger Survey

3.5.1 A badger (*Meles meles*) survey was conducted by Laura Grant whilst conducting the PEAs. The badger survey involved walking across the site searching for evidence of badgers and badger activity in accordance with standard guidance (Gov.uk, 2015). Any badger setts found were defined as main / annexe / subsidiary / outlier sett as adapted from Neal and Cheeseman (1996) and Harris *et al*. (1989). In addition to badger setts other evidence of badgers was also recorded. This included:

- Live or dead badgers;
- Foraging scrapes (distinctive excavations made by badgers when searching for food);
- Badger dung;
- Dung pits (a badger will often deposit its dung within a small excavated pit);
- Latrines (a collection of dung pits) (Roper, 2010);

- Badger guard hairs;
- Mammal paths; and
- Badger tracks.

3.5.2 Current UK Government guidance (Gov.uk, 2015) suggests that sett entrances should be monitored over an extended period of time, e.g. up to four weeks, to identify whether they are active. Camera traps were used at S1, S2 and S5 and sand was installed at the entrance of setts S1 and S2 (to record footprints), as well as sticks (to see if animals are entering or exiting) to create hair traps. The three wildlife cameras were deployed within the site positioned at entrances to burrows at:

- ///flush.magnetic.masterful (S1);
- ///yards.penned.crinkled (S2); and
- ///crossword.deeds.mimes (S5).

3.5.3 The cameras were deployed from 20 July 2022 until 19 August 2022 at S1 and S2, and 24 August to 18 October 2022 at S5 recording continuously throughout these periods. The cameras were set to trigger photographs and videos. The footage was reviewed to identify the activity of badgers within the site.

3.6 Biodiversity Impact Assessment

3.6.1 Data from the PEA and the proposed site plan were used to complete DEFRA's Biodiversity Metric 3.1: Calculation tool (Natural England, 2022) using the published DEFRA Technical Supplement (Panks *et al*., 2022). The proposed landscape scheme (Statera Energy Dwg No. SL254_L_X_GA_1) was used to calculate the change in biodiversity on site as a result of the proposed development. The full results of the Biodiversity Impact Assessment are reported on separately (Ecology by Design, 2022). Figures 1-3 in Appendix 2 indicate the baseline habitats, impacts and proposed habitats respectively.

3.7 Limitations/Constraints

3.7.1 The ecological work and surveys undertaken within the site accorded with published good practice methods and guidelines.

3.7.2 The grasslands within the fields were harvested ahead of the habitat survey in July 2022. The surveyor was able to readily identify the species within the sward therefore this is not considered to have constrained the identification of habitats or their condition.

3.7.3 Whilst July is a sub-optimal time of year to conduct ground level tree assessments due to leaves potentially concealing features of interest, this is not considered to be a significant constraint

at the site as the majority of trees are immature and/or have open canopies with features readily identified.

3.7.4 The potential sett at ///solves.punts.fists (S3) was not discovered until 16 November 2022 when the red line boundary was extended. As there has not been the opportunity to monitor the sett, for the purposes of this assessment, the sett is assumed to be active and appropriate mitigation measures have been recommended to ensure the protection of badgers.

3.7.5 The other neutral grasslands in the south and west of the site were previously due to be retained, however, now a small area of the western grassland will be lost to create woodland and the southern will accommodate part of a compound and an attenuation pond. The other neutral grassland habitats are structurally suitable to support reptiles. For the purposes of this assessment it is assumed that reptiles are present and appropriate mitigation, compensation and enhancement measures have been recommended to ensure the favourable conservation status of the populations present will be maintained within the site.

4 Results and Interpretation

4.1 Designated Sites

4.1.1 The desk study identified two internationally designated sites of nature conservation importance within 7km of the site, one nationally designated sites of nature conservation importance within 5km and three non-statutory sites within 2km of the site. These sites are detailed in Table 4.1.

Table 4.1: *Records of Statutory and non-statutory designated sites (7km for International, 5km for National designations and 2km for local designations)*

Site Name and Designation *	Distance (km) and direction	Description
International designations		
Little Wittenham SAC SSSI	4.7km SW	69ha designated for it's Great Crested Newt *(Triturus cristatus)* (GCN). Two main ponds within broadleaved and conifer woodland containing a very large GCN population.
Cothill fen SAC	7km NW	43ha of the largest surviving alkaline fen in central England with rare M13 *Schoenus nigricans* vegetation type.
National designations		
Culham Brake SSSI	1.8km W	1.5ha of wet willow woodland by the River Thames containing one of the largest British populations of the summer snowflake (*Leucojum aestivum*) a Red Data Book plant species.
Local non-statutory sites		
Furze Brake LWS	760M NE	17.8ha of woodland, it houses the most important heronry in the upper Thames basin, with nearly 50 active nests.
Radley Gravel Pits LWS	851m NW	171ha of restored gravel works and landfill into large waterbodies with sedge and reedbeds valuable for birds, plants, invertebrates and bats.
Abbey Fishponds LNR	1.65km NW	5.6ha of fen with dry rough grassland banks, tall herb and woodland. Past records for scarce oxford species including devil's-bit scabious (*Succisa pratensis*), purple moor-grass (*Molinia caerulea*), common spotted orchid (*Dactylorhiza fuchsii*) and southern marsh- orchid (*Dactylorhiza praetermissa*). The site contains Water vole, bats and notable birds.

* Where:

SAC= Special Area of Conservation (International Designation, Statutory)

SSSI = Site of Special Scientific Interest (national designation, statutory)

LNR=Local Nature Reserve (local designation, non-statutory)

4.2 Habitats

4.2.1 The following habitats were recorded on site (see habitat map at Appendix 2 and species list at Appendix 4):

Table 4.2: *Habitat types identified during the habitat survey*

Habitat type	Description (including UKHab codes in brackets where relevant)
Modified grassland (g4) / Cropland – Non-cereal crops (c1c)	There are four large fields within the site which support modified grassland (or non-cereal crops) mown (64) for hay (65). The grasslands were each very dry (117) during the survey and exhibited poor species-diversity and uniform sward height due to hay harvesting. Field F1 in the north has been sown with perennial ryegrass (*Lolium perenne*), and includes occasional cock's-foot (*Dactylis glomerata*), sterile brome (*Bromus sterilis*), and Yorkshire fog (*Holcus mollis*), and rarely occurring timothy (*Phleum pratense*), soft brome (*Bromus hordeaceus*) and annual meadowgrass (*Poa annua*). Forbs were rarely offering within the field and included field pansy (*Viola arvensis*), common poppy (*Papaver rhoeas*) and scentless mayweed (*Tripleurospermum inodorum*). See photograph 1. Fields F2-4 (Photographs 2-4) were grass-dominated and 5-10cm height, typically containing frequent Yorkshire fog, cock's-foot, perennial ryegrass and false oatgrass (*Arrhenatherum elatius*), occasional red fescue (*Festuca rubra*), timothy and wall barley (*Hordeum murinum*) and rarely occurring sterile brome. Field F6 currently includes a maize crop. Field F7 is a newly sown perennial ryegrass field with no additional species noted. All modified grassland within the site is in poor condition.
Other neutral grassland (g3c)	The margins of the fields were typically 1-2m wide with a uniform grass-dominated sward of 1m height, with frequent false oatgrass, Yorkshire fog, cock's-foot, perennial ryegrass and yarrow (*Achillea millefolium*), occasional agrimony (*Agrimonia eupatoria*) and wild parsnip (*Pastinaca sativa*), rarely occurring nettle (*Urtica dioica*), hogweed (*Heracleum sphondylium*), curled dock (*Rumex crispus*), wild carrot (*Daucus carota*), field bindweed (*Convolvulus arvensis*), creeping cinquefoil (*Potentilla reptans*) and bramble (*Rubus fruticosus* agg.). Along the central access road white stonecrop (*Sedum album*) was also present. In the east of F3 and south of the access road are two areas of other neutral grassland which are infrequently managed, resulting in tussocky grassland habitat. The sward heights include some variation due to grazing by rabbits, typically being 5-50cm height with small areas of bare ground where rabbits have foraged. The sward includes frequent false oatgrass, cock's-foot, red fescue (*Festuca rubra*) and ribwort plantain, occasional Yorkshire fog, a vetch (*Vicia* sp.), nettle, yarrow and dove's-foot crane's-bill (*Geranium pusillum*) and rarely occurring teasel (*Dipsacus fullonum*), creeping cinquefoil, dandelion (*Taraxacum officinalis* agg.), bramble, cleavers (*Galium aparine*), white clover (*Trifolium repens*), common stork's-bill (*Erodium cicutarium*), white campion (*Silene latifolia*), wavy hair grass (*Deschampsia caespitosa*) curled dock (*Rumex crispa*), common sorrel, field bindweed and perforate St John's-wort (*Hypericum perforatum*). All other neutral grassland within the site is in moderate condition.
Mixed scrub (h3h)	In the east of the site is 0.33ha of mixed scrub which appears to have been planted in c. 2010 and is typically 3m height with some already existing pedunculate oak (*Quercus robur*) or faster growing trees cherry (*Prunus* sp.) and douglas fir (*Pseudotsuga menziesii*) being up to 7m height. The scrub is species-rich, containing frequent hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*) and dogwood (*Cornus sanguinea*), occasional hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), wayfaring tree (*Viburnum lantana*), and European larch (*Larix decidua*) and rarely occurring walnut (*Juglans regia*), cherry, sycamore (*Acer pseudoplatanus*) and Scots pine (*Pinus sylvestris*). The understorey is typical of the field margins. See Photograph 10.
Bramble scrub (h3d)	In the south-east of the site is 0.52ha of scrub dominated by bramble c. 1m height including rarely occurring scattered elder (*Sambucus nigra*), hawthorn and rose (*Rosa* sp.). See photograph 11.
Bare ground (73)	There was an area of recently cleared bare ground in proximity to the southern central pylon. See Photograph 6.
Road (111)	Hardstanding roads bisect the site. See Photograph 7.
Scattered tree (11)	There are infrequent scattered trees within the site including turkey oak (*Quercus cerris*), ash, plum (*Prunus* sp.), large-leaved lime (*Tilia platyphyllos*), apple (*Malus* sp.) and pedunculate oak (*Quercus robur*).
Scattered scrub (10)	There is scattered scrub within the site including occasional elder (*Sambucus nigra*) beneath the pylons within the centre of the fields and on the boundaries, English elm (*Ulmus minor*) and hawthorn (*Crataegus monogyna*).

Conclusion

4.2.2 Habitats within the site are of negligible value in accordance with the geographic criteria in Appendix 2, however, the habitats are of biodiversity value, as detailed within Section 4.4.

4.3 Protected Species

4.3.1 In Table 4.3 the findings of the desk study and Preliminary Ecological Appraisal are presented together. Relevant legislation and policy is referred to as appropriate and further details are provided in Section 6. The presence or potential for each species/group to occur within the site is considered.

Table 4.3: *Presence of or potential for protected / notable / invasive species within the site and local area*

Species	Protection or Status *	Presence/potential at the site
Badger (*Meles meles*)	Protection of Badgers Act 1992.	The desk study returned 30 badger records within 2km. 13 records were of badger setts including one recorded on site (S2 on Figure 1) and another c. 40m and 100m south in 2020 (S5 on Figure 1). Low numbers of badger are frequently active within the site. Six badger setts and four latrines have been identified within / adjacent to site. See further details within the *Badger monitoring* section below.
Bats	EPS. Some species are also SPIs. W&CA 1981 Sch5	The desk study returned 754 records of 11 bat species. 711 of them where within 1km of the site and two roost records were within 2km. MAGIC returned three records of European Protected Species Mitigation licenses for bats within 2km of the site. Two were for common pipistrelle (*Pipistrellus pipistrellus*) and one was

		for brown long-eared and Natterer's bat (*Myotis nattereri*). All licences were granted in 2020. The open fields of the site are likely to be of limited value for foraging and commuting bats due to their open nature and absence of linear features or shelter. The woodland edge on the northern boundary is likely to be suitable for foraging and commuting bats and there are some trees on the boundary also supporting features with suitability for roosting bats. The scattered trees on site all have negligible potential to support roosting bats.
Birds	W&CA 1981 Sch1 / Sch5	The desk study returned 25,200 records of 107 species of protected or notable bird species. Of these records 313 of 18 species were recorded within the site boundary and 158 are protected species records. The resolution of these records is 1km square. Species with potential to make use of habitats within the site include 75 records of barn owl (*Tyto alba*), 175 records of fieldfare (*Turdus pilaris*), 581 records of red kite (*Milvus milvus*), 426 records of redwing (*Turdus iliacus*) and 614 records of skylark (*Alauda arvensis*). No skylark were audible within this site. The grassland fields contain limited floristic diversity and comprise single-height swards with no bare ground, limiting the suitability for breeding skylark. The scattered trees and to a lesser extent, scattered scrub, provide suitable habitat for a range of birds associated with farmland habitats.
Dormouse (*Muscardinus avellanarius*)	EPS. SPI. W&CA 1981 Sch5	No records of the species were returned by the desk study. The habitats within the site are unsuitable for the species due to their structure, isolation and/or age.
Otter *(Lutra lutra)*	EPS. SPI. W&CA 1981 Sch5	102 records of otter were returned within 2km of the site. The nearest record was 136m north in the River Thames from 2011. 52 of the records were within 1km of site.
Water vole (*Arvicola amphibius)*	W&CA 1981 Sch5	There were 56 water vole records returned, eight of which were within 1km of the site. The closest record was 300m from the site in 2009. All records are from 2015 or earlier. The
Other wild mammals	Various	No records of brown hare (*Lepus europaeus*) were recorded, however, droppings of the species were recorded within Fields F1 and F2. The desk study returned three records of harvest mouse (*Micromys minutus*) nests all earlier than 2011 and over 1km from site. The narrow arable field margins and areas of unmown grassland are of limited suitability for the species. One record of European hedgehog (*Erinaceus* europaeus) was also recorded in 2020 over 1km away. The grassland habitats provide potential foraging habitat for the species.
Reptiles	ESP W&CA 1981 Sch5	The desk study returned a record of a breeding adder (***Vipera berus***) pair 1.4km from site in 1995. Other reptile records included 46 grass snake (*Natrix natrix*) records, the closest was 124m from site in 2010, and a slow-worm (*Anguis fragilis*) record 1.km from site in 2015. The structure of the other neutral grasslands are suitable for common species of reptile.

Great crested newt (*Triturus cristatus*) and other amphibians	EPS. SPI. W&CA 1981 Sch5	382 records were returned within 2km of the site, 361 were within 1km but none were recorded on site. The closest record was 290m north in 2015. MAGIC returned two records of European Protected Species Mitigation licenses for great crested newt within 2km of the site, both with a start date of 2015 and north of the River Thames. The River Thames is c. 50m wide and strongly flowing adjacent to the site therefore this is likely to act as a barrier to dispersal for great crested newts. There are no ponds within 500m of the site south of the River Thames. The species are therefore considered unlikely to be present or impacted by the proposals.
White-clawed crayfish (*Austropotamobius pallipes*)	EPS. SPI. W&CA 1981 Sch5	No records of the species were returned by the desk study. Three records of signal crayfish (*Pacifastacus leniusculus*) were returned from the River Thames therefore it is considered likely that the species is not present either due to competition or introduction of the crayfish plague.
Invertebrates	W&CA 1981 Sch5 & Sch9	The desk study returned 23 records of five Protected butterfly species including white admiral (*Limenitis Camilla*), purple emperor (*Apatura iris*), dingy skipper (*Erynnis tages*) small heath (*Coenonympha pamphilus*), and Grizzled skipper (*Pyrgus malvae*). 19 were recorded within 1km of site however none were recorded on site. 134 protected or notable moth species were also returned with the closest record being a Shaded Broad-bar (*Scotopteryx chenopodiata*) 132m away. There were ten records of three protected bee and wasp species all within 1.3km of the site. The closest was 405 m away in 2011. One record of the protected rugged oil beetle (*Meloe rugosus*) was also returned by the desk study as 906m from site in 2006. The site offers limited opportunities for an assemblage of species typical of arable habitats.
Protected plants	W&CA 1981 Sch8	181 records of 44 species of notable or protected flowering plants were returned by the desk study. Four of the notables were indicated to be present within the site including Common cudweed (*Filago vulgaris),* Field Pepperwort (*Lepidium campestre*), Knotted Clover (*Trifolium striatum*), and Prickly Poppy (*Papaver argemone)*. These species are Red listed or scarce in Oxford. The records range between 1997-2020. No protected or notable plant species were recorded during the PEA and are considered unlikely to be present given the sward composition.
Invasive species	W&CA 1981 Sch9	139 records of invasives were returned by the desk study. Nine species of invasive plants were recorded including Japanese knotweed (*Reynoutria japonica*), Himalayan Balsam (*Impatiens glandulifera*), and Rhododendron (*rhododendron ponticum)*. None of these records are on site but the closest was 213m away. 49 records where within 1km. No invasive species were recorded within the site.

		Records of five aquatic invasive species were returned (predominantly from the River Thames) including signal crayfish, zebra mussel (*Dreissena polymorpha*), American mink (*Neovison vison*), Ruddy Duck (*Oxyura jamaicensis*) and red eared terrapin (*Trachemys scripta elegans*). The site does not provide increased potential for invasive animal species and none were recorded.

* Where:

EPS = European Protected Species under the provisions of the Conservation of Habitats and Species Regulations 2017 (as amended)

SPI = Species of Principal Importance under Section 41 of the NERC Act 2006

W&CA 1981 = Wildlife and Countryside Act 1981 (as amended)

Sch1 = Schedule 1 Birds which are Protected by Special Penalties (W&CA 1981)

Sch5 = Schedule 5 Animals which are Protected (W&CA 1981)

Sch8 = Schedule 8 Plants which are Protected (W&CA 1981)

Sch9 = Schedule 9 Animals and Plants to which Section 14 Applies (W&CA 1981)

Ground level tree assessment

4.3.2 There are two off-site ash trees on the woodland edge in the north-west of the site which were identified as supporting potential roost features; a low suitability torn limb with a downward facing feature and a south-facing rot hole of moderate suitability.

4.3.3 The remainder of trees within or adjacent to the site were identified as having negligible potential to support roosting bats.

Badger monitoring

4.3.4 During the badger monitoring, infrequent activity of badger was recorded in proximity to setts S1 and S2, with no badger recorded entering or leaving the sett entrances and no badger hairs being captured on the sticky traps. There are likely to be additional sett entrances on the embankment west of S2. Badger were recorded squeezing beneath the fence at this location and were actively using a latrine west of the fence.

4.3.5 S3 was not subject to monitoring but was of a suitable size for badger. There was no vegetation within the entrance and there was a well-worn path at the entrance along with a single rabbit dropping (see Photograph 8).

4.3.6 Camera monitoring of S5 for nearly two months recorded six passes by badger, none of which entered or emerged from the entrances monitored (each entrance was not monitored, and it is recognised there may be additional sett entrances within the bramble scrub). The low level of activity in the vicinity of the sett indicates that it is likely used infrequently by low numbers of badger as an outlier sett.

4.3.7 There is an off-site sett (S6) which includes four active entrances 40-100m south of the site which is likely to be an Annexe sett. Given the proximity of the off-site sett to S3, S3 is considered likely to be an outlier sett. There are latrines north-east and immediately west of S6.

4.3.8 In conclusion, the status of the setts is as follows:

- S1 (SU 52793 96495) = Inactive single hole outlier
- S2 (SU 52669 96671) = Inactive single hole outlier
- S3 (SU 52825 96234) = Active single hole outlier
- S4 (SU 52796 96220) = Potential single hole outlier
- S5 (SU 53498 96131) = A former annexe or main sett now used as an outlier sett with five holes identified
- S6 (off-site; SU 52825 96140) = Annexe sett with four active holes

Evaluation

4.3.9 The site is of Local value to brown hare and badger and negligible value to the remainder of other species in accordance with the geographic context set out in Appendix 4.

4.4 Biodiversity Impact Assessment

4.4.1 The habitat values input into the Defra 3.1 metric indicates that site has a baseline ecological value of 84.14 habitat units. There are no hedgerows or rivers within the site.

4.4.2 The proposals will result in the loss of 14.03ha of modified grassland, 2.7ha of other neutral grassland, two scattered trees and one hawthorn shrub. The exact location of the cable route and extension to the substation are not defined at this stage, therefore on a precautionary basis it is assumed the grassland and scrub habitats in the south-east will be lost and reinstated. The remainder of grasslands, scattered trees and scrub will be retained.

4.4.3 The proposals include:

- enhancement of 5.838ha of modified grassland to create other neutral grassland in moderate condition;
- creation of 4.9653ha of other neutral grassland in poor condition;
- creation of 3.3287ha of other broadleaved woodland in poor condition;
- creation of 2.3802ha of mixed scrub in moderate condition;
- creation of 0.4099ha of bramble scrub;
- creation of 0.3434ha of sustainable urban drainage feature (i.e. an attenuation basin) in the south;

- creation of 6.8779ha of mixed sealed and unsealed artificial unvegetated surfaces;
- creation of 0.63km of native species-rich hedgerow.

4.4.4 The proposals result in 103.67 on-site habitat units post-intervention i.e. a 23.21% increase from the baseline. The new hedgerows will deliver 4.22 hedgerow units representing a 100% gain.

4.4.5 The trading rules are satisfied as a result of the proposals.

5 Potential Impacts and Recommendations

5.1 Introduction

5.1.1 This section presents the potential impacts and subsequent recommendations for the proposed development at the site.

Adoption of the Mitigation Hierarchy

5.1.2 In accordance with the National Planning Policy Framework (NPPF) (see Section 6) and British Standard 42020:2013 'Code of Practice for Planning and Development' (BSI Standards Limited, 2013), the 'Mitigation Hierarchy' has been adopted at the site with regards to the potential ecological impacts of the proposals. The mitigation hierarchy outlines a stepwise process as follows:

- **Avoidance** – as a first option, adverse impacts should be avoided through good design, such as retaining and safeguarding important ecological features wherever practicable;
- **Mitigation** – where unavoidable, adverse impacts should be reduced as much as possible, such as reducing land-take of important habitats;
- **Compensation** – where residual effects remain, compensation should be secured to offset adverse impacts, such as through compensatory habitats creation; and
- **Enhancement** – opportunities for net gains in biodiversity should be explored and included wherever appropriate.

5.2 Designated Sites

Potential Impacts

5.2.1 The site is sufficiently distant from the designated sites within the local landscape to avoid direct or indirect impacts as a result of the proposals such as noise, dust, changes to water supply or changes in air quality.

5.3 Habitats

Potential Impacts

5.3.1 The River Thames is 130m north of the site. Assuming standard pollution control measures are specified within a Construction Environmental Management Plan (CEMP) and adopted, the proposals have no potential to directly or indirectly impact upon the river habitat or species supported by it.

5.3.2 Whilst habitats within the site are of negligible intrinsic ecological interest, they contribute to the biodiversity value of the site. Unmitigated habitat loss to accommodate the proposals

would therefore result in a loss of biodiversity habitat units. The Defra 3.1 metric has been used to identify the baseline habitat value and inform the design scheme to ensure a net gain for habitat biodiversity. Habitats of value to wildlife potentially present within the local landscape will be created including woodland, species-rich grassland and two attenuation ponds. The habitats to be created are indicated within Figure 3, Appendix 2. The methods for creation of these habitats are outlined within the Biodiversity Impact Assessment report (Ecology by Design, 2022). A Landscape and Ecological Management Plan (LEMP) will be required to specify the long-term management of the habitats to meet their target conditions and deliver long-term benefits for wildlife for 30 years.

Recommendation R1: Construction Environmental Management Plan

5.3.3 A Construction Environment Management Plan (CEMP) will be produced to identify measures to be adopted to ensure protection of valued features during construction. It includes:

1) Details of the licence required to lawfully close badger sett S3 ahead of site clearance.

2) Any update surveys needed prior to site clearance (e.g. a pre-commencement nesting bird and/or badger check).

3) Risk assessment of potentially damaging construction activities.

4) Identification of biodiversity protection zones.

5) Practical measures (both physical measures and sensitive working practices) to avoid, reduce or mitigate the impacts on important habitats and protected species during construction.

6) The location and timing of sensitive works to avoid harm to biodiversity features.

7) The times during construction when specialist ecologists need to be present on site to oversee works.

8) Responsible persons and lines of communication.

9) Use of protective fences, exclusion barriers and warning signs.

Recommendation R2: Landscape Ecological Management Plan

5.3.4 A LEMP will be produced with reference to the Biodiversity – Code of Practice for Planning and Development British Standard: BS 42020:2013 (BSI Standards Limited, 2013) and in particular, Section 11.1 which provides details on the content of management plans. This LEMP will be produced by an ecologist alongside consultation with the developer and landscape architects to ensure the appropriate design and long-term management of mitigation measures to protect and enhance the landscape character and biodiversity. It includes:

1) Review of site potential and constraints.

2) Purpose and conservation objectives for the proposed works.

3) Detail design(s) and/or working method(s) to achieve the stated objectives.

4) Extent and location/area of proposed works on appropriate scale maps and plans (e.g. woodland planting / creation of log piles).

5) Type and source of materials to be used where appropriate (e.g. native species of local provenance, specification etc).

6) Timetable for implementation.

7) Details of initial aftercare and long-term maintenance of ecological habitats (e.g. woodland, hedgerows and grassland areas).

8) Details for monitoring and remedial measures.

9) Persons responsible for implementing the works.

10) Preparation of a work schedule to cover 20 years.

11) Details of the body or organisation responsible for implementation of the plan.

5.4 Protected and Notable Species

Potential Impacts

5.4.1 The proposals will result in the destruction of a single hole outlier badger sett (S3) and potentially the disturbance or destruction of an outlier sett with five holes (S5).

5.4.2 Brown hare currently make use of the site for foraging. In the absence of mitigation, the proposals would reduce the available foraging resource available to the species. However, the retained modified grasslands will be retained and enhanced to increase their species and structural diversity. There are similarly suitable fields to the north-east and south-west and connectivity to these features will be maintained along the northern and southern site boundaries.

5.4.3 The other neutral grassland habitats in the south and east of the site may be suitable for reptiles. Clearance of these areas in the absence of mitigation, may result in the killing or injury of reptiles. The modified grassland habitats within the site are currently unsuitable, however, they will be subject to enhancements to increase their species and structural diversity which will increase their suitability for reptiles. The scattered trees felled in the south of the site will be used to create log piles in the north of the site.

5.4.4 Limited lighting will be required within the site for security purposes. Lighting could impact foraging and commuting (there are no opportunities for roosting bats in proximity to the

compounds). Lighting will therefore be sensitively designed to ensure no impacts arise. Woodland planting will increase the foraging opportunities for bats and three bat boxes will be installed on scattered trees to create roosting opportunities.

5.4.5 A fence will surround each of the battery compounds for security purposes. The fencing will comprise propriety weld mesh fences 2.5m height with a cranked top 0.5m height supporting three strands of barbed wire. The compounds themselves will be of negligible value for wildlife due to comprising hardstanding, gravel and the batteries themselves. These fences will not prevent access to habitats of value or sever the landscape, therefore no mitigation measures are considered necessary.

5.4.6 Opportunities for nesting birds will be provided by the proposed woodland habitats and three nest boxes will be installed on scattered trees.

Recommendation R3: Badger

5.4.7 Monitoring of setts S3 and S5 will be required in spring 2023 to inform a badger licence to be applied for should the setts be confirmed as active. Some bramble scrub clearance will be required around S5 to enable all sett entrances to be identified. The licence can only be applied for once planning permission has been secured. The licence can be implemented between 1st July and 30th November. Implementation will include installation of a one-way gate to enable badger to leave but not re-enter, followed by 21 days of monitoring, closure of the sett and a destructive search of the burrow.

5.4.8 Potential sett S4 is 24m from the footprint of the southern attenuation basin. The burrow entrance indicates the tunnel leads in a south-westerly direction. In the unlikely event the burrow extends north-east into the redline boundary, there is potential for construction of the attenuation basin to result in the killing or injury of badger, destruction of a sett and/or disturbance of badger. Protective fencing and signage will be included in proximity to sett S4 to avoid impacts to the potential sett.

Recommendation R4: Reptile Mitigation and Enhancement

5.4.9 The enhancement of 7.8ha of modified grassland to deliver other neutral grassland in moderate condition will represent a significant enhancement for reptiles.

5.4.10 In addition, two log piles 2m length and width and 1.5m height will be installed in the north of the site, alongside the existing other neutral grassland habitat (on the edges of the modified grassland habitat which will be subject to enhancements; see locations on Figure 3, Appendix 2).

5.4.11 Following the enhancement of reptile habitats, reptile refugia will be deployed within the other neutral grassland construction zones. Seven surveys will be conducted to identify the species and populations present. Where present, translocation will take place between March and October during suitable weather conditions for a minimum of 30 days, with five reptile-free days required to have confidence site clearance will not result in the killing or injury of reptiles. Habitat manipulation (localised strimming) may be conducted to increase capture rates. Reptiles will translocated to the 7.8ha of other neutral grassland being created north of the construction compound in the vicinity of new log pile habitats.

Recommendation R5: Bat boxes

5.4.12 Three woodcrete / woodstone bat boxes (e.g. 2F Schwegler Bat Box) suitable for crevice-dwelling species will be installed on the scattered trees in the north-east of the site.

Recommendation R6: Bird boxes

5.4.13 Three woodcrete / woodstone bird boxes suitable for starlings, woodpeckers and nuthatches (e.g. 3S Schwegler Starling Nest Box) or similar will be installed on the scattered trees in the north-east of the site.

5.5 Demonstrating Biodiversity Net Gain

5.5.1 The Defra 3.1 metric has been used to identify the biodiversity change as a result of the proposals.

5.5.2 The baseline ecological value of the site is 53.32 habitat units (there are no hedgerow or river units within the site).

5.5.3 The proposed development will include woodland, scrub, species-rich grassland and two attenuation ponds. The site will deliver 103.67 habitat units post-intervention, being a change of 19.53 habitat units or 23.21% net change.

5.5.4 Given the proposals are achieving significant biodiversity gain, Statera Energy are exploring the opportunity to bank 11.5 woodland habitat units. The banked units would be used to achieve biodiversity offsetting for other applications within the local area whilst satisfying trading rules and ensuring a minimum 10% gain for habitat units within the site.

6 Relevant Legislation and Policy

6.1 Exit from European Union

6.1.1 The Conservation of Habitats and Species Regulations 2017 (as amended), referred to as the '2017 Regulations,' are one of the pieces of domestic law that transposed the land and marine aspects of the Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Wild Birds Directive (Directive 2009/147/EC) (known as the Nature Directives). Changes to the 2017 Regulations have been made by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (referred to as the '2019 Regulations') to transfer functions from the European Commission to the appropriate authorities in England and Wales.

6.1.2 The amendments prescribed by the 2019 Regulations allow existing protections afforded by current wildlife legislation and transposed EC Council Directives to be operable from 01 January 2021.

6.1.3 The 2019 Regulations protect rare and vulnerable birds and the habitats that they depend upon. This is achieved in part through the classification of Special Protection Areas (SPAs). The Habitats Directive aims to protect plants, habitats and animals other than birds. This is achieved in part through the creation of Special Areas of Conservation (SACs). SPAs and SACs are collectively referred to as the 'National Site Network'.

6.1.4 Designated Wetlands of International Importance (known as Ramsar sites) do not form part of the National Site Network, however, all Ramsar sites remain protected in the same was as SACs and SPAs.

6.2 Local Planning Policy

6.2.1 The South Oxfordshire District Council Local Plan 2035 was adopted on 10 December 2020.

Policy ENV1: Landscape and Countryside

6.2.2 South Oxfordshire's landscape, countryside and rural areas will be protected against harmful development. Development will only be permitted where it protects and, where possible enhances, features that contribute to the nature and quality of South Oxfordshire's landscape, in particular:

- trees (including individual trees, groups of trees and woodlands), hedgerows and field boundaries;
- irreplaceable habitats such as ancient woodland and aged or veteran trees found outside ancient woodland;

- the landscapes, waterscapes, cultural heritage and user enjoyment of the River Thames, its tributaries and flood plains;
- other water course and water bodies;
- the landscape setting of settlements or the special character and landscape setting of Oxford;
- topographical features;
- areas or features of cultural and historic value;
- important views and visually sensitive skylines; and
- aesthetic and perceptual factors such as tranquilly, wilderness, intactness, rarity and enclosure.

6.2.3 The Council will seek the retention of important hedgerows. Where retention is not possible and a proposal seeks the removal of a hedgerow, the Council will require compensatory planting with a mixture of native hedgerow species.

Policy ENV2: Biodiversity – Designated Sites, Priority Habitats and Species

1. The highest level of protection will be given to sites of international nature conservation importance (Special Areas of Conservation). Development that is likely to result in a significant effect, either alone or in combination, on such sites will need to satisfy the requirements of the Conservation of Habitat and Species 2017 (as amended).

2. Sites of Special Scientific Interest (SSSI) are of national importance. Development that is likely to have an adverse effect on a SSSI (either on its own or in combination with other developments) will only be permitted in exceptional circumstances, where it can be demonstrated that the benefits of the development in the location proposed clearly outweigh an harm to the special interest features and the SSSI's contribution to the local ecological network. In such circumstances, measures should be provided (and secured through planning conditions or legal agreements) that would mitigate or, as a last resort, compensate for the adverse effects resulting from development.

3. Development likely to result, either directly or indirectly to the loss, deterioration or harm to:

- Local Wildlife Sites
- Local Nature reserves
- Priority Habitats and Species
- Legally Protected Species
- Local Geological Sites

- Ecological Networks (Conservation target Areas)
- Important or ancient hedges or hedgerows
- Ancient woodland and veteran trees

will only be permitted if:

I. the need for, and benefits of the development in the proposed location outweighs the adverse effect on the interests;

II. it can be demonstrated that it could not reasonably be located on an alternative site that would result in less or no harm to the interests and

III. measures will be provided (and secured through planning conditions or legal agreements) that would avoid, mitigate or as a last resort, compensate for the adverse effects resulting from development.

4. Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) will be refused planning permission, unless there are wholly exceptional reasons justifying the granting of planning permission.

5. Where development has the potential to affect a proposed wildlife site the developer must undertake surveys and assessments to determine whether the site meets the criteria for Local Wildlife Site status.

Policy ENV3: Biodiversity

6.2.4 Development that will conserve, restore and enhance biodiversity in the district will be supported. All development should provide a net gain in biodiversity where possible. As a minimum, there should be no net loss of biodiversity. All proposals should be supported by evidence to demonstrate a biodiversity net gain using a recognised biodiversity accounting metric, in this case DEFRA's Biodiversity Metric 3.0 or the Small Sites Metric.

6.2.5 Development proposals which would result in a net loss of biodiversity will only be considered if it can demonstrated that alternatives which avoid impacts on biodiversity have been fully explored in accordance with the mitigation hierarchy*. In the absence of alternative sites or layouts, development proposals must include adequate mitigation measures to achieve a net gain of biodiversity. Where harm cannot be prevented or adequately mitigated, appropriate compensation measures will be sought, as a last resort, through planning conditions or planning obligations (depending on the circumstances of each application) to offset the loss by contributing to appropriate biodiversity projects to achieve an overall net gain for biodiversity.

6.2.6 Planning permission will only be granted if impacts on biodiversity can be avoided, mitigated or, as a last resort, compensated fully.

6.3 National Planning Policy Framework

6.3.1 The National Planning Policy Framework (NPPF) was updated in July 2021 (MHCLG, 2021) thereby replacing the older version of February 2019. The new framework sets out in section 15 that to protect and enhance biodiversity and geodiversity, plans should:

- identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation and
- promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

6.3.2 When determining planning applications, local planning authorities should apply the following principles:

- 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;
- 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
- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.

Standing Advice (GOV.UK)

6.3.3 The GOV.UK website provides information regarding protected species and sites in relation to development proposals: 'Local planning authorities should take advice from Natural England or the Environment Agency about planning applications for developments that may affect protected species.' GOV.UK advises that 'some species have standing advice which you can use to help with planning decisions. For others you should contact Natural England or the Environment Agency for an individual response.'

6.3.4 The standing advice (originally from Natural England and now held and updated on GOV.UK) provides advice to planners on deciding if there is a 'reasonable likelihood' of protected species being present. It also provides advice on survey and mitigation requirements.

6.3.5 When determining an application for development that is covered by standing advice, in accordance with guidance in Government Circular 06/2005, Local planning authorities are required to take the standing advice into account. In paragraph 82 of the aforementioned Circular, it is stated that: 'The standing advice will be a material consideration in the determination of the planning application in the same way as any advice received from a statutory consultee…it is up to the planning authority to decide the weight to be attached to the standing advice, in the same way as it would decide the weight to be attached to a response from a statutory consultee.'

6.4 Badger

6.4.1 Badger is protected under the Protection of Badgers Act 1992. It is not permitted to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or 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. A badger sett is defined in the legislation as "a structure or place, which displays signs indicating current use by a badger".

6.4.2 ODPM Circular 06/2005 provides further guidance on statutory obligations towards badger within the planning system. Of particular note is paragraph 124, which states that "The likelihood of disturbing a badger sett, or adversely affecting badgers' foraging territory, or links between them, or significantly increasing the likelihood of road or rail casualties amongst badger populations, are capable of being material considerations in planning decisions."

6.4.3 Natural England provides Standing Advice , which is capable of being a material consideration in planning decisions. Natural England recommends mitigation to avoid impacts on badger setts, which includes maintaining or creating new foraging areas and maintaining or creating access (commuting routes) between setts and foraging/watering areas.

6.5 Bats

6.5.1 All species of bats are protected under The Conservation of Habitats and Species Regulations 2017 (as amended) with additional protection provided under the Wildlife and Countryside Act 1981 (as amended). This makes it illegal to injure or kill a bat, to disturb, damage, destroy or obstruct a bat roost.

6.6 Birds

6.6.1 All nesting wild birds are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. In addition to this, for some rarer species (listed on Schedule 1 of the Act), it is an offence to disturb them whilst they are nest building or at or near a nest with eggs or young, or to disturb the dependent young of such a bird.

6.7 Reptiles

6.7.1 All native reptile species receive legal protection in Great Britain under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are included as 'species of principal importance' for the purpose of conserving biodiversity under Section 41 (England) of the NERC Act 2006 and Section 7 of the Environment (Wales) Act 2016. Viviparous lizard, slow-worm, grass snake and adder are protected against killing, injuring and unlicensed trade only.

6.8 Wild mammals in general

6.8.1 The Wild Mammals (Protection) Act 1996 (as amended) makes provision for the protection of wild mammals from certain cruel acts, making it an offence for any person to intentionally cause suffering to any wild mammal. In the context of development sites, for example, this may apply to rabbits in their burrows.

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Appendix 1 – Photographs

Photograph 1: Field 1, view east along northern boundary

Photograph 2: Field 2, view west along southern boundary

Photograph 3: Field 3, view north along eastern boundary

Photograph 4: Field 4, view east along southern boundary

Photograph 5: Other neutral grassland in the south

Photograph 6: Scattered trees within other neutral grassland in east of site

Photograph 7: Hardstanding roads, view from north to south within centre of site

Photograph 8: Badger sett S3

Photograph 9: Bare ground beneath pylon

Photograph 10: Mixed scrub in south-east

Photograph 11: Bramble scrub in the south-east

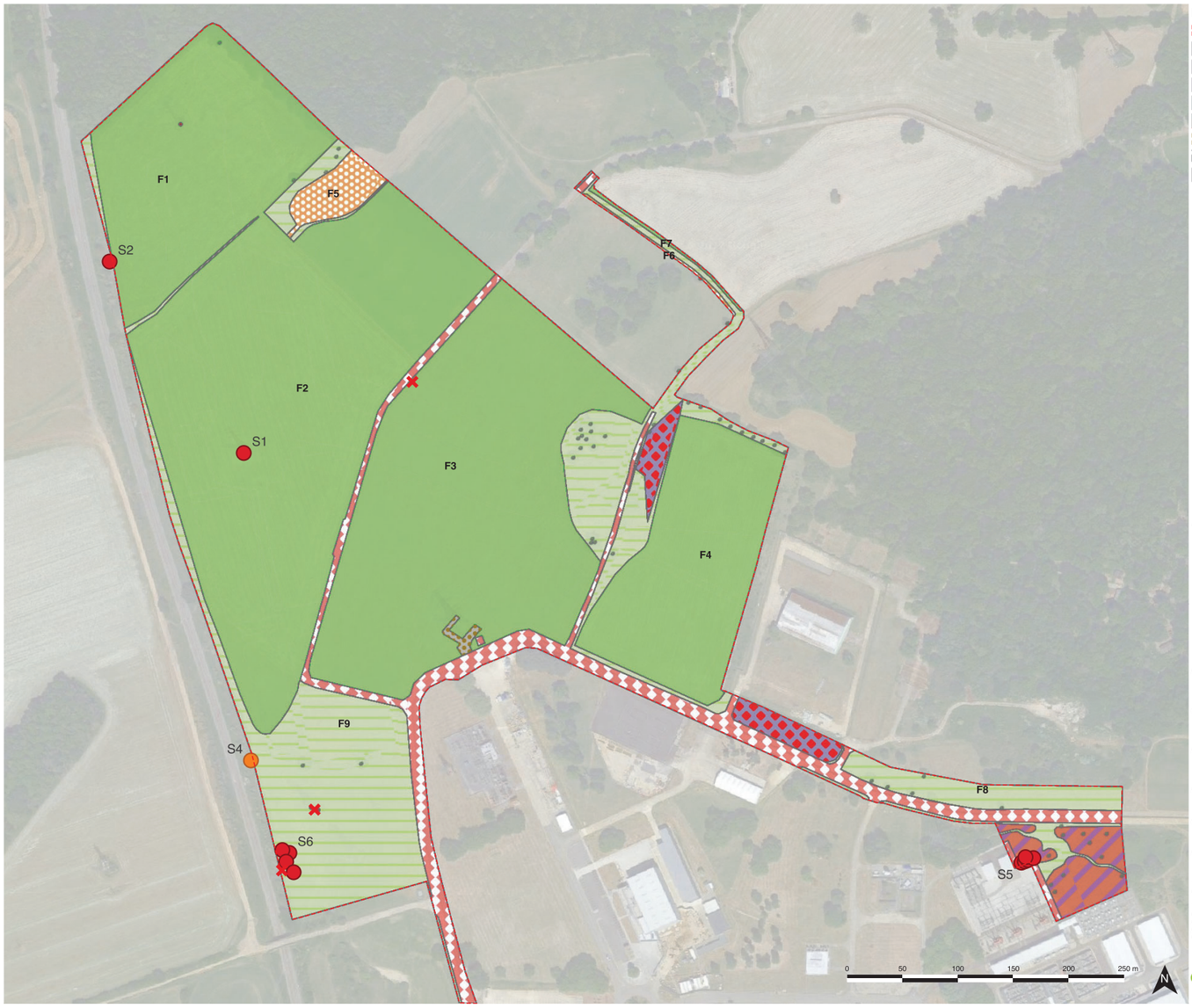
Appendix 2 – Figures

Figure 1: Baseline habitats

Figure 2: Impacts

Figure 3: Proposed habitats

(Next page)



LEGEND

- Site boundary (27.84 ha)
- c1d - non-cereal crops (0.35 ha)
- g3c - other neutral grassland (4.94 ha)
- g4 - modified grassland (19.91 ha)
- h3d - bramble scrub (0.52 ha)
- h3h - mixed scrub (0.38 ha)
- s(78) - bare ground (0.04 ha)
- u(11) - scattered tree (0.04 ha)
- u1b6 - other developed land (1.71 ha)
- Badger sett
- Possible badger sett
- Badger latrine

Location (1:75,000):

Project:

Culham Battery Storage

Client:

Statera Energy

Drawing Title:

Baseline Habitats

Drawing No.:	*Scale (@A3):*
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Central Grid Ref.:	*Date Drawn:*
SU 52879 96551	07/12/2022
Drawn by:	*Approved by:*
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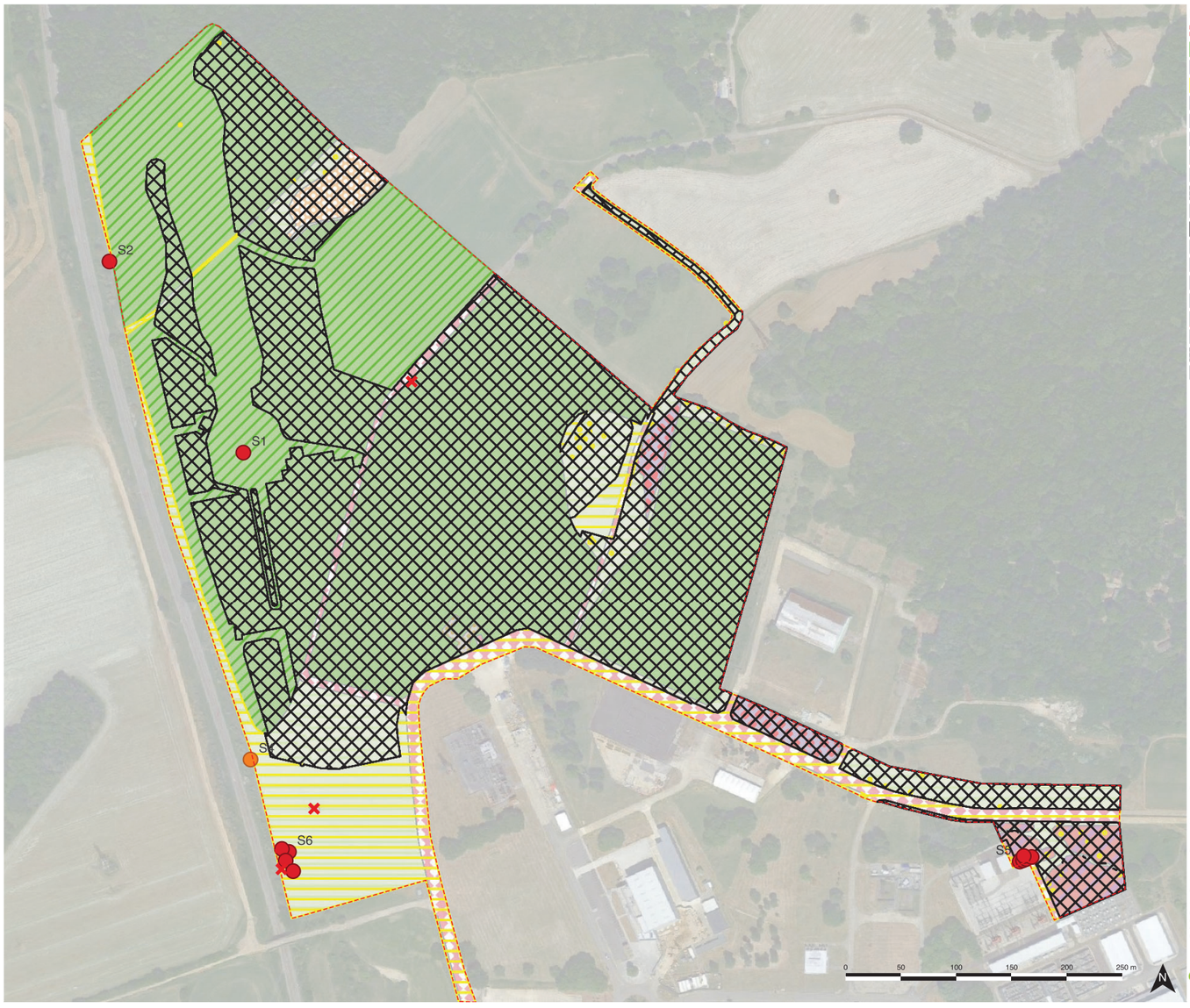

LEGEND

- Site boundary (27.84 ha)
- Retained and enhanced
- g4 - modified grassland (5.84 ha)
- Retained
- c1d - non-cereal crops (0.03 ha)
- g3c - other neutral grassland (2.29 ha)
- g4 - modified grassland (0.04 ha)
- h3h - mixed scrub (0 ha)
- s(78) - bare ground (0 ha)
- u(11) - scattered tree (0.04 ha)
- u1b6 - other developed land (1.34 ha)
- Lost
- c1d - non-cereal crops (0.32 ha)
- g3c - other neutral grassland (2.65 ha)
- g4 - modified grassland (14.03 ha)
- h3d - bramble scrub (0.52 ha)
- h3h - mixed scrub (0.37 ha)
- s(78) - bare ground (0.04 ha)
- u(11) - scattered tree (0 ha)
- u1b6 - other developed land (0.37 ha)
- Badger sett
- Possible badger sett
- Badger latrine

Location (1:75,000):

Project:

Culham Battery Storage

Client:

Statera Energy

Drawing Title:

Impacts

Drawing No.:	*Scale (@A3):*
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Central Grid Ref.:	*Date Drawn:*
SU 52879 96551	07/12/2022
Drawn by:	*Approved by:*
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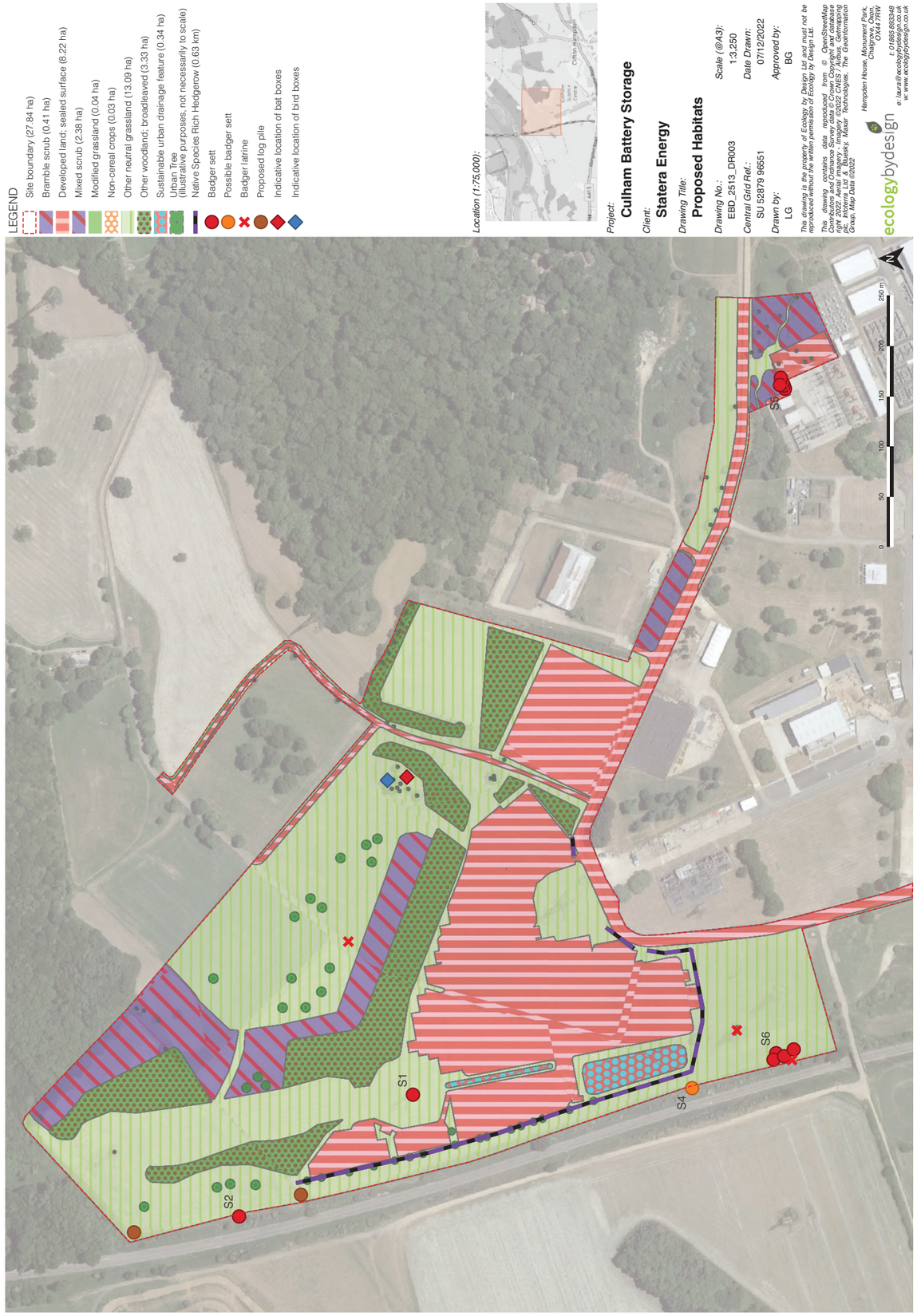

Appendix 3 – Definitions of the Geographic Context of Habitat Importance

Geographic Context of Importance	Examples
International value	Ramsar Sites, Special Protection Areas, Biosphere Reserves, Special Areas of Conservation. Sites supporting populations of internationally important species.
National value	SSSIs or non-designated Sites meeting SSSI selection criteria, NNRs, Marine Nature Reserves, NCR Grade 1 Sites. Sites containing viable areas of key habitats identified in the UK Biodiversity Action Plan.
Regional value	Sites containing viable areas of threatened habitats listed in a Regional BAP (or some Natural Areas), comfortably exceeding SINC criteria, but not exceeding SSSI criteria.
County / Metropolitan	Sites meeting the criteria for county or metropolitan designation (SINC, CWS, etc.). Ancient semi-natural woodland, LNRs or viable areas of key habitat types listed in county BAPs/Natural Areas.
District / Borough	Undesignated Sites or features considered to appreciably enrich the habitat resource in the District or Borough.
Local i.e. Parish / Neighbourhood	Undesignated Sites or features which appreciably enrich the habitat resource within the Parish or Neighbourhood.
Negligible value	Low grade and widespread habitats.

Appendix 4 – Definitions of the geographic Context of Species Importance

Geographic Context of Importance	Examples
International	Any regularly occurring population of an internationally important species, which is threatened or rare in the UK. i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.
National	Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A regularly occurring, regionally or county significant population/number of any nationally important species.
Regional	Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation; A regularly occurring, locally significant number of a regionally important species.
County/ Metropolitan	Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan "red data book" or BAP on account of its regional rarity or localisation; A regularly occurring, locally significant number of a County/Metropolitan important species.
District / Borough	A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation; A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.
Local i.e. Parish / Neighbourhood	Species that are not threatened but are valued at a local level on intrinsic appeal.
Negligible	Common or widespread species.

Appendix 5 – Recommended Enhancements

Products	Description
	**3S Schwegler Starling Nest Box (or similar)** A versatile box that attracts other species such as woodpeckers, nuthatches and pied flycatchers. http://www.nhbs.com/title/177925/3s-schwegler-starling-nest-box
	**2F Schwegler Bat Box (or similar)** A standard bat box for smaller bats to be placed on a mature tree. http://www.nhbs.com/2f-schwegler-bat-box-general-purpose