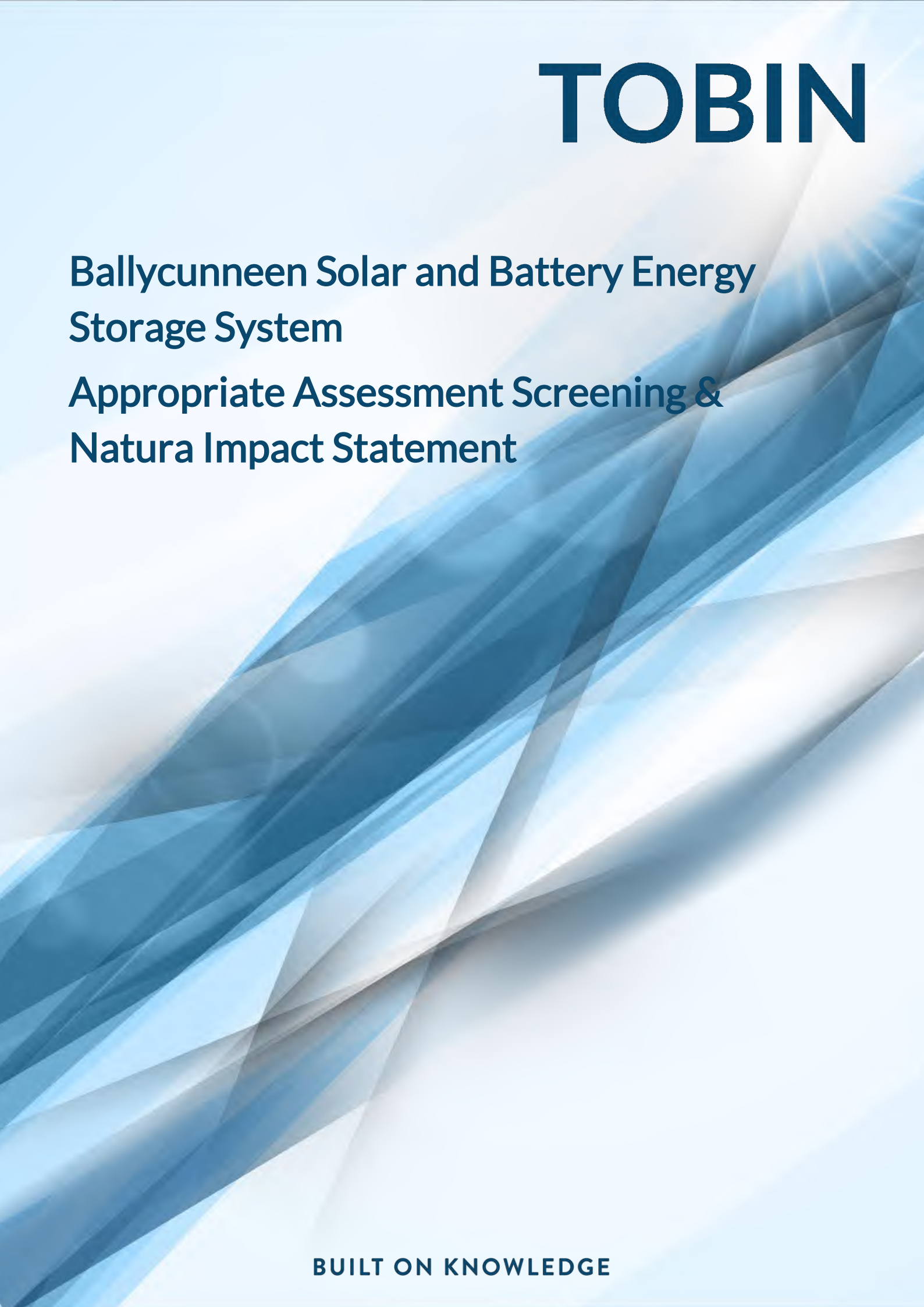




TOBIN

**Ballycunneen Solar and Battery Energy
Storage System**

**Appropriate Assessment Screening &
Natura Impact Statement**

BUILT ON KNOWLEDGE

Document Control Sheet

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1. INTRODUCTION

BNRG Ballycunneen Ltd. (hereafter referred to as BNRG) is proposing to develop a Solar Farm with an associated Battery Energy Storage System (BESS), grid connection, and a 38kV substation, in the townlands of Ballycunneen, Drumline, Ballycasey More, Clonmoney West, Firgrove, and Ardkyle, Co. Clare. The development is referred to hereafter as the proposed project. A short of summary of the proposed project is provided in Section 1.2 with full project details provided in Section 4.

1.1 BACKGROUND TO THE APPLICATION

A planning application for the proposed project was submitted to the competent authority, Clare County Council, on 11th September 2025 (Ref No. 2560560). To support the application, TOBIN prepared a Stage One Screening for Appropriate Assessment (AA) and a Stage Two Natura Impact Statement (NIS) to inform the Appropriate Assessment process. The combined AA Screening and NIS (AASR-NIS) report was prepared alongside a Planning Environmental Considerations Report (PECR) to accompany the planning application to Clare County Council for the proposed project. This AASR-NIS report and the PECR has been informed by a combination of desktop studies and directed ecological field surveys.

The application for the proposed project was refused by Clare County Council in due to concerns relating to:

1. land-use zoning and future development potential, and potential visual and landscape impacts,
2. aviation safety risks,
3. inadequate ecological and Appropriate Assessment (AA), and
4. insufficient Environmental Impact Assessment (EIA) screening, particularly in relation to cumulative impacts.

On behalf of BNRG, TOBIN submitted a Statement of Case in January 2026 to support a First Party Appeal to An Coimisiún Pleanála (ACP) in response to the decision of Clare County Council to refuse planning permission for the proposed project (ACP Case No. PL-500676-CE-26). The Statement of Case set out the grounds for appeal, including detailed rebuttals of the reasons for refusal and reference to relevant precedent decisions, and commitment to additional mitigation.

Following a review of the appeal ACP issued a Request for Further Information (RFI), requiring additional details to support the assessment of the proposed Battery Energy Storage System (BESS) and ecological impacts. The applicant must submit the requested information by 29 July 2026, including:

1. A Fire Risk Management Plan (FRMP) outlining fire hazards, risk evaluation, and preventative measures.
2. An Emergency Response Plan (ERP) detailing procedures in the event of a fire or similar emergency.

3. Details of firewater management measures, including containment to prevent contamination of surface water and groundwater.
4. Confirmation of adequate water supply provision for firefighting purposes.
5. An updated NIS incorporating any additional mitigation measures.
6. Full details and results of ornithological surveys, including survey dates and winter bird data.
7. Additional information or justification regarding the representativeness of bird surveys, particularly in relation to wintering species.
8. Confirmation of whether bird surveys accounted for tidal cycles, particularly in areas adjacent to the SPA.

This revised combined AASR-NIS report has been prepared in response to the RFI issued by ACP, fulfilling the requirements of Item 5 (updated NIS). This revised combined AASR-NIS report provide clarifications with in relation to Items 6 - 8 concerning ecological and ornithological matters. The report also has regard to Items 1 - 4.

In addition, this revised combined AASR-NIS report incorporates relevant ecological aspects set out in the Statement of Case to address the ecological issues raised by Clare County Council in its reasons for refusal, including additional mitigation commitments made by BNRG.

1.2 SEPARATELY, TOBIN HAS SUBMITTED A DEDICATED FURTHER INFORMATION RESPONSE DOCUMENT TO THE ACP. THE RESPONSE DOCUMENT PROVIDES A DETAILED, ITEM-BY-ITEM RESPONSE TO EACH OF THE EIGHT RFI QUERIES RAISED. THE RESPONSE DOCUMENT INCLUDES COMPREHENSIVE TECHNICAL SUBMISSIONS ADDRESSING FIRE SAFETY AND EMERGENCY RESPONSE REQUIREMENTS ASSOCIATED WITH THE BESS, CLARIFICATIONS ON ECOLOGICAL AND ORNITHOLOGICAL DATA, AND SURVEY METHODOLOGY, COVERAGE, AND ASSESSMENT. THE RESPONSE DOCUMENT HAS BEEN PREPARED TO ENSURE THAT ALL MATTERS RAISED BY THE BOARD ARE FULLY ADDRESSED IN A CLEAR, STRUCTURED, AND TRANSPARENT MANNER, THEREBY SUPPORTING THE BOARD'S ASSESSMENT OF THE PROPOSED PROJECT.

PROJECT SUMMARY

The proposed project includes the installation of PV panels at four distinct land parcels, labelled 1 to 4, are shown in Figure 1.1. The land parcels have a combined area of 98ha. The northernmost land parcel, labelled 1, is located in the townland of Ard Kyle, with an additional land parcel 2 further south in the townlands of Ballycunneen and Firgrove, and the southernmost land parcels 3 and 4 situated in Clonmoney West. These parcels are strategically located on both sides of the N18 National Road and R458 Regional Road and are interconnected via underground cabling.

Electricity generated by the PV panels will be converted from DC to AC by MV stations distributed within the parcels, ensuring efficient energy conversion close to the point of



generation. The location of MV stations are shown in Figure 1.1. The AC electricity will then be transmitted through the internal underground network to the onsite 38 kV substation located at Firgrove, before being exported to the 110kV substation at Drumline. The proposed internal network of underground cabling, the location of the onsite 38 kV substation at Firgrove, and the interconnecting cable to the 110kV substation at Drumline are shown in Figure 1.1. Along the cable route, horizontal directional drilling (HDD) will be used to cable under the Urlan Beg_010 WFD RWB (IE_SH_27U010950) to north of land parcel 3 and also under the N18 road. The locations of the HDD points are shown in Figure 1.1.

The southern limit of the project redline is located approximately 3m from the Lower River Shannon Special Area of Conservation (SAC; Site Code: 002165) and around 4m from the River Shannon and River Fergus Estuaries Special Protection Area (SPA; Site Code: 004077). All proposed infrastructure has been set back a further 72 m to the north, providing a protective buffer between construction activities and the boundaries of these designated conservation site.

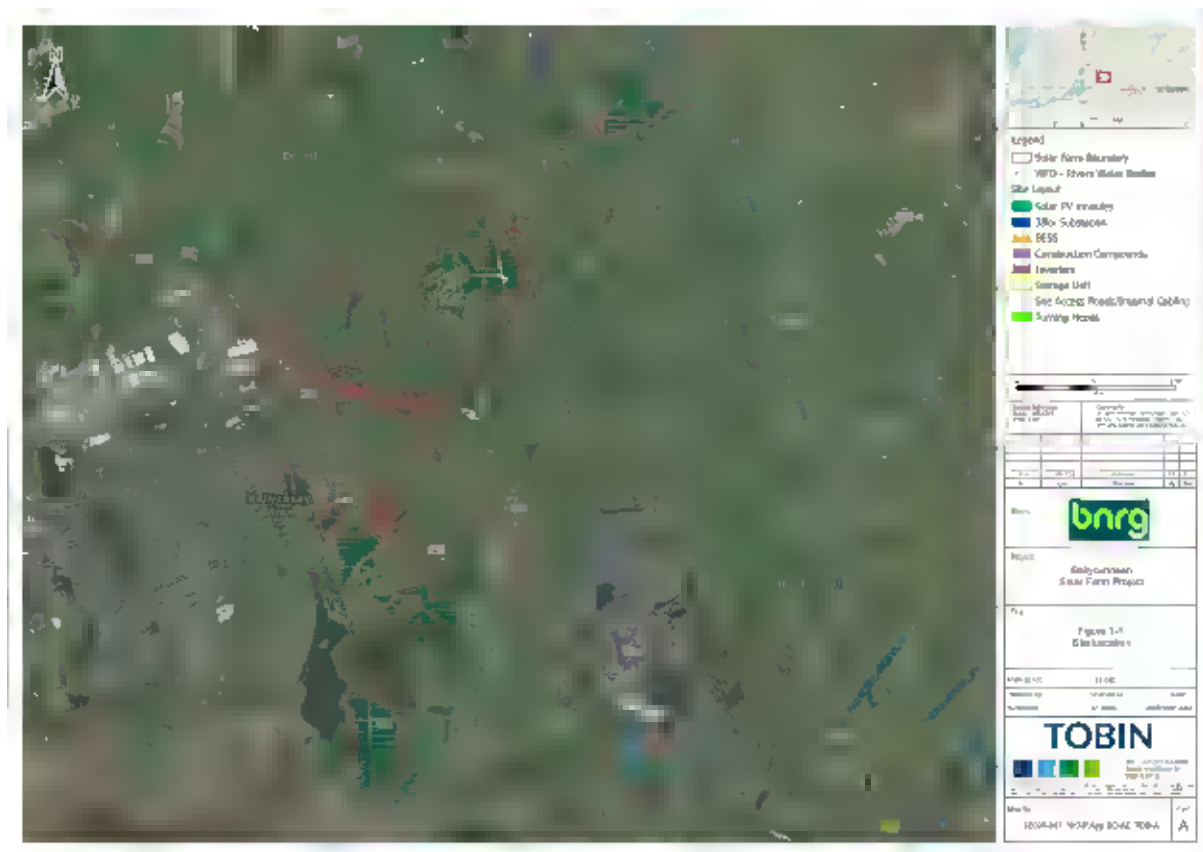


Figure 1.1: Proposed Project

1.3 STATEMENT OF AUTHORITY

This revised combined AASR-NIS report was prepared by Ciara Byrne B.Sc. (Hons) Ecologist with TOBIN, and senior reviewed by Dr. James Forde (B.Sc. (Hons), M.Sc., Ph.D., MCIEEM).

Ciara completed her degree in Wildlife Biology with Munster Technological University, Kerry. Ciara has been with TOBIN for over 2 years where she has carried out various ecological surveys for protected habitats and species. Ciara has experience managing and analysis data in addition to producing ecological reports on topics such as winter and breeding bird surveys, Invasive Species Management Plans (ISMP), Feasibility studies, Preliminary Ecological Assessment (PEA), Appropriate Assessment Screening Reports (AASR) and Natura Impact Statements (NIS). Ciara also assists within Environmental Impact Assessment Reports (EIARs).

James is Senior Ecologist and Technical Director of the TOBIN Environment & Planning (E&P) division. James holds a B.Sc. (Hons) and M.Sc. degrees in marine ecology, and a Ph.D. in ecology. James is also a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). James has almost 20 years' academic and environmental consultancy experience. He has an extensive understanding of ecology and appreciation of the objectives and mechanisms of national and international environmental legislation and policy. He has significant experience in preparing and reviewing ecological reports including PECRs, AA screening, NIS and Ecological Impact Assessment (EclA) reporting, and EIARs. James has provided strategic technical and environmental advice for developments across a wide range of sectors, including onshore and offshore renewables, telecommunications, flood relief schemes, port and harbour developments, energy generation and transmission.

The baseline ecological surveys used to inform this assessment of likely significant effects on biodiversity were conducted by a team of qualified ecologists with the relevant skills and experience to undertake the required surveys.

TOBIN ecologists undertook all terrestrial ecological surveys, including habitat mapping, assessments of flora and non-volant mammal species (e.g. badger, otter), and general ecological fieldwork. The TOBIN ecologists responsible for undertaking the multidisciplinary walkover surveys used to inform for the proposed project were:

- Úna Butler (B.A. Hons, M.Sc.)
- Ciara Byrne (B.Sc. Hons)
- Joe Freijser (B.A. Hons, M.Sc.)
- Eoghan Phelan (B.Sc. Hons)

Other external collaborators included:

- John Curtin (B.Sc. Hons), Consultant Ecologist with Éire Ecology, was responsible for the design, implementation, analysis, and reporting of all bat-related ecological surveys and assessments undertaken in relation to the proposed project. His remit encompassed the formulation of survey methodologies, coordination and execution of fieldwork, and the preparation of mitigation and enhancement measures specific to bat conservation. His work included static detector surveys, dusk emergence and dawn re-entry surveys, ground-level assessments of features with potential to support roosting bats, and the evaluation of potential impacts on bat species in accordance with current best practice guidelines (e.g. Collins, 2016/2023).

- Michael O’Clery (B.A. Hons), Ornithologist with Goldcrest Environmental, undertook all avian transect surveys, breeding bird surveys, and wintering bird assessments. His work informed the assessment of potential impacts on bird species of conservation concern, in line with national and international guidance for ornithological impact assessments.
- Martin Bundel (QFSM MIFireE M.ISRM AIFSM), Managing Director of Greenfire Solutions. Greenfire Solutions (GS) is led by former senior officers of fire and rescue services with over three decades of operational and strategic experience in fire safety, emergency response and risk management. Drawing on this experience, we provide high-quality, bespoke and ethically sound advice to fire authorities, planning authorities and private sector clients across the UK and the Republic of Ireland, including projects determined under the Irish planning and fire safety regime.

2. APPROPRIATE ASSESSMENT METHODOLOGY

2.1 LEGISLATIVE CONTEXT

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as the ‘Habitats Directive’, provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 network.

Articles 6(3) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites (Annex 1.1). Article 6(3) establishes the requirement for AA:

‘Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.’

The provision for an AA is transposed into Irish law by Part XAB of the Planning and Development Act 2010 (as amended). Section 177U (4) of the said Acts provides for screening for Appropriate Assessment as follows:

‘The competent authority shall determine that an appropriate assessment of [...] a proposed development [...] is required if it cannot be excluded, on the basis of objective information, that the [...] proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.’

Section 177U (5) provides as follows:

‘The competent authority shall determine that an appropriate assessment of a [...] proposed development, [...], is not required if it can be excluded, on the basis of objective information, that the [...] proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.’

An AA should be based on best scientific knowledge and the competent authority should ensure that expertise such as ecological, geological, and hydrological are utilised, where relevant.

The Court of Justice of the European Union (CJEU) has made several rulings in relation to AA, regarding when it is required, its purpose, and the standards it should meet. Consideration has been given to the evolution in interpretation and application of directives and national legislation arising from jurisprudence of the European and Irish courts, in respect of Article 6 of the Habitats Directive.

2.2 STAGES INVOLVED IN THE APPROPRIATE ASSESSMENT PROCESS

There are four potential stages in the AA process; the result of each stage determines the requirement for assessment under the next.

Stage 1: Screening

This process identifies the likely significant effects upon a European site from a proposed project or plan. Its purpose is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project which is not directly connected with or necessary to the management of the site as a European site, individually or in-combination with other plans or projects is likely to have a significant effect upon the European site, in view of its conservation objectives. A project may be 'screened-in' if there is a possibility or uncertainty of possible effects upon the European site, requiring a Stage Two AA. If there is no evidence to suggest significant effects due to the proposed plan or development the project is 'screened-out' from further assessment.

Stage 2: Appropriate Assessment

In this stage, consideration is given to ascertain whether the plan or project would adversely affect the integrity of a European site(s), either alone or in-combination with other plans or projects, with respect to the European site's structure and function and its conservation objectives. This stage of the assessment is carried out by the consenting authority and is informed by a NIS. A NIS is required where there is uncertainty as to whether or not an adverse effect arises, uncertainty of the effect itself, or a potential effect has been defined which requires further procedures/mitigation to remove uncertainty of a defined impact (i.e. significant effects cannot be excluded). Where there are adverse effects, an assessment of the potential mitigation to ameliorate those effects is required. If the assessment results in a negative conclusion, i.e. adverse effects on the integrity of a site cannot be excluded (by design or mitigation) or there is uncertainty as to whether an adverse impact arises, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage 3: Assessment of Alternatives

This stage of the potential process arises where adverse effects on the integrity of a European site cannot be excluded and examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. However, in circumstances where there will not be any adverse effects on any European site, the developer places no reliance upon this third stage of the process in the context of this application for planning permission for the proposed project.

Stage 4: Assessment Where Adverse Effects Remain

This is the derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest [IROPI] for allowing a project to proceed where adverse effects on the integrity of a European site have been predicted. Compensatory measures must be proposed and assessed as part of this stage and the EU Commission must be informed of the compensatory measures. Again, the developer places no reliance upon this stage of the process in the context of the application for planning permission for the proposed project.

This report details a Stage One: Screening and Stage Two: Appropriate Assessment (NIS), to assist the competent authority in carrying out its AA for the proposed project.

2.3 LEGISLATION AND GUIDANCE

This report has been carried out in accordance with the following legislation and guidance:

Legislation

- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011)
- Planning and Development Acts 2000 to 2024, as amended, including Part XAB

European Commission Guidance

- European Commission (EC, 2000). Communication from the Commission on the Precautionary Principle
- European Commission (EC, 2006). Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg
- European Commission (EC, 2013). Interpretation Manual of European Union Habitats. Version EUR 28
- European Commission (EC, 2019). Managing Natura 2000 Sites – The provisions of Article 6 of the Habitats Directive 92/43/EEC
- European Commission (EC, 2021). Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg

Irish Guidance

- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government (DoEHLG, 2010)
- Applications for Approval for Local Authority Developments made to An Bord Pleanála under 177AE of the Planning and Development Act, 2000, as amended (Appropriate Assessment) – Guidelines for Local Authorities (An Bord Pleanála, 2013)
- Office of the Planning Regulator (OPR, 2021). Appropriate Assessment Screening for Development Management

2.4 DEFINITIONS

Definitions of conservation status, integrity and significance used in this assessment are defined in accordance with '*Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*' (EC, 2018):

- Favourable conservation status (FCS) can only be defined and achieved at the level of the natural range of a species or a habitat type. A broad conservation objective aiming at achieving FCS can therefore only be considered at an appropriate level, such as for example the national, biogeographical or European level. The conservation measures have to correspond to the ecological requirements of the natural habitat types in Annex I and of the species in Annex II present on the site. The ecological requirements of those natural habitat types and species involve all the ecological needs which are deemed necessary to ensure the conservation of the habitat types and species. They can only be defined on a case-by-case basis and using scientific knowledge.

- The integrity of a European site is defined as the coherent sum of the site's ecological structure, function, and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated.
- Significant effect should be determined in relation to the specific features and environmental conditions of the protected site concerned by the plan or project, taking particular account of the site's conservation objectives and ecological characteristics.

3. METHODOLOGY

3.1 DESKTOP STUDY AND INFORMATION SOURCES

A desktop study for the proposed project was undertaken in June 2025. The following briefly outlines the key datasets and information sources used for the desktop study while findings are detailed in Section 6.1:

- A detailed review of European sites within the zone of influence (Zol) of the proposed project was undertaken to identify potential pathways/links between the project site and European sites and/or supporting habitats. This included examination of NPWS¹ resources, including site synopses reports, Natura 2000 data forms, site specific conservation objectives (SSCOs) documents, mapping, and available supporting reports, for the relevant Qualifying Interests (QIs) of SACs and Special Conservation Interests (SCIs) of SPAs.
- NPWS Article 17² reporting and mapping on Annex I habitats and Annex II species
- A detailed review of the NPWS website.
- Review of available literature and web data on the National Biodiversity Data Centre (NBDC) website³ including published data and documents from Bat Conservation Ireland, BirdWatch Ireland, Mammal Atlas, Irish Butterflies and Botanical Society of Britain and Ireland.
- Environmental Protection Agency (EPA) mapping database⁴ to support AA.
- EPA website on Water Framework Directive (WFD) reporting⁵.
- Review of Inland Fisheries Ireland (IFI) research data⁶ including Fish Stock Survey of Transitional Waters in the Shannon International River Basin District 2017⁷.

In addition, aerial photography (Google Maps, Bing Maps) and mapping (Geological Survey Ireland) were used to identify non-designated habitats such as rivers, woodlands, and hedgerows which may provide connectivity/corridors to surrounding habitats or designated sites.

The desk study identified ecological features relevant to AA potentially affected by the proposed project and informed the scope of field surveys undertaken. Section 3.2 below briefly outline the field surveys undertaken while survey results are detailed in Section 6.2.

The data collected during the field surveys were robust and allowed TOBIN to draw accurate, definitive and coherent conclusions on the possible effects of the proposed project.

¹ Accessed June 2025 via <https://www.npws.ie/protected-sites>.

² Accessed June 2025 via <https://www.npws.ie/publications/article-17-reports> and <https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17-gis-and-metadata-downloads>.

³ Accessed June 2025 via <https://maps.biodiversityireland.ie/Map>.

⁴ Accessed June 2025 via <https://gis.epa.ie/EPAMaps/AAGeoTool>.

⁵ Accessed June 2025 via <https://www.catchments.ie/guide-water-framework-directive/>.

⁶ Accessed June 2025 via <http://wfdfish.ie/index.php/category/river-surveys->.

⁷ Accessed June 2025 via https://www.fisheriesireland.ie/sites/default/files/2023-02/wfd_tw_survey_shannon_report_2017.pdf



3.2 ECOLOGICAL FIELD SURVEY AREA

The study area for the ecology surveys undertaken to inform the biodiversity assessment for the proposed project included the four land parcels of the proposed project, the intervening lands between the parcels that will feature underground cabling, the proposed grid connection route along the public roads, the underground cabling to the Drumline 110 kV substation, plus the wider surrounding hinterland.

3.2.1 Multidisciplinary ecological field surveys

Multidisciplinary ecological field surveys were undertaken by qualified and experienced TOBIN ecologist. The aim of the surveys was to determine the presence or absence of protected habitats and species, including Habitats Directive Annex I habitats and Annex II species (with the exception of Annex II bat species which were surveyed using directed/targeted surveys (see summary in Section 3.2.2). The multidisciplinary field surveys also assessed the suitability of the habitats within the proposed project site to support protected species. The multidisciplinary walkover surveys were undertaken at representative and significant habitats within the proposed project site and its immediate surroundings over 3 days by a team of TOBIN ecologists. These multidisciplinary surveys were conducted on the May 1st and 2nd, 2025 and July 8th, 2025

- Multidisciplinary surveys were undertaken at the proposed project site following the methodologies outlined in Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011) and Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009). The surveys specifically assessed Annex I habitats and targeted Annex II species (with the exception of bats) of the Habitats Directive. The data were recorded, and the habitats encountered during the surveys were classified in accordance with Fossitt (2000), with reference to the Interpretation Manual of EU Habitats (EC, 2013) as appropriate.
- The multidisciplinary surveys also included species protected under the Flora (Protection) Order, 2022 (S.I. No. 235/2022), as well as species listed in the Irish Red Data List of Irish Plants.
- The proposed project site was also searched for evidence of invasive non-native species (INNS) listed in Part 1 of the Third Schedule of S.I. No. 477/2011 and S.I. No. 374/2024, as well as other species of concern under the European Union (Invasive Alien Species) Regulations 2024.

3.2.2 Volant Mammals (Bats)

To assess the presence and activity of bats within the proposed project area, Eire Ecology carried out the following a series of bat surveys including:

- Ground level preliminary roost assessment of trees and buildings at the proposed project site on February 11th and 14th, 2025.
- Bat activity emergence surveys at buildings within the proposed project site on the 3rd and 21st of July 2025 to examine for roosting bats that could be impacted by the project, observe bat interactions such as commuting routes, feeding areas, and examine if there are current impediments to bats within the surrounding environment. The surveys were conducted using full-spectrum detectors, thermal imaging, and night-vision equipment. Each bat encounter was recorded and identified to species where possible. Surveys

measured activity, not abundance, and were carried out during the active season under suitable weather conditions.

- Static bat detector surveys across the proposed project site during the spring and summer bat seasons of 2025 to record species and activity. Initial deployment occurred from 16th of April for 20 nights, with a second deployment on the 11th of July for 10 nights, concluding on 21st July.

All bat surveys were carried out in accordance with Irish Wildlife Manual No. 134. Bat Mitigation Guidelines for Ireland- V2 (Marnell, et al., 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition) The Bat Conservation Trust, London (Collins, 2023).

3.2.3 Birds

Michael O'Clery (B.A. Hons), Ornithologist with Goldcrest Environmental, undertook bird monitoring for the proposed project. An initial site scoping survey was undertaken on 29th January 2025 to inform the design of the ornithological survey programme. This visit established suitable transect routes to ensure comprehensive coverage of the study area, identify key habitats and vantage points, and address access considerations, including landowner liaison and site constraints. The transect routes defined during this scoping exercise formed the basis for subsequent monthly bird surveys.

To inform the original application to Clare County Council monthly ornithological surveys were undertaken from February to August 2025 (inclusive). Following submission of the original application monthly transect surveys continued from September 2025 to January 2026 (inclusive) to cover the winter season. Combined the full suite of surveys covered the full annual cycle and established patterns of species diversity and seasonal habitat use across the site. Specifically, the transect surveys were undertaken on 5th February, 12th March, 5th April, 5th May, 4th June, 18th July, 1st August, 21st September, 21st October, 8th November, 30th December 2025, and 31st January 2026. The transect surveys were walked at a standard walking speed. Notes on aural and visual registrations of bird species were recorded during field surveys. Visual registrations were recorded with the aid of binoculars (e.g., 8 x 42) and, where necessary, with the aid of a telescope (e.g., 20-45 x 60 scope).

Access to the site was at times constrained by the presence of livestock, requiring coordination with landowners to facilitate entry (e.g. unlocking gates or moving animals). As a result, the timing of transect surveys was not formally structured around tidal cycles and was partially influenced by access availability. However, the timings for the 12 monthly surveys did cover a wide range of tidal conditions at the Shannon estuary. The timings of each of the 12 monthly surveys at Area 4, in relation to High to Low tides are shown in the Table 3.1. Specifically, the transect surveys were undertaken across a range of tidal states, including low tide, mid tide (both rising and falling), and mid-to-high tide conditions. Several surveys coincided with falling tides, capturing conditions associated with active foraging, while others were undertaken during rising tides, including mid-to-high stages, which are more representative of transition periods and potential movement towards roosting areas. Surveys were also conducted at low tide and low-rising conditions, ensuring that intertidal foraging behaviour and habitat use were observed.



Overall, the survey programme encompassed a representative spread of tidal conditions, allowing for the observation of bird movement, foraging activity, and potential high-tide roosting patterns across the site.

The surveys recorded bird species presence, abundance, and behaviour, providing baseline of site utilisation by avifauna, with particular attention to species potentially associated with the adjacent River Shannon and River Fergus Estuaries SPA (Site code: 004077).

Table 3.1: Survey times in relation to High to Low tides on the adjacent Shannon Estuary.

Survey Date	Area 1 - Time	Area 2 - Time	Area 3 - Time	Time of High Tide / Low Tide at Limerick Dock	Area 4 - Time	Tide State during surveys at Area 4
29 th January 2025	Scoping survey					
5 th February 2025	11:25 – 12:05	12:15 – 13:25	13:35 – 14:25	H 11:43 L 18:24	14:40 – 15:00	Mid, falling
12 th March 2025	08:40 – 09:15	09:05 – 10:10	10:20 – 11:15	H 05:41 L 11:53	11:25 – 11:40	Low
5 th April 2025	13:30 – 14:05	14:10 – 15:10	15:20 – 16:15	H 13:23 L 19:59	16:30 – 16:50	Mid, falling
5 th May 2025	13:40 – 14:10	14:15 – 15:25	15:40 – 16:25	H 14:34 L 21:16	16:40 – 16:55	Mid, falling
4 th June 2025	08:50 – 09:25	09:30 – 10:30	10:40 – 11:30	L 08:56 H 14:52	11:40 – 11:55	Mid to Mid-High, rising
18 th July 2025	13:25 – 14:00	14:05 – 15:35	15:40 – 16:25	H 13:16 L 19:54	16:35 – 16:50	Mid, falling
1 st August 2025	07:35 – 08:00	08:05 – 08:55	09:10 – 09:55	L 06:36 H 12:46	10:05 – 10:20	Mid to Mid-High, rising
21 st September 2025	11:35 – 12:10	12:15 – 13:10	13:25 – 14:25	H 07:24 L 13:18	14:45 – 15:00	Low, rising
21 st October 2025	08:30 – 09:15	09:20 – 10:15	10:25 – 11:30	H 07:23 L 13:20	11:45 – 12:30	Mid Low, falling to Low
7 th November 2025	14:20 – 14:55	15:05 – 16:00	16:10 – 16:45	L 13:25 H 19:55	16:50 – 17:00	Mid, rising

Survey Date	Area 1 - Time	Area 2 - Time	Area 3 - Time	Time of High Tide / Low Tide at Limerick Dock	Area 4 - Time	Tide State during surveys at Area 4
30 th December 2025	08:55 – 09:25	09:30 - 10:20	10:30 – 11:15	L 09:04 H 14:45	11:25 – 11:40	Mid, rising
31 st January 2026	09:05 – 09:30	09:35 – 10:15	10:20 – 11:10	H 05:11 L 11:39	11:20 – 11:35	Low

3.2.4 Zone of Influence Methodology

The identification of European sites within the zone of influence (Zol) of the proposed project was evaluated on a case-by-case basis with reference to the nature, size and location of the proposed project, and the sensitivities of the ecological receptors, and the potential for in-combination effects with other plans or projects.

Using the source-pathway-receptor model (OPR, 2021) an examination of the potential effects of the proposed project was also undertaken (alone and / or in-combination) to identify what European sites, and which of their QIs or SCIs are potentially at risk. This conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. In the context of the proposed project, the model comprises:

- Source (s) – potential impacts from the proposed project, e.g. loss of habitat, direct emissions (water, air, noise and light);
- Pathway (s) – hydrological, physical or ecological connectivity between the proposed project and the European site; (e.g. water bodies and proximity); and
- Receptor (s) – QIs and/or SCI of the European sites.

The existence of a pathway is a crucial element in the screening process as, if no pathway can be identified between the ‘source’ and the ‘receptor’, then no effect can be anticipated on the receptor (OPR, 2021). Therefore, the identification of relevant European sites (i.e. European sites connected with the proposed project through an identified pathway) is fundamental in an AA.

The Chartered Institute of Ecology and Environmental Management (CIEEM) defines the Zol of a project as the area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities (CIEEM, 2018).

In order to establish the Zol of the proposed project, the likely key biophysical changes associated with the works were determined having regard to the proposed project characteristics set out in Section 7.1 through Section 7.3 of this report.

4. PROJECT-SPECIFIC FIRE AND EMERGENCY MANAGEMENT PLANS

In response to the ACP RFI Item 1 and 2 (see Section 1.1 above), BNRG have commissioned standalone Fire Risk Management Plan (FRMP) (see APPENDIX A) and Emergency Response Plan (ERP) (see APPENDIX B) to accompany this application.

The FRMP provides a comprehensive assessment of potential fire risks associated with the BESS, including identification of fire hazards, risk evaluation, and the implementation of preventative measures. These include system design controls, safe storage and handling of materials, ongoing maintenance procedures, and the provision of appropriate fire detection, alarm, and suppression systems.

The ERP sets out a structured response framework to be implemented in the event of a fire or emergency. This includes clearly defined roles and responsibilities, communication protocols, coordination with emergency services, and procedures to ensure a rapid and effective response to minimise risk to human health, property, and the environment.

These documents are supported by site-specific measures relating to water management and pollution control, including the containment of firewater runoff to prevent any discharge to surface water or groundwater. Provision of an adequate water supply for firefighting purposes is also incorporated into the design of the proposed development.

In addition, potential impact pathways associated with the proposed BESS, including risks related to fire events and associated firewater runoff, were identified at scoping stage and have been assessed in this report. Specific mitigation measures, including fire risk management, emergency response, and surface water protection, are set out in Sections 9.4.

5. DESCRIPTION OF THE PROPOSED PROJECT

The Proposed Development comprises a Solar Photovoltaic (PV) Solar Farm, Battery Energy Storage System (BESS), 38kV Substation and associated Grid Connection to the existing Drumline 110kV Substation.

The solar farm will provide up to 60 MW of energy which will supply approximately 11,700 homes locally. BNRG is applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operational period of 40 years).

The development will be the subject of a Planning Application to Clare County Council.

The proposed project will include solar panels, internal access tracks, MV stations, BESS, storage containers, hard standings, material storage, internal electrical and communications cabling, CCTV, temporary construction compound, drainage infrastructure and all associated works related to the construction of the solar farm as well as measures designed to protect and enhance existing habitats.

The proposed project will consist of the construction of the following:

- Linear arrays of solar PV panels on ground mounted steel supported structures with associated cabling and ducting (including underground cable grid connection to the Drumline 110kV substation);
- 2 no. Horizontal Directional Drilling (HDD) locations associated with interconnecting cable routes
- 11 no. proposed single storey MV stations;
- A BESS installation (including 20 No. containers with cells and 5no. containers with PCS MV stations, drainage network, 1No collection sump and 4No. fire water storage tanks).
- Perimeter fencing;
- Palisade double security gates at all temporary (3No.) and permanent (3 no). site entrances;
- 2 no. temporary construction compound/carpark/material storage areas with associated temporary site offices, parking areas and security fencing;
- 8 no. steel storage containers;
- 5 no. turning bays;
- On-site pole mounted CCTV cameras;
- 3 no. temporary construction stage wheel wash systems; and
- Temporary soil storage areas;

A temporary sealed below ground wastewater storage tank will be constructed on site to hold wastewater generated by toilets in the temporary staff building during the construction phase. It will have a high-level alarm to alert when it should be emptied, and its content transported offsite for treatment at a licenced facility. Fire water storage tanks at the BESS will only be utilised in emergency scenarios. Water collected from the storm water drainage will be utilised to top up the storage tanks.

All solar MV stations and the energy storage containers will sit on a reinforced concrete slab.

The proposed solar panels (modules) will be fixed in position with galvanised steel framing pile driven into the ground, so there will be no moving parts. The solar PV panels are to be arranged in south facing rows, approximately 4m apart, within the existing field boundaries, will be fenced. A 5 m buffer between the field boundaries/hedgerows and fencing is proposed.

The proposed solar panels are typically set 0.6 m above ground level at the lowest point increasing to a maximum height above ground level of 3 m. The panels will be mounted typically at 5-25 degrees to the horizontal, but this may be adjusted to suit local conditions.

Each land parcel will be accessed via existing site entrances off both local and regional road networks. In the case of the southernmost parcel (No. 4) this will be accessed through parcel No. 3 using an existing track running through woodland.

Internal access tracks (approx. 3.5m wide) will be required for construction and maintenance. A road crossing (via Horizontal Directional Drilling - HDD) will be required across the N18 road that divides the site in order to access the northern and southern land parcels and at Ardkyle to connect parcels No.1 and No.2.

Access gates, for security purposes, will be provided as part of the development. Gates will be located at a setback distance of 4.5 m from the road to allow vehicles to pull in from the main carriageway to access the gates. The security gates will be located at the main entrances to the site and will be screened by planting. Other gates required internally that separate land parcels will be provided and will be similar to the existing agricultural gates on the lands.

The proposed solar panels are typically set 0.6–0.8 m above ground level at the lowest point increasing to a height above ground level of 3 m. The panels will be mounted typically at 25 degrees to the horizontal, but this may be adjusted to suit local conditions. The final arrangement would be subject to detailed design and will be submitted to the Planning Authority prior to the commencement of development

All 11no. MV stations will sit on a 200 mm reinforced concrete slab. The typical MV stations, measuring approximately 6m (length) x 2.5m (width) x 3m (height), will be lifted into place. It should be noted the final appearance of inverters may alter due to detailed design requirements; flexibility of the design is required for tendering purposes. It should also be noted that this layout represents a worst-case scenario, and any post planning design changes (during detailed design) will only reduce any impacts/effects.

It is proposed to connect the Ballycunneen Solar Farm 38kV Substation to the existing 110 kV ESB/EirGrid substation located at Drumline via an underground cable. This will be undertaken using a 38 kV cable to connect back to the substation and 33 kV cable to connect between the parcels.

The construction phase will be short term in nature. It is anticipated that the construction phase will be limited to between 10 -12 months in total. Works will be restricted to standard day-time operational hours i.e. 07:00 to 19:00, Monday to Friday and 08:00 to 14:00 on Saturdays. No work will be undertaken on Sundays or Bank Holidays.

6. RECEIVING ENVIRONMENT

6.1 DESK STUDY RESULTS

The following section provides a summary of the results obtained from the desk study undertaken to inform the ecological assessment. The desk study involved the collection, collation, and review of existing ecological data relevant to the proposed project site and its surrounding area. The sources consulted are outlined in Section 3.1 above. The purpose of the desk study was to:

- Identify designated sites of conservation interest (e.g. SACs, SPAs) within the Zol of the proposed project;
- Determine the presence or potential occurrence of species and habitats listed under the EU Habitats Directive (Annex I habitats and Annex II species), EU Birds Directive (Annex I bird species);
- Review records of rare, protected, or notable flora and fauna in proximity to the proposed project;
- Establish baseline information on hydrology, land use, and connectivity of habitats relevant to the project site and surrounding environment.

The results of the desk study are presented in the following subsections and are used in conjunction with findings from field surveys to provide a comprehensive ecological baseline for assessment.

6.1.1 Habitats and Flora

Records of Annex I habitats and Annex II species of the Habitats Directive recorded at NPWS Article 17⁸ 10km grid squares encompassing the proposed project site are presented in Section 6.1.1.1 while Section 6.1.1.2 outlines records of Annex I species of the Birds Directive, and Habitats Directive Annex II species included on the NBDC database⁹ for the 2 km Irish grid squares R46F, R46G, and R46H, which encompass the proposed project site.

6.1.1.1 NPWS Article 17 Mapping

6.1.1.1.1 Protected Annex I Habitats

The NPWS Article 17 Map Viewer shows records of 15 Annex I Habitats within the grid squares encompassing the proposed project site. These include:

- Estuaries [1130]
- Tidal mudflats and sandflats [1140]
- Reefs [1170]
- Atlantic salt meadows [1330]
- Mediterranean salt meadows [1410]
- Hard water lakes [3140]
- Rich pondweed lake habitat [3150]
- Vegetation of flowing waters [3260]
- Wet heaths [4010]
- Dry heaths [4030]

⁸ <https://storymaps.arcgis.com/collections/1a721520030d404f899d658d5b6e159a>

⁹ <https://maps.biodiversityireland.ie/>. Accessed in July 2025



- Transition mires [7140]
- *Cladium fens** [7210]
- Alkaline fens [7230]
- Caves [8310]
- Old oak woodland [91A0]

6.1.1.1.2 Protected Annex II Species

The NPWS Article 17 Map Viewer shows records of eight Annex II Species within the grid squares encompassing the proposed project site. These include:

- Marsh fritillary *Euphydryas aurinia* [1065]
- White-clawed crayfish *Austropotamobius pallipes* [1092]
- Sea lamprey *Petromyzon marinus* [1095]
- Brook lamprey *Lampetra planeri* [1096]
- Atlantic salmon *Salmo salar* [1106]
- Lesser horseshoe bat *Rhinolophus hipposideros* [1303]
- Otter *Lutra lutra* [1355]
- Pine marten *Martes martes* [1357]

6.1.1.2 National Biodiversity Data Centre Records

6.1.1.2.1 Birds and Volant Mammals

A search of the NBDC database for species listed under Annex I of the Habitats Directive, and Annex I and Annex II of the Birds Directive was conducted for the 2 km Irish grid squares R46F, R46G and R46H, which encompass the proposed project site.

The review identified three species listed under the Bird Directive (see Table 6.1):

- Lapwing (*Vanellus vanellus*), recorded in R46F
- Little egret (*Egretta garzetta*), recorded in R46F
- Curlew (*Numenius arquata*), recorded in R46G

The above species have the potential to occur within the proposed project site.

No other Bird Directive Annex I species were recorded. No records of Annex II species, including the lesser horseshoe bat, other mammals, fish, amphibians, invertebrates, or protected plants, were found in the NBDC database for the 2 km Irish grid squares R46F, R46G and R46H.

Table 6.1: Relevant Biodiversity Records – Bird Species

Common Name	Scientific Name	Record Count	Last Record	Designation
NBDC				
Birds				
R46F				
Lapwing	<i>Vanellus vanellus</i>	1	31/12/2011	Birds Directive Annex II
Little Egret	<i>Egretta garzetta</i>	2	31/12/2011	Birds Directive Annex I
R46G				
Curlew	<i>Numenius arquata</i>	1	19/12/2021	Birds Directive Annex II

6.1.1.3 Hydrology and Hydrogeology

6.1.1.3.1 Hydrology

Catchment

Hydrologically, the proposed project, which comprises four land parcels interconnected via underground cabling, are situated within the Shannon Estuary North WFD Catchment (Catchment code: 27) (see Figure 6.1).

Subcatchments

The northern-most land parcel at Ard Kyle (land parcel 1) is located in the owenogarney_SC_020 (WFD code: 27_12) while the land parcels 2, 3 and 4 are situated within the Ballygreen_SC_010 (WFD code: 27_10) (see Figure 6.1).

WFD River Water Bodies (RWB)

The northern-most land parcel (land parcel 1) is bordered to the north and east by the Cloverhill Stream 010 WFD River Water Body (RWB) (IE_SH_27C100600) (see Figure 6.2).

No WFD river water bodies intersect the land parcels at Ballycunneen and Firgrove (land parcels 2) within the Ballygreen_SC_010. Similarly, the underground cabling connecting the Ard Kyle land parcel 1 with the land parcel 2 at Ballycunneen and Firgrove parcel, as well as the 38kV Substation, does not intersect any WFD RWBs. Likewise the underground cabling extending south from the 38kV Substation to the R458 also does not intersect any WFD RWBs. At the R458, however, the underground cabling follows the road alignment which crosses the Urlan Beg_010 WFD RWB (IE_SH_27U010950) (see Figure 6.2).

The land parcels 3 and 4 at Clonmoney West are bordered on the western side and intersect with the Urlan Beg_010 WFD river water body (IE_SH_27U010950) which flows south (see Figure 6.2).

WFD Water Quality Status

The latest WFD water quality status of the Urlan Beg_10 (IE_SH_27U010950) WFD RWB have been reported as *Moderate*.

6.1.1.3.2 Hydrogeology

Hydrogeologically, the proposed project lies on the Tulla-Newmarket on Fergus WFD groundwater body (GWB) (IE_SH_G_229) (Figure 6.3).

This GWB is a moderately productive bedrock aquifer situated within the Shannon Estuary North catchment. This groundwater body is classified with Good water quality status, meeting the ecological standards set out under the WFD. The GWB WFD risk is currently classified as Not at Risk.

This GWB is a moderately productive bedrock aquifer situated within the Shannon Estuary North catchment. This groundwater body is classified with Good water quality status, meeting the ecological standards set out under the WFD. The GWB WFD risk is currently classified as Not at Risk.

The groundwater flow direction in the GWB is likely to follow the natural topographic gradient of the area, flowing from the higher inland area towards the lower-lying discharge areas near

the Shannon Estuary. Specifically, groundwater moves predominantly southwest to westward or towards the Shannon Estuary.

Figure 6.1: WFD Catchment and Subcatchments relative to the Proposed Project and Townlands

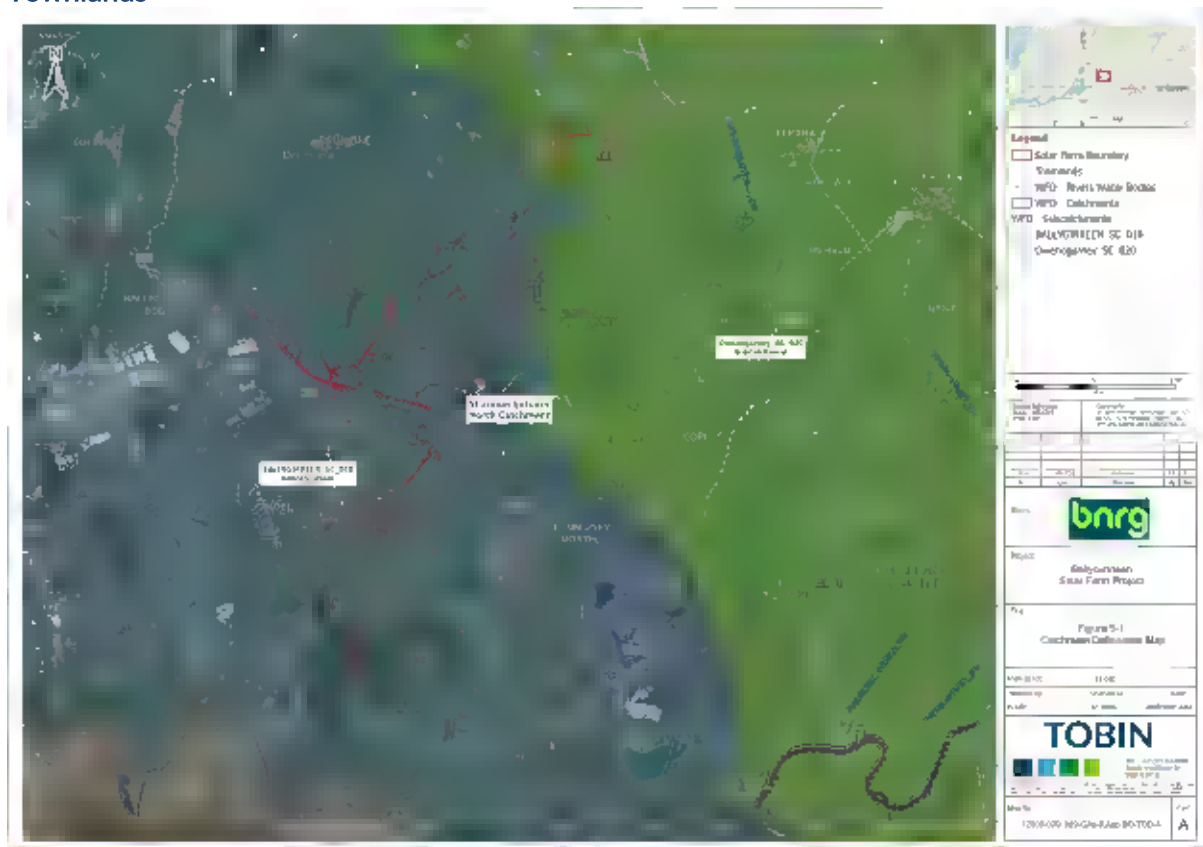


Figure 6.2: Proposed Project relative to WFD river bodies



6.1.2 European Sites

The southern limit of the project redline is located approximately 3m from the Lower River Shannon Special Area of Conservation (SAC; Site Code: 002165) and around 4m from the River Shannon and River Fergus Estuaries Special Protection Area (SPA; Site Code: 004077). While all proposed infrastructure has been set back a further 72m to the north, providing a protective buffer between construction activities and the boundaries of these designated sites, there remains potential pathways for impacts on these European sites.

Potential impacts may include sediment runoff, changes in water quality, disturbance to habitats, and effects on species foraging or commuting within ecologically connected areas. The proximity of the proposed project site to these European sites means that careful assessment of potential direct and indirect effects is required to ensure that the conservation objectives of the SAC and SPA are not compromised.

Further detailed information on the Lower River Shannon Barrow SAC and the River Shannon and River Fergus Estuaries SPA and other the European sites potentially within the Zol of the proposed project, including their qualifying interests, habitats, and species, is provided in the Stage One Screening for Appropriate Assessment presented in Section 8 below. Section 7 provides a summary of potential impacts associated with the proposed project that could affect European sites.

6.2 FIELD SURVEY RESULTS

6.2.1 Habitats and Flora

During the multidisciplinary walkover survey, the dominant habitat within the proposed project site was improved agricultural grassland (GA1). Other occasionally occurring habitats included

- BL3 - Buildings and artificial surfaces
- ED1 - Exposed sand, gravel or till
- FS1 - Reed and large sedge swamps
- FW1 - Eroding/ upland rivers
- FW4 - Drainage ditches
- GM1 - Marsh
- GS2 - Dry meadows and grassy verges
- GS4 - Wet grassland
- WD1 - (Mixed) broadleaved woodland
- WD2 - Mixed broadleaved/ conifer woodland
- WD4 - Conifer plantation
- WL1 - Hedgerows
- WL2 - Treelines
- WS1 - Scrub

Figure 6.4 through Figure 6.6 illustrate the habitats within and adjacent to the proposed project site.

No Third Schedule S.I. 477 invasive plant species were recorded within the proposed project site.

Figure 6.4: Multidisciplinary survey results: Parcel 1, Parcel 2 and Adjacent Areas

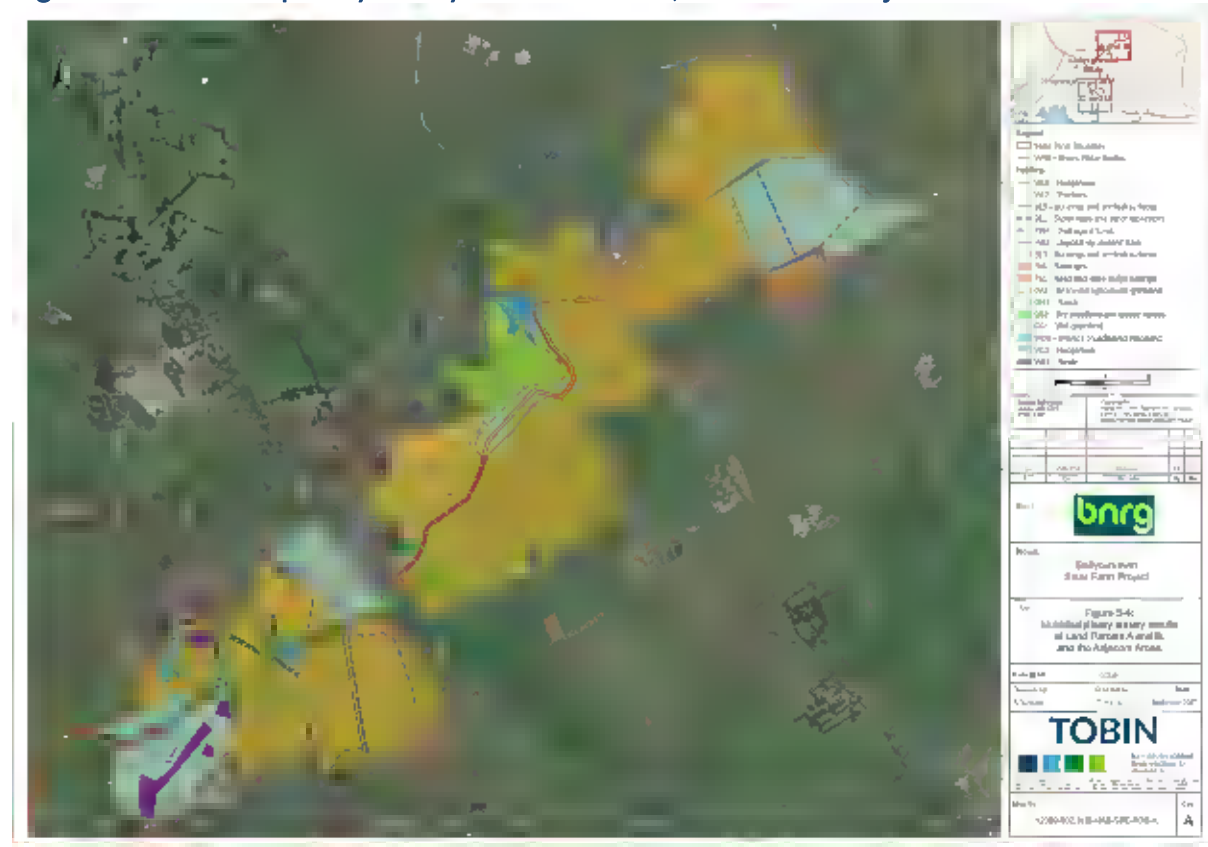
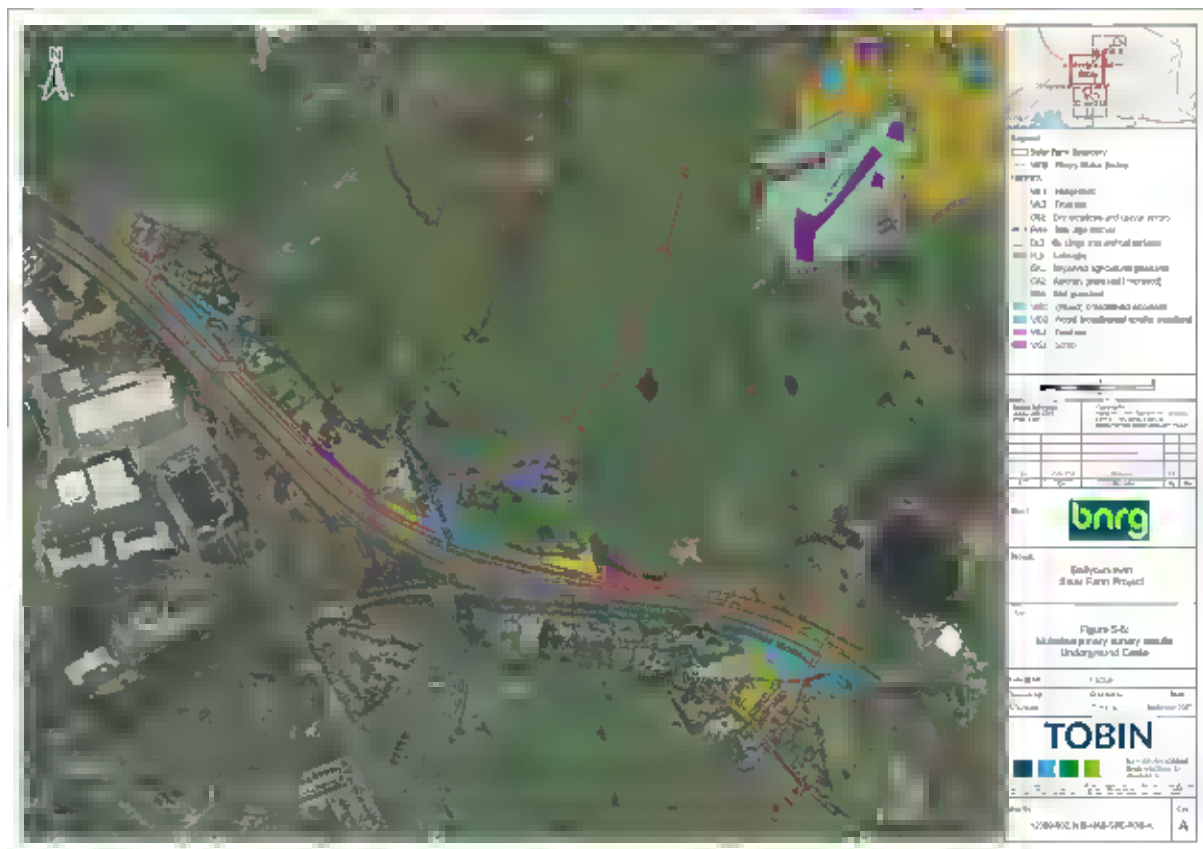




Figure 6.6: Multidisciplinary survey results: Underground Cable



6.2.2 Fauna

6.2.2.1 Habitat Directive Annex II Species

No Annex II Habitat Directive species were recorded during the ecological survey of the proposed project site.

The Lower River Shannon SAC is designated for the following Annex II fauna species (NPWS, 2012a):

- Freshwater pearl mussel (*Margaritifera margaritifera*),
- Sea lamprey (*Petromyzon marinus*),
- Brook lamprey (*Lampetra planeri*),
- River lamprey (*Lampetra fluviatilis*),
- Salmon (*Salmo salar*),
- Otter (*Lutra lutra*)
- Common bottlenose dolphin (*Tursiops truncatus*).

Although, no signs of otter were recorded during the survey of the proposed project site, it is considered that the habitats within and adjacent to the proposed project site are suitable to support this species. Otter which are present in the vicinity of the proposed project site are likely to be connected to the QI population associated with the Lower River Shannon SAC.

There is no record of brook, river or sea lamprey within the surface water features in the proposed project site. However, there is potential for suitable habitat within the Urlan Beg_010 River and the Cloverhill Stream_010. Lamprey species within the vicinity of the proposed project site are likely to be connected to the QI population associated with the Lower River Shannon SAC.

There are no records of freshwater pearl mussel within the proposed project site. According to the NPWS conservation objectives the QI only applies to the freshwater pearl mussel population in the Cloon River, Co. Clare. The Cloon population is confined to the main channel and is distributed from Croany Bridge to approx. 1.5km upstream of Clonderalaw Bridge (NPWS, 2012a) which is 30km west of the proposed project site.

There is no record of salmon within the surface water features in the proposed project site. However, there is potential for suitable habitat within the Urlan Beg_010 River and the Cloverhill Stream_010. Salmon within the vicinity of the proposed project site are likely to be connected to the QI population associated with the Lower River Shannon SAC. The Shannon transitional waterbody is considered an area of international importance for commuting and nursery habitat for salmon and other marine species.

There are no habitats suitable to support this species within the proposed project site. There is no potential for common bottlenose dolphin to be present within the proposed project site.

To establish a baseline of bat species assemblages, as well as the spatial and temporal distribution of species activity within the proposed project site a series of directed bat surveys were undertaken including:

- Ground-level assessment of trees and hedge clusters, and structures was undertaken on the 11th and 14th February 2025 to evaluate potential bat roosts.

- Nighttime roost surveys and emergence surveys were conducted on the 3rd July and 21st July 2025.
- Static detector surveys were carried out from the 16th April for 20 nights and redeployed from 11th July for ten nights.

Full details of these surveys undertaken can be found in Eire Ecology's Bat report in APPENDIX A.

The Annex II species, lesser horseshoe bat is a QI of the Ratty River Cave SAC (0002316) which is an important roosting location for bats, providing shelter and breeding opportunities for the species. The SAC is located approximately 4.10km from the project site. The SSCO document for the SAC provides a 2.5km buffer surrounding the site within which is considered the core sustenance zone (CSZ) for species using the roosts. The proposed project site which lies a further 1.6km outside this zone includes a network of hedgerows, treelines and woodlands provide connectivity for the species.

There are 19 known roosts located within a 6km buffer of the project site, 13 of which contain lesser horseshoe bats.

During the static surveys, 20 registrations of lesser horseshoe bat were recorded at three of the seven detectors deployed, these detectors were located within both open and edge habitats within the proposed project site. (Figure 6.7)

6.2.2.2 *Birds Directive Annex I Species*

The River Shannon and River Fergus Estuaries SPA is designated under the EU Birds Directive to protect important populations of waterbirds and wetland species. The SPA is designated for 23 specific SCI bird species plus waterbird or wetland assemblages (Wetland and Waterbirds [A999]). The SPA supports both breeding and migratory birds, providing key feeding, roosting, and wintering habitats across estuarine and tidal mudflats, saltmarshes, and shallow waters. The SPA is hydrologically connected to the proposed project site.

The presence of open farmland and wet grassland provides suitable supporting habitat for several SCI species of the River Shannon and River Fergus Estuaries SPA, offering foraging and loafing opportunities, particularly during the winter months when migratory waterbirds utilise agricultural grasslands, damp pastures, and wet grasslands located in proximity to estuarine roost sites.

As outlined previously, ornithological surveys were conducted monthly between January 2025 and January 2026. A total of nine bird species were recorded during these field surveys; namely

- Kestrel
- Little Egret
- Lesser Black-backed Gull
- Herring Gull
- Buzzard
- Curlew
- Snipe
- Grey Heron
- Sparrowhawk

Of these, Curlew was the only SCI species of the River Shannon and River Fergus Estuaries SPA recorded in the proposed project area during the February 2025 to August 2025 period. During the February transect surveys, a single flock of 51 Curlew was observed feeding on grasslands in the southern section of the proposed project site (land parcel 4) during the February 2025 transect survey. The flock remained at parcel 4 for a period of approximately 10 minutes before relocating outside of the project site to the east.

Following submission of the original application monthly transect surveys continued from September 2025 to January 2026 (inclusive) to cover the winter season. During this period a total of nine species was recorded; namely,

- Lesser Black-backed Gull
- Buzzard
- Mallard
- Herring Gull
- Grey Heron
- Snipe
- Curlew

- Common Gull
- Black-headed Gull

SCI species of the SPA recorded included during this period was Curlew in November 2025, and Black-headed Gull in November and December 2025 and January 2026.

During the November 2025 transect surveys, a mixed flock of ten Curlew, 16 Herring Gulls, 22 Common Gulls, 110 Black-headed Gulls, and 4 Lesser Black-backed Gulls were observed feeding on fields in Area 4.

In December 2025 Black-headed Gull x1 at Area 3, and 3 Area 4: Black-headed Gull in Area 4

In January 2026, a small mixed flock was observed feeding in Area 4, consisting of seven Black-headed Gulls, two Lesser Black-backed Gulls, and five Oystercatchers.

Full details of these surveys undertaken can be found in Goldcrest Bird Survey report in APPENDIX D. Other species that may potentially utilise such habitats include; Whooper Swan (*Cygnus cygnus*) and Light-bellied Brent Goose (*Branta bernicla hrota*), which are known to forage in improved and semi-improved grasslands adjacent to the estuary. Golden Plover (*Pluvialis apricaria*) and Lapwing (*Vanellus vanellus*) frequently exploit open farmland and wet grasslands for feeding and roosting, while Black-tailed Godwit (*Limosa limosa*) may also use damp pasture and flooded fields as supplementary foraging areas. While no individuals of these species were recorded within the proposed project site during surveys, the suitability of these habitats indicates that occasional or opportunistic use by SCI species cannot be ruled out, particularly during periods of cold weather or high tide when alternative foraging areas may be limited.

7. OVERVIEW OF POTENTIAL IMPACTS

7.1 CONSTRUCTION PHASE

It is anticipated that construction activities during the construction phase will be limited to between 10 - 12 months in total. Works will be restricted to standard day-time operational hours i.e. 07:00 to 19:00, Monday to Friday and 08:00 to 14:00 on Saturdays, with no works undertaken on Sundays or Bank Holidays.

Works during the construction phase may result in the following:

- Disturbance of wildlife within the immediate environs
- Fragmentation of wildlife corridors due to installation of fencing
- Loss of habitat used by wildlife for resting, foraging and commuting
- Loss of resting or breeding places and/or mortality
- Water quality and habitat degradation impacts due to construction runoff or contamination.
- Dust from construction and earthworks may settle on vegetation, soil, or waterbodies, potentially reducing habitat quality and disturbing foraging or roosting species.

Potential construction phase impacts associated with the proposed project are discussed hereunder. The key impact mechanism are:

1. Habitat Loss and Fragmentation- arising from installation of infrastructure
2. Habitat Degradation - arising from water quality, air quality, and the potential introduction of IAPS
3. Disturbance - arising from noise and vibration

7.1.1 Habitat Loss and Fragmentation

The proposed project is not located within the Lower River Shannon SAC, and no direct loss of SAC habitats arises from the project.

The proposed project will result in the localised loss of terrestrial habitats within the project boundary, including areas of GS4 wet grassland and GA1 improved agricultural grassland (NIS Section 6.2.1). These habitats occur entirely outside the designated boundaries of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA and do not constitute qualifying habitats of either European site (NIS Section 8.1.1; Table 8.1; Section 8.1.2; Table 8.2). Accordingly, no direct loss or alteration of SAC or SPA habitats will occur as a result of the proposed project. **Inland Areas (Areas 1–3)**

- Areas characterised by:
 - Improved grassland
 - Agricultural grazing
 - Hedgerows and limited forestry
 - Located 800 m to >4.5 km from the coast
 - Provide unsuitable habitat for most SPA waterbirds, which depend on mudflats, estuaries, and saltmarsh
- Interpretation:

- Low species diversity and negligible species usage considered ecologically typical.

Coastal Fringe (Area 4)

- Area Immediately adjacent to estuary but separated by road and narrow grass strip (15–200 m)
- Occasional use by:
 - Curlew and gull species
 - Most SPA species remain within estuarine habitats feeding primarily on exposed mudflats, moving offshore or to roost sites (e.g. Saint's Island) on rising tides

Permanent habitat loss at the project site will occur for the installation of access tracks and handstanding areas for MV stations and BESS. The area of solar panels within this site totals approximately 40ha. The internal cabling will be installed underground with land reinstatement completed afterward. The area beneath the PV panels them will remain accessible for sheep grazing, and for foraging and commuting wildlife species. Temporary disturbance to adjacent habitats may also occur during construction activities, but the majority of the site will continue to support terrestrial habitats, including grasslands, treeline, hedgerows, woodland and scrub.

The majority of habitats over which the ground-mounted panels will be installed are of lower ecological value at a local scale, consisting predominantly of improved agricultural grassland (GA1). While these areas are not part of, and are unlikely to provide essential functional support to, the conservation objectives of any European site, they may still offer some foraging opportunities for Annex I bird species. Consequently, the reduction in available foraging habitat could potentially influence local feeding behaviour and overall fitness of these species.

A smaller proportion of habitats within the proposed project site that will be lost are of higher ecological value. While these areas are not designated features in their own right, they may provide potential supporting functions (e.g. foraging) for Annex I species under the Birds Directive. The areas may also provide potential supporting functions for Habitats Directive Annex II species including lesser horseshoe bat and otter.

For the Annex II species including lesser horseshoe bat certain habitats within the site to be removed may function as commuting corridors and foraging grounds for the species. These features act as commuting corridors between roosting and feeding areas, providing essential ecological connectivity that enables bats to navigate the landscape safely while accessing food resources.

Fencing around the solar panel infrastructure, tracks, and MV stations incorporates ecological considerations, with small mammal gates installed at 100m intervals and all fencing maintaining a minimum clearance of 0.1m above ground level. This design allows for the unimpeded movement of mammals, including species such as badgers, ensuring connectivity across the site and preventing habitat fragmentation. The strategic placement and design of the enclosure fencing mean that any ecological impacts are anticipated to be negligible within the local context.

Cabling between panels will result in excavation of minor cable routes/channels that will result in direct disturbance to the surface of the ground. The grassland habitat will remain intact underneath the solar panels. These construction requirements will be within the context of improved agricultural grassland and are evaluated as imperceptible in the local context.

In the case of the Habitats Directive Annex II species otter, no instream works will take place within the Urlan Beg_010 River or the Cloverhill Stream_010, and as such, there will be no direct loss of aquatic foraging habitat. However, certain terrestrial habitat features within the site that will be removed may function as commuting corridors for otter, supporting connectivity between resting, breeding, and feeding locations.

7.1.2 Habitat Degradation

7.1.2.1 Water Quality Impacts

It will be necessary to progressively clear topsoil and subsoil across the proposed project site to facilitate construction activities. Volumes of soil will be removed to accommodate the construction of solar panel hardstand areas, access tracks, underground cable trenches, and construction compounds. If not properly managed, site clearance, excavation, and material stockpiling have the potential to generate runoff of sediment and nutrients into the Urlan Beg_010 River and the Cloverhill Stream_010, both of which flow adjacent to or through the proposed site. These watercourses are hydrologically connected to the River Shannon, and increased suspended solids or nutrient deposition could lead to water quality deterioration and habitat degradation downstream.

There is also a risk of spills or leaks of oils, fuels, and chemicals, including the release of cement-based products, which could directly impact aquatic habitats within the Urlan Beg_010 River and the Cloverhill Stream_010 at the project site, as well as downstream habitats within the River Shannon.

To install the internal connection cable between land parcels 3 and 4, horizontal directional drilling (HDD) will be used to underneath the Urlan Beg_010 RWB. During HDD, there is a risk of structural fracturing or collapse of the river channel, as well as potential “frac-out” of drilling lubricants (e.g., bentonite), which could introduce fine suspended solids into the watercourse, potentially impacting water quality and aquatic habitats at the River Shannon.

For the interconnection cable HDD will be carried out beneath the N18. There are no waterbodies adjacent to these works, and the HDD location is not hydrologically connected to any European site; therefore, there is no hydrological pathway impacts.

7.1.2.2 Air Quality Impacts

Excavation activities have the potential to generate temporary dust emissions in the vicinity of the works. The Institute of Air Quality Management provides guidelines (Holman et al., 2014) which define potential dust emission risk classes for ecological receptors. These guidelines indicate that an assessment is required where ecological receptors occur within 50 m of the site boundary or of routes used by construction vehicles.

Dust generated due to construction activities associated with the proposed project, including solar panel installation, erection of ground-mounted structures, construction of hardstand areas and access tracks, excavation, earthworks, operation of machinery and vehicles, and use of tools and equipment, have the potential to affect habitats supporting Annex I bird species and Annex II species in the area. Such dust emissions could reduce the quality of habitats, potentially impacting foraging, commuting, or roosting opportunities for these species.

7.1.2.3 Potential Introduction of Invasive Alien Plant Species

No Third Schedule listed IASP were recorded within the proposed project site during the ecological surveys. However, it is possible that the movement of construction vehicles and material to and from the site may result in the introduction of invasive species if not appropriately managed. Invasive species may also travel via watercourses if sufficient measures or buffers are not established from the riparian zone to prevent transfer of IAPS to courses. Colonisation of invasive species to an area can inhibit growth and crowd out native plant species, alongside reducing the overall biodiversity of an area.

7.1.3 Disturbance - Noise & Vibration

The installation of solar panel arrays will generate a temporary, intermittent source of noise during the construction phase, primarily when installing the ground-mounted frames for the panels. Additional noise will arise from the operation of construction vehicles and machinery, including excavators, driven piles/screw pile drivers, and other equipment used to install the mounting system. An increase in personnel and traffic movements to and from the site is also expected. Increases in noise, vibration, during construction may result in disturbance to wildlife, including species Annex I birds of the Birds Directive and Annex II species of the Habitats Directive, within the immediate vicinity of the proposed project.

Rock breaking is not anticipated and no blasting is planned. In the unlikely event that rock breaking is required following detailed site investigation, the activity could generate intermittent noise and vibration, and measures will be implemented to minimise impacts.

Temporary construction lighting may also be required during certain phases. Fugitive lighting could deter wildlife movement in and around the site, in particular the Habitats Directive Annex II species lesser horseshoe bat.

7.2 OPERATIONAL PHASE

Potential operational phase impacts associated with the proposed project are discussed hereunder.

The proposed project is expected to remain operational for at least 40 years. During the operational phase, there will be no additional loss of habitats. Intermittent maintenance of the site will be required throughout the lifetime of the project, with ongoing agricultural use, such as sheep grazing, continuing across the site. Some localised noise may arise from operational infrastructure, such as MV stations and substation equipment, as well as from routine maintenance activities. The solar panels and their mountings are designed to withstand excessive wind speeds and other forces of nature without movement or creation of noise. Maintenance activities will be confined to infrastructure areas, including solar panels, MV stations, substations, and other hardstanding surfaces, and will not require any further habitat clearance. Maintenance will also include routine activities across the site, including minor maintenance of hedgerows. It should be noted that no operational lighting will be required during the operational phase.

The operational phase may result in the following:

- Disturbance due to noise from operational infrastructure.
- Minor disturbance from periodic maintenance activities and associated traffic.

- Risk of accidental pollution incidents during maintenance works (e.g., small-scale fuel or oil spills, fire water).

The key impact mechanisms associated with the operational phase are:

1. Disturbance (Infrastructure Noise & Maintenance Activities)
2. Risk of Water Quality Impacts (pollution incidents)

Potential operational phase impacts associated with the proposed project are discussed hereunder.

7.2.1 Disturbance

7.2.1.1 Infrastructure Noise

During the operational phase, infrastructure noise may have the potential to interact with species protected under the Birds Directive (Annex I) and the Habitats Directive (Annex II). Localised noise from MV stations fans and routine maintenance may temporarily disturb birds and mammals, potentially influencing their foraging, commuting, or roosting behaviour.

The solar panels themselves will generate no noise during the operational phase, ensuring minimal disturbance to wildlife. The MV stations will produce low-level operational sounds; however, these are not expected to significantly affect local fauna.

7.2.1.2 Maintenance Activities

Minor noise disturbance may also arise from traffic and human activity associated with site visits and routine maintenance, which could potentially affect Birds Directive Annex I species and Habitats Directive Annex II species using habitats within or adjacent to the site.

7.2.2 Risk of Water Quality Impacts

There is a potential for accidental pollution incidents during maintenance works, such as small-scale fuel, oil, or chemical spills, which could enter soil or nearby drainage features. As outlined in Section 7.1.2.1 release of these substances have the potential to contaminate local watercourses, affecting water quality and potentially impacting aquatic habitats and the species both at the project site and hydrologically connected areas.

Water is required as part of the operational phase of the proposed project for the washing of the solar panels when required. This activity is only expected to be carried out occasionally (panels typically need to be washed 1-3 times per year depending on the soiling condition on the panels) and require approximately 1.5 m³ per MW. It is proposed to provide water via a mobile tanker rather than drill a borehole well in each land parcel or to use water from the local public water supply. The water will percolate to the ground immediately after washing. The washing will only require water and will not require the use of any chemicals.

Drainage details are added to the proposed BESS layout – See Figure 12099-2049 included in Appendix F. In the unlikely event of a fire, water generated during the damping down of the boundaries will flow to the drainage network and collected at the sump. Water generated can be reused repeatedly to reduce overall water demand. The water collected will be tested at the collection sump following the cessation of the fire event. Based on the testing water will either be reused in the tanks on site or sent for disposal. All water will be contained on site. The BESS

location was identified to maximise the distance to any surface water stream. The BESS is over 430 m from the nearest stream and over 125 m from the nearest drainage channel.

Surplus water from the sump will be utilised to top up the above ground water tanks on site.

7.3 DECOMMISSIONING PHASE

Decommissioning will involve disconnecting the BESS facility from the power grid, shipping electrical equipment to recycling facilities for material recovery, and having a waste management company remove the batteries. It will also include the removal of concrete bases, re-levelling the ground to its original contours using imported soil where necessary, and reseeded with grass. Security systems, CCTV, associated supports, wiring, and fencing will be dismantled and recycled.

Impacts on habitats during the decommissioning phase are expected to be less extensive and of lower magnitude than those during the construction phase, and the duration of activities will be shorter.

8. STAGE ONE SCREENING FOR APPROPRIATE ASSESSMENT

8.1 OVERVIEW

Stage One Screening for AA identifies any likely significant effects on European sites (i.e. SACs and SPAs) within the Natura 2000 network arising from the proposed project, either alone or in combination with other plans or projects. The specific tests at the screening stage are to determine:

1. whether a plan or project can be excluded from AA requirements because it is directly **connected with, or necessary to, the management of a European site**; and
2. whether the plan or project **is likely to have a significant effect** on a European site, either alone or in combination with other plans or projects, in view of the site's conservation objectives, or where residual uncertainty exists regarding potential impacts.

Test 1 – Connection to management of European sites

The proposed project is not directly connected with or necessary to the management of European sites. Having regard to Article 6 of the Habitats Directive, it is therefore appropriate that the proposed project is subjected to Stage One Screening for AA.

Test 2 – Likelihood of significant effects

The test of the screening is to determine whether the proposed project, alone or in combination with other plans or projects, is likely to have a significant effect on the integrity of any European site, in view of the site's conservation objectives. If the screening concludes that no likely significant effects are expected, the project can be excluded from further Appropriate Assessment. Conversely, where potential impacts or uncertainty remain, the project would proceed to Stage Two NIS to assess potential effects in detail.

An assessment of likely significant effects of the proposed project on European sites and their associated QIs and SCIs is presented in Section 8.2 below. The assessment considers potential pathways for impacts, including habitat loss, disturbance, water quality changes, or disruption of species movement.

A cumulative effects assessment, considering the potential in-combination effects of the proposed project in combination with other existing or planned projects, is presented in Section 8.3.

8.2 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS ON EUROPEAN SITES

An overview of potential impacts of the construction, operation and decommissioning phases of the proposed project is presented in Section 7 above. In summary, the potential impacts are habitat loss, habitats degradation and disturbance. Considering the potential impacts, the SACs and SPAs considered with the Zol of the proposed project are:

- Lower River Shannon SAC (002165) (NPWS, 2012a)
- River Shannon and River Fergus Estuaries SPA (004077) (NPWS, 2012b)
- Ratty River Cave SAC (0002316) (NPWS, 2018a)
- Kilkishen House SAC (02319) (NPWS, 2018b)
- Curraghchase Woods SAC (000174) (NPWS, 2023)
- Poulmagordon Cave (Quin) SAC (000064) (NPWS, 2018c)

- Danes Hole, Poulnalecka SAC (000030) (NPWS, 2018d)
- Lough Gash Turlough SAC (000051) (NPWS, 2017)
- Old Domestic Building (Keevagh) SAC (002010) (NPWS, 2018e)
- Newhall and Edenvale Complex SAC (002091) (NPWS, 2018f)
- Newgrove House SAC (002157) (NPWS, 2018g)

Table 8.1 below presents an assessment of whether the abovementioned impacts could result in likely significant effects on the QIs and SCIs of the European sites in view of their conservation objectives.



Table 8.1: Assessment of European sites within the Potential Zol of the Proposed Project

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
Lower River Shannon SAC (002165) (NPWS, 2012a)	- Common Bottlenose Dolphin (<i>Tursiops truncatus</i>) [1349] - Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>) [1029] - Sea Lamprey (<i>Petromyzon marinus</i>) [1095] - Brook Lamprey (<i>Lampetra planeri</i>) [1096] - River Lamprey (<i>Lampetra fluviatilis</i>) [1099] - Otter (<i>Lutra lutra</i>) [1355] - Atlantic Salmon (<i>Salmo salar</i>) [1106] - Estuaries [1130] - Mudflats and sandflats not covered by seawater at low tide [1140] <i>Salicornia</i> and other annuals colonizing mud and sand [1310] - Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>) [1330] - Sandbanks which are slightly covered by sea water all the time [1110] - Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410] - Coastal lagoons [1150] - Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260] - Large shallow inlets and bays [1160] - Reefs [1170] - Perennial vegetation of stony banks [1220]	Physical: The temporary generation of dust at the proposed project area is expected during the Construction Phase due to activities such as vehicle and machinery movements, road upgrade works, vegetation clearance, HDD operations, and excavation. As some works are located within 50 m of Urlan Beg_010 River and the Cloverhill Stream_010 watercourses that connect to the SAC, there is potential for dust deposition to indirectly affect the designated site. There is potential that dust may indirectly affect fauna from the SAC using the project area that rely on these habitats for roosting and foraging. Hydrological: There is a hydrological connection between the proposed project and this SAC via Urlan Beg_010 River and the Cloverhill Stream_010. The proposed project has the potential to result in a degradation of water quality of the watercourses and downstream hydrologically connected SAC. There is potential for indirect or direct impacts on the SAC which is designated for QIs due to changes in water quality. Hydrogeological: The proposed project site partially overlaps with the Tulla–Newmarket on Fergus GWB. However, the SSCO document for the SAC identifies the only Groundwater Dependent Terrestrial Ecosystem (GWDTE) QI as Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)*. This habitat is located within a separate GWB (Limerick City East GWB). Therefore, there is no potential for either direct or indirect impacts on this QI arising from the proposed project. Ecological: The proposed project site occurs within the foraging/commuting range of otter, which is a QI species for which this SAC is designated. While no signs of otter were recorded during the ecological walkover survey, there is suitable habitat within the proposed project. Otter which are present in the vicinity of the proposed project site are likely to be connected to the QI population. Source-pathway-receptor links exist between the proposed project site and this SAC.	Yes - Viable pathways (hydrological and ecological) for effects were identified between the proposed project site and this SAC. There is potential for likely significant effects on this SAC which are assessed further (Section 9).

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
	• Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] • Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410] • Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)* [91E0]		
River Shannon and River Fergus Estuaries SPA (Site code: 004077) (NPWS, 2012b)	• Cormorant (<i>Phalacrocorax carbo</i>) [A017] • Whooper Swan (<i>Cygnus cygnus</i>) [A038] • Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] • Shelduck (<i>Tadorna tadorna</i>) [A048] • Teal (<i>Anas crecca</i>) [A052] • Pintail (<i>Anas acuta</i>) [A054] • Scaup (<i>Aythya marila</i>) [A062] • Ringed Plover (<i>Charadrius hiaticula</i>) [A137] • Golden Plover (<i>Pluvialis apricaria</i>) [A140] • Grey Plover (<i>Pluvialis squatarola</i>) [A141] • Lapwing (<i>Vanellus vanellus</i>) [A142] • Knot (<i>Calidris canutus</i>) [A143] • Dunlin (<i>Calidris alpina</i>) [A149] • Black-tailed Godwit (<i>Limosa limosa</i>) [A156] • Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] • Curlew (<i>Numenius arquata</i>) [A160] • Redshank (<i>Tringa totanus</i>) [A162] • Greenshank (<i>Tringa nebularia</i>) [A164]	Physical: The temporary generation of dust within the works area is expected during the Construction Phase due to activities such as vehicle and machinery movements, road upgrade works, vegetation clearance, HDD operations, and excavation. As some works are located within 50 m of Urlan Beg_010 River and the Cloverhill Stream_010 watercourses that connect to the SAC, there is potential for dust deposition to indirectly affect the designated site. Dust can impact plant communities by reducing photosynthesis, respiration, and transpiration, potentially altering community composition. In turn, this may stunt vegetation growth and indirectly affect local fauna that rely on these habitats for roosting and foraging. Hydrological: The SPA is hydrologically connected to the proposed project site via the Urlan Beg_010 River and the Cloverhill Stream_010. Construction activities have the potential to degrade water quality in these watercourses through increased sediment loading, accidental release of hydrocarbons, or nutrient enrichment. Such water quality deterioration could extend downstream to the hydrologically connected SPA. Reduced water quality may adversely affect aquatic invertebrate populations and other prey resources, thereby diminishing the availability of suitable foraging opportunities for SCI species. Indirect impacts could arise through reduced prey abundance, altered prey distribution, and degradation of foraging habitats within the SPA.	Yes - Viable pathways (hydrological and ecological) for effects were identified between the proposed project site and this SPA. There is potential for likely significant effects on this SPA which will be assessed further (Section 9).

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
	- Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] - Wigeon (<i>Mareca penelope</i>) [A855] - Shoveler (<i>Spatula clypeata</i>) [A857] - Wetland and Waterbirds [A999]	Ecological: The SPA is designated for 21 Annex I bird species. There is suitable habitat (open farmland and wet grassland) within the proposed project site for several SCI species for which the SPA is designated including, whooper swan, light-bellied brent goose, golden plover, lapwing, black-tailed godwit, black-headed gull and curlew. The SCIs may temporarily be impacted during the construction phase of the project as a result of loss of foraging habitat. Source-pathway-receptor links exist between the proposed project site and this SPA.	
Ratty River Cave SAC (Site code: 0002316) (NPWS,2018a)	- Caves not open to the public [8310] - Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 4.1km southwest of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m Zol for dust impacts there is no potential for indirect or direct impacts i.e. habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Hydrogeological: The proposed project shares the same GWB, the Tulla-Newmarket on Fergus with the SAC. However, the SAC is not designated for any GWDTE therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat. The proposed project site is outs of their foraging/ commuting range of the lesser horseshoe bat (2.5km). However, the species is known to travel further than 6km from the roost, as the proposed project site is connected to the summer roost for this SAC via. a network of hedgerows, treelines, and woodlands. Therefore, there is potential for indirect or directs impacts on the QI species within the SAC. Source-pathway-receptor links exist between the proposed project site and this SAC.	Yes - Viable ecological pathway for effects were identified between the proposed project site and this SAC. There is potential for likely significant effects on the SCI, lesser horseshoe bat which will be assessed further (Section 9).
Kilkishen House SAC (Site code: 02319) (NPWS,2018b)	Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)[1303]	Physical: The proposed project site is located 8.3km southwest of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m Zol for dust impacts there is no potential for indirect or direct impacts i.e. habitat degradation on the QI species within the SAC.	No - No pathway for effects were identified between the proposed project site and this SAC.

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
		Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project site is located within a separate GWB, therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat. The proposed project site is outside of the foraging/commuting range of the lesser horseshoe bat (2.5km). While a network of hedgerows, treelines and woodlands provide some connectivity, given the distance, there is no potential for indirect or direct impacts on the QI species within the SAC. No Source-pathway-receptor links exist between the proposed project site and this SAC.	There is no potential for likely significant effects on this SAC.
Curraghchase Woods SAC (Site code: 000174) (NPWS, 2023)	- Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) [91E0] <i>Taxus baccata</i> woods of the British Isles [91J0] - Desmoulin's Whorl Snail (<i>Vertigo moulinsiana</i>) [1016] - Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 8.6km north of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m ZoI for dust impacts there is no potential for indirect or direct impacts i.e. habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project site is located within a separate GWB, therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat and Desmoulin's Whorl Snail. The proposed project site lies beyond the typical foraging and commuting range of the lesser horseshoe bat (2.5 km) and is situated on the opposite, southern side of the River Shannon. In addition, there is not connectivity to the aquatic and riparian habitats required to support Desmoulin's Whorl Snail. Consequently, there is no functional ecological connectivity between the proposed project and the QI species of the SAC. As a result, there	No - No pathway for effects were identified between the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
		is no functional ecological connectivity between the project site and the SAC for the QI species. No Source-pathway-receptor links exist between the proposed project site and this SAC.	
Poulnagordon Cave (Quin) SAC (Site code: 000064) (NPWS,2018c)	- Caves not open to the public [8310] - Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 8.7km south of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m ZoI for dust impacts there is no potential for indirect or direct impacts i.e. habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project site is located within a separate GWB, therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat. The proposed project site lies beyond the typical foraging and commuting range of the lesser horseshoe bat (2.5 km). While a network of hedgerows, treelines and woodlands provide some connectivity, given the distance, there is no potential for indirect or direct impacts on the QI species within the SAC. No Source-pathway-receptor links exist between the proposed project site and this SAC.	No - No pathway for effects were identified between the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.
Danes Hole, Poulnalecka SAC (Site code: 000030) (NPWS,2018d)	- Caves not open to the public [8310] - Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles [91A0] - Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 10km southwest of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m ZoI for dust impacts there is no potential for indirect or direct impacts i.e. water pollution and habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project shares the same GWB, the Tulla-Newmarket on Fergus with the SAC. However, the SAC is not	No - No pathway for effects were identified between the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
		designated for any GWDTE therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat however the proposed project site is outside of their foraging/commuting range of the lesser horseshoe bat (2.5km). While a network of hedgerows, treelines and woodlands provide some connectivity, given the distance, there is no potential for indirect or direct impacts on the QI species within the SAC. No Source-pathway-receptor links exist between the proposed project site and this SAC.	
Lough Gash Turlough SAC (Site code: 000051) (NPWS,2017)	- Turloughs [3180] - Rivers with muddy banks with <i>Chenopodium rubrip.p.</i> and <i>Bidention p.p. vegetation</i> [3270]	Physical: The proposed project site is located 5km southeast of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m Zol for dust impacts there is no potential for indirect or direct impacts i.e. water pollution and habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project site is located within a separate GWB, therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated habitats, therefore there is no ecological connectivity between the SAC and the proposed project site. No Source-pathway-receptor links exist between the proposed project site and this SAC.	No - No pathway for effects were identified between the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.
Old Domestic Building (Keevagh) SAC (Site code: 002010) (NPWS,2018e)	Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 11.3km south of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m Zol for dust impacts there is no potential for indirect or direct impacts i.e. water pollution and habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs.	No - No pathway for effects were identified between the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
		Hydrogeological: The proposed project shares the same GWB, the Tulla-Newmarket on Fergus with the SAC. However, the SAC is not designated for any GWDTE therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat however the proposed project site is outside of their foraging/commuting range of the lesser horseshoe bat (2.5km). While a network of hedgerows, treelines and woodlands provide some connectivity, given the distance, there is no potential for indirect or direct impacts on the QI species within the SAC. No Source-pathway-receptor links exist between the proposed project site and this SAC.	
Newhall and Edenvale Complex SAC (Site code: 002091) (NPWS,2018f)	- Caves not open to the public [8310] - Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 13.5km southeast of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m Zol for dust impacts there is no potential for indirect or direct impacts i.e. water pollution and habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project site is located within two separate GWB, therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat however the proposed project site is outside of their foraging/commuting range of the lesser horseshoe bat (2.5km). While a network of hedgerows, treelines and woodlands provide some connectivity, given the distance, there is no potential for indirect or direct impacts on the QI species within the SAC. No Source-pathway-receptor links exist between the proposed project site and this SAC.	No - No pathway for effects were identified between the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.
Newgrove House SAC (Site code: 002157)	Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	Physical: The proposed project site is located 14.6km south of the SAC. There is no physical connectivity between the SAC and the proposed project site. The SAC is outside of the 50m Zol for dust impacts there is	No - No pathway for effects were identified between

European Site	Qualifying Interests /Special Conservation Interests	Source-Pathway-Receptor Link	Possibility for Likely Significant Effects
(NPWS,2018g)		no potential for indirect or direct impacts i.e. water pollution and habitat degradation on the QI species within the SAC. Hydrological: There is no hydrological connection between the proposed project and this SAC. Therefore, there is no potential for indirect or direct impacts on the SACs QIs. Hydrogeological: The proposed project shares the same GWB, the Tulla-Newmarket on Fergus with the SAC. However, the SAC is not designated for any GWDTE therefore there is no potential for indirect or direct impacts on the QI of the SAC. Ecological: The SAC is designated for lesser horseshoe bat however the proposed project site is outside of their foraging/commuting range of the lesser horseshoe bat (2.5km). While a network of hedgerows, treelines and woodlands provide some connectivity, given the distance, there is no potential for indirect or direct impacts on the QI species within the SAC. No Source-pathway-receptor links exist between the proposed project site and this SAC.	the proposed project site and this SAC. There is no potential for likely significant effects on this SAC.

8.3 POTENTIAL IN-COMBINATION EFFECTS

A comprehensive evaluation of the likely in-combination effects of the proposed project and all associated activities was conducted, taking into account existing and proposed plans and projects in the surrounding area. This evaluation focused on how plans and projects, when considered together, could lead to combined environmental impacts that might not be evident when examining each project individually.

8.3.1 Assessment of Plans

The review of relevant plans focused on evaluating policies and objectives that have the potential for impacting European sites in-combination with the proposed project. the Clare County Council (CCC) County Development Plan (CDP) 2023–2029¹⁰. The proposed project site is located within a zoned area under the Clare CDP. The CDP includes the following objectives:

- **Objective 2.18** - *To facilitate and support the development of solar farms in appropriate locations throughout the County including on agricultural lands and brownfield sites subject to normal planning considerations; and to encourage the use of solar thermal or solar PV installations as part of the design and planning process for new developments and refurbishments.*

Also, and relevant to the protection of European sites against significant effects from any plan or project, is Objective 15.4, which assures compliance with the Habitats Directive:

- **Objective 15.4** - *To implement Article 6(3) and where necessary 6(4) of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s);*

It is clear that the CCC planned for plans and projects such as the proposed project, and it includes the requirement that any future plans or projects will be subject to AA to examine and assess their effects on European sites, alone and in-combination with other plans and projects.

Volume 9 of the CDP is the Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary¹¹. This inter-jurisdictional plan, developed collaboratively with Limerick and Kerry County Councils, aims to guide sustainable development within the estuary's land and marine environments. Ecological and Biodiversity Objectives of the SIFP emphasises the protection and enhancement of biodiversity within the Shannon Estuary. Key objectives include:

- Conservation of Natura 2000 Sites: Safeguarding Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) from adverse impacts.
- Protection of Species and Habitats: Ensuring that developments do not negatively affect designated species and habitats.

¹⁰ <https://www.clarecoco.ie/services/planning/plans/clarecountydevelopmentplan23-2029/>

¹¹ <https://clarecdp2023-2029.clarecoco.ie/stage3-amendments/adoption/volume-9-strategic-integrated-framework-plan-for-shannon-estuary-clare-county-development-plan-2023-2029-51393.pdf>



- Sustainable Management of Natural Resources: Promoting the responsible use of the estuary's natural resources to maintain ecological balance.
- Integration of Ecological Considerations into Planning: Incorporating environmental assessments into planning processes to align with the EU Birds and Habitats Directives.

These objectives are detailed in Volume 10a¹² of the development plan, which includes the Appropriate Assessment Natura Impact Report, Strategic Environmental Assessment, and Strategic Flood Risk Assessment.

The ecological and biodiversity objectives of Clare CDP are positive in nature, aiming to protect and enhance habitats, species, and ecological connectivity within the Shannon Estuary. Given their protective and enhancement focus, these objectives do not pose any potential for adverse or in-combination effects on European sites, and therefore the likelihood of such impacts can be excluded.

The assessment of in-combination effects also considered relevant policies in Ireland's 4th National Biodiversity Action Plan 2023-2030 (DoCHG, 2024). This assessment aimed to determine how existing regulatory frameworks support ecological preservation and mitigate potential environmental impacts. In addition to biodiversity-focused policies, the review examined objectives related to European sites conservation. The five key strategic objectives guide biodiversity conservation efforts:

- Adopt a Whole of Government, Whole of Society Approach to Biodiversity: This objective emphasises the need for collective action across all sectors of government and society to effectively address biodiversity challenges.
- Meet Urgent Conservation and Restoration Needs: Focusing on immediate actions required to conserve and restore Ireland's biodiversity, this objective aims to halt further loss and promote recovery of vital ecosystems.
- Secure Nature's Contribution to People: Recognising the essential services that nature provides, this objective seeks to ensure the sustainable use of natural resources, benefiting both people and the environment.
- Enhance the Evidence Base for Action on Biodiversity: This objective highlights the importance of strengthening scientific research and data collection to inform effective biodiversity policies and actions.
- Strengthen Ireland's Contribution to International Biodiversity Initiatives: Aiming to bolster Ireland's role in global biodiversity efforts, this objective focuses on active participation and contribution to international conservation initiatives.

These objectives collectively aim to deliver transformative changes in how Ireland values and protects its natural heritage. The NBAP also introduces a public sector duty on biodiversity, as mandated by the Wildlife (Amendment) Act 2023. This legislation requires all public service bodies, including government departments, agencies, and local authorities, to integrate biodiversity considerations into their plans, policies, and programs, and to report on their progress. Given their focus on the protection, restoration, and sustainable management of

¹² <https://clarecdp2023-2029.clarecoco.ie/stage2-draft/display/volume-10a-appropriate-assessment-natura-impact-report-45176.pdf>



biodiversity, these NBAP objectives are positive in nature, and the potential for any in-combination adverse effects on European sites can be excluded.

8.3.2 Assessment of Projects

A review of the Clare online Planning Registers was carried out to identify past, present, and future plans and projects that could contribute to in-combination environmental effects. An assessment of in-combination effects of those projects in combination with the proposed project is presented below.

GP Joule (Planning Ref: 24435)

In December 2024, GP Joule Ireland Limited lodged a planning application (Planning Ref. 24435) with Clare County Council. The application sought permission for a renewable energy development, consistent with the company's wider portfolio of solar and energy projects across the county. On 24 February 2025, as part of the review process for planning application Clare County Council issued a request for further information be provided by GP Joule to allow a determination to be made by Council. The application was formally withdrawn by GP Joule in June 2025. The project has since been resubmitted under Planning Ref: 25260 (see below), incorporating some alterations to the original design and revised impact assessments to address issues raised during the earlier review process.

GP Joule (Planning Ref: 25260)

In August 2025, GP Joule submitted a planning application (Planning Ref: 25260) to Clare County Council for a 95-hectare solar PV farm spanning the townlands of Mogullaun, Crossagh, Rathlaheen South, Culleen, Drumline, and Ballycasey Beg. The proposed GP Joule project is designed to operate for a 35-year period following its commissioning. As part of the planning application, a Screening for AA and a NIS were submitted to evaluate the potential effects of the GP Joule project on local biodiversity and nearby European sites, including SACs and SPAs. These assessments considered both direct impacts, such as habitat loss and disturbance to species within the site, and indirect impacts, including potential changes to water quality, hydrological connectivity, and the availability of foraging or roosting habitats. The screening also incorporated an assessment of cumulative or in-combination effects with other existing or planned developments in the surrounding area and identified mitigation measures designed to avoid or minimise potential adverse effects on protected habitats and species.

Terra Solar – Firgrove, Sixmilebridge (Planning Ref: 1731)

Terra Solar secured planning permission for a renewable energy development at Firgrove, Sixmilebridge (Planning Ref: 1731), located immediately adjacent to the north and west of the proposed project site. The Terra Solar project provides for a 34,300 m² solar farm with ground-mounted panels supported on steel frames, together with a substation, underground cabling, and the demolition of a derelict cottage to facilitate development. The project will be connected to the national grid via the Drumline 110kV Substation.

Terra Solar – Clonloghan, Caherteige (Planning Ref: 18585)

Terra Solar obtained planning permission for a development at Clonloghan, Caherteige, (Planning Ref: 18585). The development covers approximately 63,000 m² and features ground-mounted solar panels, a substation, four inverter/transformer stations, a battery storage



module, security fencing, and CCTV for site monitoring. It also includes internal access tracks, an agricultural bridge, drainage works, and the creation of a new site entrance from the R472. A 10-year permission period was granted to facilitate project delivery and commissioning.

Assessment of Potential In-Combination Effects

The potential impact mechanisms associated with the above-listed solar projects are broadly similar to those of the current BNRG project, including runoff, sedimentation, changes to drainage, habitat modification, and disturbance from construction and operational activities. These mechanisms have the potential to affect a range of ecological receptors, including hydrologically connected SACs and SPAs.

There is uncertainty regarding potential in-combination effects, particularly via indirect pathways such as hydrological connectivity, habitat fragmentation, or overlapping species ranges. In the absence of clarity regarding these potential interactions, the GP Joule project (Planning Ref: 25260), and Terra Solar projects (Planning Ref: 1731 and 18585) are brought forward to the Stage 2 AA / NIS alongside the proposed solar development for a detailed assessment of in-combination effects on European sites. This ensures that any additive or in-combination effects on SACs, SPAs, and their qualifying interests are fully evaluated, and that appropriate mitigation can be applied if necessary.

Kieran Kelly Haulage Ltd. (Planning Ref:2360568)

Project Context: The Kieran Kelly Haulage Ltd. development involves the importation of inert fill to agricultural lands, the establishment of internal access roads, and associated ancillary site works within the same area as the proposed solar project. These activities will result in temporary habitat disturbance, particularly to GA1 grassland, including temporary vegetation removal and habitat modification. Following completion, GA1 grassland is anticipated to naturally re-establish on the infilled areas. Short-term noise and dust generation may also occur during construction; however, these effects are localised and expected to be temporary.

- **Hydrology and Water Quality:** Potential impacts on hydrology and water quality are expected to be negligible. Standard drainage and sediment control measures will be implemented to prevent any deterioration in water quality or knock-on effects on downstream habitats. There is no expected adverse impact on hydrologically connected habitats, including those supporting designated species within nearby European sites.
- **Ecology and Species Considerations:** Species potentially using the area for foraging, commuting, or shelter, such as bird and mammals (volant and non-volant) may experience temporary disturbance. However, the scale, duration, and the spatial extent of the works are limited, and mitigation measures will minimise impacts. No permanent habitat loss or fragmentation is anticipated.
- **Temporal Separation of Works:** The infill project and the proposed solar development will not be undertaken concurrently. This temporal separation ensures there is no additive or cumulative disturbance from construction activities, further reducing any potential for impacts on local habitats or species.

Conclusion:

Based on the assessment, the Kieran Kelly Haulage project alone, and in combination with the proposed solar development, is not expected to result in significant adverse effects on the

integrity of nearby European sites. Habitats and species present on-site, and those potentially using the area for foraging or commuting, are unlikely to be affected in a manner that would compromise the conservation objectives of any SACs or SPAs in the vicinity.

John Callinan Munster Footgolf (Planning Ref: 2460459)

Project Context: Developer has been granted conditional permission on January 2025 to extend the existing carpark and to develop a mini golf course including ancillary site works. I intend to apply for a 10-year duration for the grant of Retention/Permission. The development is located 500m upstream of the proposed project site.

- **Hydrology and Water Quality:** The Footgolf development, being primarily a recreational and car park extension project, may increase impervious surface area. Given the 500 m separation, there is no significant in-combination effects on downstream watercourses. Water quality impacts in combination with the solar park are considered negligible.
- **Ecology and Biodiversity:** The Footgolf development is located outside any designated Natura 2000 sites and involves landscaped recreational areas. The development have limited habitat disturbance and include mitigation measures. No sensitive ecological features are affected by either project. Therefore, in-combination effects on European sites or species of interest can be excluded.
- **Air Quality and Dust:** Construction dust from the Footgolf project may occur during car park extension and landscaping, while solar park construction will generate localised dust. Dust-generating activities are temporary, spatially separated. No in-combination air quality impacts on sensitive receptors are predicted.

Conclusion: Based on the assessment of potential pathways (hydrology, ecology, air quality), the John Callinan Munster Footgolf development and the proposed project are unlikely to result in any significant in-combination effects. Consequently, the likelihood of adverse in-combination effects on Natura 2000 sites or other ecological receptors can be excluded.

Other Smaller Developments:

There are a number of small-scale projects and planning applications in the vicinity of the proposed project, including the construction or extension of residential properties and farmyard sheds (e.g., application nos. 061035, 23274, 04144, 091047, 062818, and 09913). These developments are relatively minor in scale, involve limited earthworks, and do not include activities likely to result in significant habitat loss, water quality impacts, or other pressures on ecological receptors. Additionally, there is no ecological or hydrological connectivity between these sites and the proposed project.

Conclusion: As a result, the likelihood of cumulative or in-combination effects with the proposed project is considered negligible, and there is no potential for significant adverse effects on any designated European sites.

8.4 SCREENING ASSESSMENT CONCLUSION

Following an examination, analysis, and evaluation of the relevant information, including the nature of the proposed project and its potential connectivity to the Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, and Ratty River Cave SAC, and applying the

precautionary principle, it is the professional opinion of the authors that it is not possible to rule out the possibility of likely significant effects on these European sites.

This conclusion has been reached without assuming the implementation of any mitigation measures and is based solely on the potential impact sources and pathways associated with the proposed project (as outlined in Section 6). Accordingly, a Stage 2 AA / NIS is required to determine whether adverse effects on the integrity of these sites can be excluded.

An assessment of in-combination effects with other plans and projects has also been undertaken. In-combination effects of the proposed project with other plans and projects have been excluded, with the exception of the GP Joule (Planning Ref: 25260), Terre Solar (Planning Ref: 1731) and Terr Solar (Planning Ref: 18585) projects. These projects are considered in the Stage 2 Appropriate Assessment, as they may give rise to potential in-combination effects on water quality and species, which cannot be ruled out without further detailed evaluation.

9. NATURA IMPACT STATEMENT

This NIS includes an examination and analysis of the best available scientific knowledge and field data to identify and assess the implications of the proposed project on the Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA, and Ratty River Cave SAC in view of their conservation objectives. It also considers whether there are ex-situ implications for any European sites, for example from impacts occurring via downstream hydrological pathways, from effects on populations of ex-situ species located outside of the designated sites, or from impacts on ex-situ supporting habitats.

The assessment further considers potential in-combination effects with other plans and projects in the surrounding area. In-combination effects have been excluded, with the exception of the GP Joule project (Planning Ref: 25260), and the Terra Solar projects (Planning Ref: 1731 and 18585).

The assessment evaluates whether the proposed project, either alone or in combination with other plans or projects, could adversely affect the integrity of these European sites. In reaching a conclusion, consideration has been given to any mitigation measures necessary to avoid or reduce potential adverse effects.

9.1 DESCRIPTION OF EUROPEAN SITES AND ASSESSMENT OF POTENTIAL ADVERSE EFFECTS

9.1.1 The Lower River Shannon SAC

The proposed project site is located 3m north of the of the Lower River Shannon SAC, while proposed infrastructure is positioned an additional 72m from the SAC boundary.

This SAC consists of the freshwater stretches of the Shannon, the marine area between Loop Head and Kerry Head. Various habitats such as reefs, mudflats, saltmarshes and the Shannon and Fergus Estuaries which form the largest estuarine complex in Ireland. (NPWS, 2013).

The SAC is designated for the following Annex I habitats and Annex II species which are listed and discussed in relation to the proposed project below (* indicates priority habitat):

- Common Bottlenose Dolphin (*Tursiops truncatus*) [1349]
- Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029]
- Sea Lamprey (*Petromyzon marinus*) [1095]
- Brook Lamprey (*Lampetra planeri*) [1096]
- River Lamprey (*Lampetra fluviatilis*) [1099]
- Otter (*Lutra lutra*) [1355]
- Atlantic Salmon (*Salmo salar*) [1106]
- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Salicornia and other annuals colonizing mud and sand [1310]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
- Sandbanks which are slightly covered by sea water all the time [1110]
- Mediterranean salt meadows (*Juncetalia maritim*) [1410]
- Coastal lagoons [1150]



- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation [3260]
- Large shallow inlets and bays [1160]
- Reefs [1170]
- Perennial vegetation of stony banks [1220]
- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)* [91E0]

The above QIs and their conservation objectives are further assessed in Table 9.1 below.

Table 9.1: Qualifying Interests, Extent of Habitat and Conservation Objectives for the Lower River Shannon SAC and Potential for Effect

Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Common Bottlenose Dolphin (<i>Tursiops truncatus</i>) [1349]	The SSCO document indicates that this species is located within the estuary and bay at a hydrological distance of approximately 34km from the proposed project site (NPWS, 2012a).	To maintain the favourable conservation condition.	No - this species is located at a significant hydrological distance of approximately 34km. Additionally, due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project. This species is therefore outside the Zol and there is no potential for likely impacts.
Freshwater Pearl Mussel (<i>Margaritifera Margaritifera</i>) [1029]	The SSCO document (NPWS, 2012a) indicates that this species is located within in the Cloon River, Co. Clare located which is 30km west of the proposed project site.	To maintain the favourable conservation condition.	No - this species is located at a significant hydrological distance of approximately 30km. Additionally, due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project. This species is therefore outside the Zol and there is no potential for likely impacts.
Sea Lamprey (<i>Petromyzon marinus</i>) [1095]	The current distribution of this species is not recorded within the SSCO document. Available NPWS data illustrates this species is located within 10km grid square R46 which encompass the proposed project. This indicates these species may be present within the Urlan Beg_010 River and the Cloverhill Stream_010. IFI sea lamprey survey data from 2022 and 2023 reported spawning within the Mulkear River at Annacotty, Co.Limerick located 23km upstream of the proposed project site. (Gallagher <i>et al.</i> , 2023) (Gallagher <i>et al.</i> , 2022).	To restore the favourable conservation condition.	Yes - there is potential for these species to be present within the Urlan Beg_010 River, the Cloverhill Stream_010 and downstream within the SAC. There is low potential for the proposed project to give rise to water quality impacts which may negatively impact this species within the SAC. Maitland (2003) notes that the critical freshwater habitat requirements of lamprey relate to the availability of clean spawning gravels and nursery silts. As there is potential for this QI to be located within the Zol of the proposed project, there is potential for likely impacts.

Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Brook Lamprey (<i>Lampetra planeri</i>) [1096]	The current distribution of these species is not recorded within the SSCO document. Available NPWS data illustrates that brook lamprey species are located within the 10km grid square R46. This indicates these species may be present within the Urlan Beg_010 River and the Cloverhill Stream_010.		
River Lamprey (<i>Lampetra fluviatilis</i>) [1099]			
Otter (<i>Lutra lutra</i>) [1355]	According to the SSCO document the current commuting range of this species is mapped within the 100m of the proposed project site (NPWS, 2012a). According to the available NPWS data the proposed site is not located within the current distribution however, the current range grid square encompasses the proposed project site. The watercourses within the site are considered to be suitable for otters.	To restore the favourable conservation condition.	Yes – there is potential for this species to be present within Urlan Beg_010 River, the Cloverhill Stream_010 and downstream within the SAC. There is low potential for the proposed project to disturb the species during the construction phase. Increased noise can negatively impact the local population of otter within the SAC. There is therefore potential for indirect impacts to this species, and thus likely significant effects.
Atlantic Salmon (<i>Salmo salar</i>) [1106]	The current distribution of this species is not recorded within the SSCO document. Available NPWS data illustrates that Atlantic salmon current range and distribution for Atlantic salmon is within the Zol of the proposed project.	To restore the favourable conservation condition.	Yes – there is potential for this species to be present within the Urlan Beg_010 River, the Cloverhill Stream_010 and downstream within the SAC. There is low potential for the degradation of water quality and the increase in sedimentation can negatively impact salmon by degrading suitable spawning habitats, consequently reducing the carrying capacity of salmon within the watercourse. In addition, the prolonged sedimentation of a watercourse has the potential to inhibit fish passage restricting salmon from reaching important spawning sites. A degradation of water quality, a decrease in suitable spawning habitats and impediments to migration would all negatively impact the designated population of Atlantic salmon within the SAC. There is therefore potential for likely significant effects on this species.

Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Estuaries [1130]	The Site-Specific Conservation Objectives (SSCO) document indicates that this transitional habitat is located 84m south of the proposed project site (NPWS, 2012a) at a hydrological distance of approximately 243m downstream from the proposed project.	To maintain the favourable conservation condition.	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 243m. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Tidal mudflats and sandflats not covered by seawater at low tide [1140]			
<i>Salicornia</i> and other annuals colonising mud and sand [1310]	The SSCO document indicates that this marine habitat is located within the lower reaches of the SAC(NPWS, 2012a) at a hydrological distance of approximately 40km downstream from the proposed project.	To maintain the favourable conservation condition	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a significant hydrological distance of approximately 40km. Additionally, due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project once the first WFD transitional water body is reached. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Atlantic salt meadows [1330]	The Site-Specific Conservation Objectives (SSCO) document indicates that this habitat is located 191m south of the proposed project site (NPWS, 2012a) at a hydrological distance of approximately 519m downstream from the proposed project.	To restore the favourable conservation condition	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 519m. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is

Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			considered an ineffective pathway for impacts from the proposed project. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Sandbanks which are slightly covered by sea water all the time [1110]	The SSCO document indicates that this marine habitat is located within the lower reaches of the SAC (NPWS, 2012) at a hydrological distance of 64km downstream from the proposed project.	To restore the favourable conservation condition	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 64km. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) [1410]	The Site-Specific Conservation Objectives (SSCO) document indicates that this habitat is located 14.4km southwest of the proposed project site (NPWS, 2012) at a hydrological distance of approximately 17km downstream from the proposed project.	To restore the favourable conservation condition	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 17km. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Coastal lagoons [1150]	The Site-Specific Conservation Objectives (SSCO) document indicates that this habitat is located 6.6km southwest of the proposed project site	To restore the favourable	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 7.8km. Due to the mixing zone

Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
	(NPWS, 2012) at a hydrological distance of approximately 7.8km downstream from the proposed project.	conservation condition	effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]	The Site-Specific Conservation Objectives (SSCO) document indicates that this habitat is located 14.3km southeast of the proposed project site (NPWS, 2012) at a hydrological distance of approximately 18.5km downstream from the proposed project.	To maintain the favourable conservation condition.	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 18.5km. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Large shallow inlets and bays [1160]	The SSCO document indicates that this habitat is located within the lower reaches of the SAC (NPWS, 2012) at a hydrological distance of approximately 46.3km downstream from the proposed project.	To maintain the favourable conservation condition.	No - this habitat is located downstream from the proposed project within the Shannon estuary, at a hydrological distance of approximately 46.3km. Due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works there is no potential for the proposed project to impact the habitat area or community distribution of the habitat. Therefore, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project.



Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			This habitat is therefore outside the Zol and there is no potential for likely impacts.
Reefs [1170]	The SSCO document indicates that this habitat is located within the lower reaches of the SAC (NPWS, 2012) at a hydrological distance of approximately 19.5km downstream from the proposed project.	To maintain the favourable conservation condition.	No - this habitat is located downstream from the proposed project at a significant hydrological distance of approximately 19.5km. Additionally, due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project once the first WFD transitional water body is reached. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Perennial vegetation of stony banks [1220]	The SSCO document indicates that this habitat is located within the lower reaches of the SAC (NPWS, 2012) at a hydrological distance of approximately 46.1km downstream from the proposed project.	To restore the favourable conservation condition	No - this habitat is located downstream from the proposed project at a significant hydrological distance of approximately 46.1km. Additionally, due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project once the first WFD transitional water body is reached. This habitat is therefore outside the Zol and there is no potential for likely impacts.
Vegetated Sea cliffs of the Atlantic and Baltic coasts [1230]	The SSCO document indicates that this habitat is located within the lower reaches of the SAC (NPWS, 2012) at a hydrological distance of approximately 62km downstream from the proposed project.	To restore the favourable conservation condition	No - this habitat is located downstream from the proposed project at a significant hydrological distance of approximately 62km. Additionally, due to the mixing zone effect of transitional waters, the separation distance and the nature of the proposed works, the hydrological pathway from the proposed project is considered an ineffective pathway for impacts from the proposed project once the first WFD transitional water body is reached.

Qualifying Interests (*indicates a priority habitat)	Extent of Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			This habitat is therefore outside the Zol and there is no potential for likely impacts.
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>) [6410]	The extent of this habitat is not mapped within the SSCO document. Available NPWS data illustrates that the nearest mapped area is 7.1km east of the proposed project.	To restore the favourable conservation condition	No – there is no physical or hydrological connection between the proposed project site and the habitat. The habitat location is outside of the Zol for dust impacts, therefore there is no potential for likely significant effects on this QI as a result of the proposed project.
*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) [91E0]	The SSCO document illustrates that the closest area of this habitat is located 21.6km east of the proposed project site. This habitat is a GWDTE, however the locations of this habitat are within different groundwater bodies.	To restore the favourable conservation condition	No – There is no hydrological or hydrogeological connectivity between the proposed project site and the habitat. The habitat is located upstream in a separate subcatchment and within a separate GWB to the proposed project site. There is no potential for likely significant effects on this QI as a result of the proposed project.

9.1.2 River Shannon and River Fergus Estuaries SPA

The proposed project redline boundary is located 4m north of the River Shannon and River Fergus Estuaries SPA, while proposed infrastructure is positioned an additional 72m from the SAC boundary.

The proposed project is hydrologically connected via the Urlan beg_010 which flows downstream into the SPA. The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland and contains the most important coastal wetland site in the country with an assemblage of over 20,000 wintering waterbirds and over 50,000 wintering waterfowl. The site is of national importance for 17 species and international importance for four species, light-bellied brent goose, dunlin, black-tailed godwit, and redshank. The site also supports a nationally important breeding population of Cormorant (NPWS, 2015).

The SPA is designated for the following Annex I species which are listed and discussed (Table 10.2) in relation to the proposed project below:

- Cormorant (*Phalacrocorax carbo*) [A017]
- Whooper Swan (*Cygnus cygnus*) [A038]
- Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]
- Shelduck (*Tadorna tadorna*) [A048]
- Teal (*Anas crecca*) [A052]
- Pintail (*Anas acuta*) [A054]
- Scaup (*Aythya marila*) [A062]
- Ringed Plover (*Charadrius hiaticula*) [A137]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Grey Plover (*Pluvialis squatarola*) [A141]
- Lapwing (*Vanellus vanellus*) [A142]
- Knot (*Calidris canutus*) [A143]
- Dunlin (*Calidris alpina*) [A149]
- Black-tailed Godwit (*Limosa limosa*) [A156]
- Bar-tailed Godwit (*Limosa lapponica*) [A157]
- Curlew (*Numenius arquata*) [A160]
- Redshank (*Tringa totanus*) [A162]
- Greenshank (*Tringa nebularia*) [A164]
- Black-headed Gull (*Chroicocephalus ridibundus*) [A179]
- Wigeon (*Mareca penelope*) [A855]
- Shoveler (*Spatula clypeata*) [A857]
- Wetland and Waterbirds [A999]

Ornithological surveys undertaken in January to August 2025 recorded nine species and only one SCI species, Curlew. Following submission of the original application to Clare County Council monthly transect survey continued to cover the winter season and provide information of the bird assemblage over the full annual cycle. During the monthly survey undertaken from September 2025 to January 2026, only two SPA SCI species were recorded, Curlew and Black-backed Gull.

In summary survey results indicate low bird usage of the site (13 species recorded in total across all surveys, dominated by common farmland and generalist species), with only limited and



infrequent occurrence of SPA SCI species,(Curlew and Black-backed Gull) and no regular use by other SPA species, confirming the site is of low ecological importance to SPA populations and largely functionally separate from adjacent estuarine habitats.

Curlew

Although intertidal mud and sandflats are the main foraging habitat, Curlew may temporarily use adjacent terrestrial habitats, particularly during high tide, for opportunistic feeding. This includes wet or marshy areas, such as GS4 wet grasslands, which occur at the proposed project site in Land Parcels 1 and 2 to the north and Land Parcel 4 to the south. However, these habitats do not replace the core functional importance of intertidal areas for supporting the SPA Curlew population.

GS4 habitats contiguous with GA1 occur to the north of the proposed project at Land Parcels 1 and 2, as shown in Figure 6.4. While the project will result in the loss of GS4 and GA1 habitat at these locations, the areas are situated over approximately 3km from the SPA and therefore fall outside the typical foraging range of Curlew, which is 1-2 km (SNH, 2016). population foraging will not occur.

The southernmost part of the proposed project, Land Parcel 4, lies adjacent to the SPA. In the northwest and northeast of this land parcel, approximately 600m northwest and 550m northeast of the SPA boundary, GA1 habitats are contiguous with GS4 wet grassland (see Figure 6.5). While there is some loss of these habitats within Land Parcel 4 no Curlew were recorded in these areas during any of the monthly transect surveys, it is noted that there is potential that the species may utilise these habitats, as they fall within the 1-2 km typical foraging range of the species.

While GA1 habitats within the land parcel maybe used by the species opportunistically and on a temporary basis, it is unlikely that they constitute an important or regularly used foraging resource for the SPA Curlew population. When considered alongside the availability of extensive alternative foraging habitat in the surrounding landscape, including lands immediately to the east, this suggests that the proposed project lands are of low importance for Curlew. Accordingly, the proposed project is not expected to significantly affect the SPA Curlew population foraging. Consequently, the proposed project would not result in a meaningful loss of foraging habitat or adversely affect the favourable conservation status of Curlew within the River Shannon and River Fergus Estuaries SPA.

In light of the above, the proposed project will not result in significant effects on the River Shannon and Fergus Estuaries SPA, either alone or in combination with the Terra Solar and GP Joule projects, and will not adversely affect the conservation status of its qualifying habitats or species. As the other solar farm projects are located outside the foraging range of the SCI species Curlew, there is no credible pathway for cumulative or in-combination effects.

Black-headed Gull

The Black-headed Gull is primarily regarded as a wintering species within the River Shannon and River Fergus Estuaries SPA, where it utilises a range of habitats including intertidal mudflats, estuarine waters, and adjacent terrestrial environments for foraging and roosting. While intertidal habitats represent the primary feeding resource, the species may also use nearby agricultural lands, including improved grassland (GA1) and wet grassland (GS4), on an

opportunistic basis, particularly during high tide or periods of disturbance within core estuarine habitats.

Within the proposed project site, Black-headed Gull was recorded intermittently and primarily during the winter period, with occasional use of fields within Area 4 and recorded once on Area 3. These observations were characterised by temporary foraging activity by mobile flocks, often associated with wider movements between estuarine feeding and roosting areas. While some use of the site occurs, it is considered opportunistic and does not indicate reliance on the lands as a key foraging resource.

The habitats present within the site are neither unique nor limited in availability in the surrounding landscape, with extensive areas of comparable or higher-quality foraging habitat located in close proximity, including lands immediately adjacent to the SPA. In particular, the extensive intertidal mudflats and estuarine habitats within the SPA represent the core functional foraging resource for the species.

Given the intermittent and low-dependency use of the site, together with the availability of alternative habitats, the proposed development will not result in a meaningful loss of foraging habitat for Black-headed Gull. Accordingly, no significant effects on the species' foraging behaviour, distribution, or conservation status are predicted.

In light of the above, the proposed project will not give rise to significant effects on the River Shannon and River Fergus Estuaries SPA, either alone or in combination with other plans or projects, and will not adversely affect the conservation objectives of Black-headed Gull or other qualifying species.

Table 9.2 Potential for Effects on the SCIs of the River Shannon and River Fergus Estuaries SPA

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Cormorant (<i>Phalacrocorax carbo</i>) [A017] (Breeding and Wintering)	Cormorant breed on cliff edges and in trees along waterbodies. This species winter and forage along rivers, lakes and the sea. The closest suitable foraging habitat for cormorant is 40m south from the proposed project site.	To maintain the favourable conservation condition.	Yes While no suitable breeding or foraging habitat occurs within the proposed project site, the project could indirectly affect the species through potential impacts on water quality in connected waterbodies, with any deterioration potentially reducing fish prey availability and negatively affecting foraging success.
Whooper Swan (<i>Cygnus cygnus</i>) [A0308] (Wintering)	Mostly lowland open farmland, wetlands, wet grassland, dry improved grassland, stubble fields. Traditionally feeds on aquatic vegetation, but also graze on improved and unimproved grassland, as well as some arable crops.	To maintain the favourable conservation condition.	No There is suitable habitat (farmland/ improved grasslands) within the proposed project site which is within the species core foraging range (5-8km). (SNH, 2016). The species is often found at inland freshwater habitats, including lakes, rivers, flooded fields, and wet grasslands. They feed mainly by grazing on grasses, agricultural crops, and aquatic vegetation, rather than foraging in marine or estuarine environments. However, the species was not observed during surveys at the project site. Should the species be present, there are extensive alternative foraging areas available within the local landscape, meaning that the potential impact of the project on foraging habitat is likely to be minimal and not significant.
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>) [A046] (Wintering)	Mostly found on coastal estuaries during the autumn and early winter, and on grasslands from mid-winter, until departure for the breeding grounds begins in late April. During the winter, it feeds mostly on eel-grass, which grows on muddy estuaries, and on grasslands, usually when coastal supplies have been depleted at estuarine sites.	To maintain the favourable conservation condition.	No Light-bellied Brent goose is a coastal wintering species that primarily feeds on intertidal habitats, including eelgrass beds, algae, and other marine vegetation. They also use farmland/ improved grasslands both of which are present within the proposed project site which is within the species core foraging range (5km). (SNH, 2016). However, the species was not observed during

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			surveys at the project site. Should the species be present, there are extensive alternative foraging areas available within the local landscape, meaning that the potential impact of the project on foraging habitat is likely to be minimal and not significant.
Shelduck (<i>Tadorna tadorna</i>) [A048] (Wintering)	This species winters and forages in sheltered estuaries or tidal mudflats. The closest suitable foraging habitat for shelduck is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Shelduck is a coastal and estuarine duck that typically winters on mudflats, estuaries, tidal lagoons, and sheltered coastal waters. They feed primarily on invertebrates such as molluscs, crustaceans, and worms by dabbling or probing in shallow water and mudflats. There is no suitable foraging habitat within the proposed project site. The project could indirectly affect the species through potential impacts on water quality in connected waterbodies.
Teal (<i>Anas crecca</i>) [A052] (Wintering)	Found on wetlands with good cover, such as reedbeds, estuaries, inland marshes, lakes, ponds, and turloughs. The closest suitable foraging habitat for Teal is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Teal (is a small dabbling duck that typically winters on shallow freshwater habitats, marshes, estuaries, and wet grasslands. They feed by dabbling and grazing, primarily consuming aquatic plants, seeds, and small invertebrates. There is no suitable foraging habitat within the proposed project site. The project could indirectly affect the species through potential impacts on water quality in connected waterbodies.
Pintail (<i>Anas acuta</i>) [A054] (Wintering)	This species flocks on brackish coastal lagoons, in estuaries and on large inland lakes. The closest suitable foraging habitat for pintail is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Pintail is a dabbling duck that typically winters on shallow freshwater habitats, estuaries, and coastal lagoons. They feed mainly by dabbling in shallow water, foraging on aquatic plants, seeds, and invertebrates. There is no suitable foraging habitat within the proposed project site.

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			The project could indirectly affect the species through potential impacts on water quality in connected waterbodies.
Scaup (<i>Aythya marila</i>) [A062] (Wintering)	Found on coastal estuaries and bays. The closest suitable foraging habitat for scaup is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Scaup is a diving duck that primarily winters on coastal and inland freshwater habitats, such as lakes, rivers, estuaries, and sheltered bays. They forage by diving underwater, feeding mainly on bivalves, molluscs, and aquatic invertebrates. And there is no suitable foraging habitat within the proposed project site. However, the project could indirectly affect the species by impacting water quality in connected waterbodies, which could in turn reduce the availability of prey for the species.
Ringed Plover (<i>Charadrius hiaticula</i>) [A137] (Wintering)	Found along the coastline and estuaries. The closest suitable foraging habitat for ringed plover is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes There is no suitable foraging habitat within the proposed project site. Ringed plovers rely on marine and estuarine habitats rather than inland fields or grasslands. The project could indirectly affect the species through potential impacts on water quality in connected waterbodies.
Golden Plover (<i>Pluvialis apricaria</i>) [A140] (Wintering)	This species feeds on winter cereals, stubbles, grazed pasture and more open areas above the foreshore at coastal locations. There is suitable foraging habitat within the proposed project site for this species.	To maintain the favourable conservation condition.	No There is suitable habitat (farmland/grasslands) within the proposed project site which is within the species core foraging range (3-11km). (SNH, 2016). The species was not observed during surveys at the project site. Should the species be present, there are extensive alternative foraging areas available within the local landscape, meaning that the potential impact of the project on foraging habitat is likely to be minimal and not significant.
Grey Plover (<i>Pluvialis squatarola</i>) [A141] (Wintering)	Found on large muddy estuaries feeding on a wide variety of burrowing intertidal invertebrates, particularly polychaete worms,	To maintain the favourable	Yes There is no suitable foraging habitat within the proposed project site.

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
	molluscs and crustaceans. The closest suitable foraging habitat for grey plover is 20m south from the proposed project site.	conservation condition.	The species was not observed during surveys at the project site. Grey Plover is a coastal and estuarine forager during the winter. They typically feed on mudflats, sandflats, and other intertidal habitats along coasts and estuaries, probing for invertebrates. The project could indirectly affect the species through potential impacts on water quality in connected waterbodies used by the species for foraging.
Lapwing (<i>Vanellus vanellus</i>) [A142] (Wintering)	Found on wetlands, pasture and rough land adjacent to bogs. There is suitable foraging habitat within the proposed project site for this species.	To maintain the favourable conservation condition.	Yes The project could indirectly affect the species through potential impacts on water quality in connected waterbodies. Any deterioration in water quality could reduce the availability of aquatic and invertebrate prey resources in wetland habitats, thereby negatively affecting the species' foraging success.
Knot (<i>Calidris canutus</i>) [A143] (Wintering)	Found on estuarine sites with extensive areas of muddy sand. The closest suitable foraging habitat for knot is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes While there is no suitable breeding or foraging habitat within the proposed project site itself, the project could indirectly affect the species through potential impacts on water quality in connected estuarine and coastal habitats. Any deterioration in water quality could reduce benthic invertebrate prey availability, thereby negatively affecting the species' foraging success.
Dunlin (<i>Calidris alpina</i>) [A149] (Wintering)	This species favours coastal areas, particularly estuaries and tidal mudflats. The closest suitable foraging habitat for dunlin is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes The Dunlin is a small wader that it forages primarily on benthic invertebrates. While there is no suitable habitat within the proposed project site, the project could indirectly affect the species through potential impacts on water quality in connected estuarine habitats. Any deterioration in water quality could reduce benthic prey availability, thereby negatively affecting the species' foraging success.

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Black-tailed Godwit (<i>Limosa limosa</i>) [A156] (Wintering)	Black-tailed Godwit are largely confined to estuaries, and adjacent wet grassland, with largest numbers recorded on sandy estuaries.	To maintain the favourable conservation condition.	Yes Black-tailed Godwit is a large wader that winters mainly on estuaries, wetlands, and wet grasslands, where it forages on invertebrates within soft sediments and agricultural land. While no suitable habitat occurs within the proposed project site, the project could indirectly affect the species through potential impacts on water quality in connected waterbodies. Any deterioration in water quality could reduce the abundance of benthic invertebrate prey, thereby negatively impacting the species' foraging opportunities.
Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] (Wintering)	This species is found on estuaries, intertidal sands and mudflats. The closest suitable foraging habitat for bar-tailed godwit is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Bar-tailed Godwit is a medium-to-large wader that winters mainly on estuaries and intertidal mudflats, where it feeds on benthic invertebrates. There is no suitable habitat within the proposed project site; however, the project could indirectly affect the species through potential impacts on water quality in connected waterbodies. A deterioration in water quality could reduce benthic prey availability, thereby negatively affecting the species' foraging success.
Curlew (<i>Numenius arquata</i>) [A160] (Wintering)	Curlew are found in wetland habitats (coastal and inland). Good feeding areas including damp fields.	To maintain the favourable conservation condition.	Yes There is suitable habitat (wet grassland) within the proposed project site which is within the species core foraging range (1-2km). (SNH, 2016) therefore, there is a potential impact on the species for loss of foraging habitat. A flock of 51 curlew were recorded within the southern section of the proposed project site during the February survey and 10 during November 2025. Should the species be present, there are extensive alternative foraging areas available within the local landscape, meaning that the potential impact of the

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			project on foraging habitat is likely to be minimal and not significant. A deterioration in water quality could reduce benthic prey availability, thereby negatively affecting the species' foraging success.
Redshank (<i>Tringa totanus</i>) [A162] (Wintering)	Favours mudflats, large estuaries and inlets. Smaller numbers at inland lakes and large rivers. The closest suitable foraging habitat for redshank is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Redshank is a medium-sized wader associated with estuaries, saltmarshes, mudflats, and wet grasslands, where it forages mainly on invertebrates. While no suitable habitat occurs within the proposed project site, the project could indirectly affect the species through potential impacts on water quality in connected waterbodies. A reduction in water quality may decrease invertebrate prey availability, thereby negatively impacting the species' foraging success.
Greenshank (<i>Tringa nebularia</i>) [A164] (Wintering)	Favour estuaries. The closest suitable foraging habitat for greenshank is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Greenshank is a large wader typically associated with estuaries, tidal flats, saltmarshes, and shallow coastal waters, where it forages primarily on small fish and aquatic invertebrates. While no suitable habitat occurs within the proposed project site, the project could indirectly affect the species through potential impacts on water quality in connected waterbodies. Any deterioration in water quality may reduce prey availability and thus negatively affect the species' foraging success.
Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] (Wintering)	Coastal and inland areas such as grasslands, bogs and marshes.	To maintain the favourable conservation condition.	Yes (But not significant) The Black-headed Gull is a medium-sized gull that breeds colonially on inland wetlands and forages opportunistically across a wide range of habitats, including estuaries, rivers, lakes, farmland, and coastal areas. No suitable breeding or regular foraging habitat occurs within the proposed project site, and due to its opportunistic feeding behaviour, the project is not

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
			expected to have any significant impact on this species, even considering potential indirect effects via water quality in connected waterbodies. Within the proposed project site, Black-headed Gull was recorded intermittently during winter surveys, primarily within the southern section (Land Parcel 4), where temporary foraging by mobile flocks was observed. This usage is considered opportunistic and of short duration, reflecting wider movements between core estuarine feeding and roosting areas rather than reliance on the site as a key resource. The habitats within the proposed project site are neither unique nor limited in availability locally, with extensive areas of suitable or higher-quality foraging habitat available within and adjacent to the SPA, particularly intertidal mudflats which represent the primary feeding resource for the species. As such, any potential loss of terrestrial foraging habitat within the site would be negligible and would not affect the overall foraging resource available to the SPA population. Yes Potential indirect effects via changes in water quality are also considered unlikely, as robust surface water management and sediment control measures will be implemented to prevent any deterioration in water quality within hydrologically connected systems. Accordingly, while a pathway for interaction exists, the scale, nature, and context of site usage indicate that the proposed project will not result in significant effects on Black-headed Gull, either alone or in combination with other plans or projects, and will not adversely affect the conservation objectives of the SPA.

Special Conservation Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Wigeon (<i>Mareca penelope</i>) [A855] (Wintering)	Found in wetlands, marshes, lagoons, estuaries, coastal bays, inland lakes, rivers and turloughs. The closest suitable foraging habitat for wigeon is 20m south from the proposed project site.	To maintain the favourable conservation condition.	No Wigeon is a dabbling duck that winters primarily on shallow freshwater habitats, wet grasslands, and coastal lagoons, feeding on aquatic plants, seeds, and occasionally small invertebrates. No suitable habitat occurs within the proposed project site, and given its mobility and wide availability of alternative foraging areas in the surrounding landscape, the project is not expected to have any significant impact on this species, including via potential indirect effects on water quality.
Shoveler (<i>Spatula clypeata</i>) [A857] (Wintering)	Found in coastal estuaries, lagoons and inland lakes and callows. The closest suitable foraging habitat for shoveler is 20m south from the proposed project site.	To maintain the favourable conservation condition.	Yes Shoveler is a dabbling duck that winters primarily on shallow freshwater habitats, lagoons, and wetlands, feeding on aquatic invertebrates and plant material using its specialized broad bill. No suitable habitat occurs within the proposed project site. There is potential for indirect effects via impacts on water quality
Wetland and Waterbirds [A999]	Wetlands are located at a hydrological distance of approximately 723.4m and 20m (as the crow flies) south of the proposed project site.	To maintain the favourable conservation condition.	Yes The proposed project site does not contain any wetland habitat. There is potential for indirect effects to waterbird species via impacts on water quality.



9.1.3 Ratty River Cave SAC

The proposed project site is located 4.1km southwest of the of the Ratty River SAC. This SAC consists of a cave which is an important winter roost and breeding site of the lesser horseshoe bat. In 2001, 187 bats were recorded making the site of international importance. The surrounding area contains a stretch of river providing foraging and commuting habitat and a derelict cottage which contains a maternity roost(NPWS, 2014).

The SAC is designated for the following Annex I habitats and Annex II species which are listed and discussed (Table 10.3) in relation to the proposed project below (* indicates priority habitat):

- Caves [8310]
- Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303]

Table 9.3 Potential for Effects on the QIs of Ratty River SAC

Qualifying Interest	Habitat & Closest Proximity	Conservation Objective	Pathway & Potential for Effects
Caves [8310]	The SSCO document indicates that this habitat is located 4.5km northeast of the proposed project site.	A conservation objective has not been set for the habitat as it is integrally linked to lesser horseshoe bat, as part of the habitat for the species.	No There is no viable connection between the proposed project site and the habitat. The habitat location is outside of the ZOI for impacts, therefore there is no potential for likely significant effects on this QI as a result of the proposed project.
Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) [1303]	The SSCO document indicates that this species is within habitats including a derelict cottage (4.1km) and caves (4.5km) northeast of the proposed project site.	To restore the favourable conservation condition.	Yes The proposed project site contains suitable habitat and provides good commuting habitat (scattered patches of woodland and treelines). Although the proposed project is located outside of the species core foraging range (2.5km) however, as outlined in Eire Ecology Bat Report (APPENDIX A) existing linear landscape features should be retained within 5km of lesser horseshoe bat roosts with 20 bats or more. Therefore, there is a potential impact for likely significant effects on this QI through loss of hedgerows, treelines and patchy woodland.

9.2 ASSESSMENT OF ADVERSE EFFECTS ON SITE INTEGRITY

9.2.1 Potential Impacts on QIs and SCIs

It has been determined, in the absence of appropriate mitigation, the proposed project has the potential for impacts on four of the QIs of the Lower River Shannon SAC due to the potential degradation of water quality, seven SCIs of the River Shannon and River Fergus Estuaries SPA due to habitat loss and, one QI of the Ratty River Cave SAC for habitat loss and disturbance during the proposed project works:

QIs of the Lower River Shannon SAC:

- Brook lamprey (*Lampetra planeri*) [1096]
- River lamprey (*Lampetra fluviatilis*) [1099]
- Atlantic salmon (*Salmo salar*) [1106]
- Otter (*Lutra lutra*) [1355]

SCIs of the River Shannon and River Fergus Estuaries SPA:

- Cormorant (*Phalacrocorax carbo*) [A017]
- Shelduck (*Tadorna tadorna*) [A048]
- Teal (*Anas crecca*)
- Pintail (*Anas acuta*) [A054]
- Scaup (*Aythya marila*) [A062]
- Ringed Plover (*Charadrius hiaticula*) [A137]
- Grey Plover (*Pluvialis squatarola*) [A141]
- Lapwing (*Vanellus vanellus*) [A142]
- Knot (*Calidris canutus*) [A143]
- Dunlin (*Calidris alpina*) [A149]
- Wetland and Waterbirds [A999]

QI of the Ratty River Cave SAC:

- Lesser Horseshoe Bat (*Rhinolophus hipposideros*) [1303]

9.2.2 Conservation Objectives of the European Sites

European and national legislation places a collective obligation on Ireland and its citizens to maintain or restore habitats and species in the Natura 2000 Network to favourable conservation condition. Ireland has determined conservation objectives for European sites, which define favourable conservation condition for habitats and species protected under the Habitats Directive and Birds Directive.

Site-specific conservation objectives have been set by the NPWS for each of the listed QIs of the Lower River Shannon SAC, the River Shannon and River Fergus Estuaries SPA, and the Ratty River Cave SAC. The NPWS (2012a) Conservation Objectives state that:

'A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site. The maintenance of habitats and species within the Natura 2000 network at favourable conservation condition will contribute to

the overall maintenance of favourable conservation status of those habitats and species at a national level'.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

Favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

An assessment of whether the potential impacts, identified in Section 9.2.1 could adversely affect the integrity of the Lower River Shannon SAC, the River Shannon and River Fergus Estuaries SPA, and the Ratty River Cave SAC was undertaken in relation to the attributes, measures and targets that would be expected to define the favourable conservation condition of the QIs the SACs and the SCIs of the SPA. This assessment is presented in Table 9.4, Table 9.5 and Table 9.6 below.

Table 9.4: Evaluation of Potential Adverse Effects on the Conservation Objectives of the Lower River Shannon SAC as a Result of the Proposed Project

Attributes	Measures	Target	Potential for Adverse Effects
[1096] Brook Lamprey (<i>Lampetra planeri</i>)			
Distribution	% of river accessible	Access to all water courses down to first order streams.	There will be no instream works undertaken within this SAC as part of the proposed project, as such there is no potential for the proposed project to inhibit accessibility through river channels within the SAC. Therefore, there is no potential for adverse effect on the integrity of the site.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present.	The proposed project has the potential to result in the degradation of water quality to the Urlan Beg_010 and the Cloverhill Stream_010 which flows into the SAC. Unfavourable water quality conditions could impact upon the population structure of juveniles, juvenile density in fine sediment, extent of spawning habitat and availability of juvenile habitat within the watercourses by impeding upon the availability of suitable fine sediment habitat and necessary/favourable water chemistry conditions for brook lamprey. Such impacts to the water column and suitable habitat would constitute an adverse effect on the integrity of the site .
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m².	
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds.	
Availability of juvenile habitat	Number of positive sites in 2 nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.	
[1099] River Lamprey (<i>Lampetra fluviatilis</i>)			
Distribution: extent of anadromy	% of river accessible	Access to all water courses down to first order streams.	There will be no instream works undertaken within this SAC as part of the proposed project, as such there is no potential for the proposed project to inhibit accessibility through river channels within the SAC. Therefore, there is no potential for adverse effect on the integrity of the site.
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present.	The proposed project has the potential to result in the degradation of water quality to the Urlan Beg_010 and the Cloverhill Stream_010 which flows into the SAC.
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m².	Unfavourable water quality conditions could impact upon the population structure of juveniles, juvenile density in fine sediment, extent of spawning habitat and availability of juvenile habitat within the watercourses impeding upon the

Attributes	Measures	Target	Potential for Adverse Effects
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds.	availability of suitable fine sediment habitat and necessary/favourable water chemistry conditions for river lamprey.
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.	Such impacts to the water column and suitable habitat would constitute an adverse effect on the integrity of the site.
[1106] Atlantic Salmon (<i>Salmo salar</i>)			
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary.	There will be no instream works undertaken within this SAC as part of the proposed project, as such there is no potential for the proposed project to inhibit accessibility through river channels within the SAC. Therefore, there is no potential for adverse effect on the integrity of the site
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded.	The proposed project has the potential to result in the degradation of water quality and habitat, which could result in impacts on the CL of the Lower River Shannon SAC. A decrease in adult spawning fish would constitute an adverse effect on the integrity of the site.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling.	The proposed project has the potential to result in the degradation of water quality to the Urlan Beg_010 and the Cloverhill Stream_010 which flows into the SAC. Unfavourable water quality conditions could impact upon the number of adult spawning fish, salmon fry and out-migrating smolt abundance, number and distribution of redds within the Urlan Beg_010 and the Cloverhill Stream_010 and associated waterbodies by impeding upon the availability of suitable fine sediment habitat and necessary/favourable water chemistry conditions for Atlantic salmon.
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes.	
Out-migrating smolt abundance	Number	No significant decline.	

Attributes	Measures	Target	Potential for Adverse Effects
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA.	The proposed project has the potential to result in the degradation of water quality to the Urlan Beg_010 and the Cloverhill Stream_010 which flows into the SAC. The degradation of water quality due to the proposed project could prevent the watercourse from achieving Q4 water quality status. A degradation in water quality would constitute an adverse effect on the integrity of the site.
[1355] Otter (<i>Lutra lutra</i>)			
Distribution	Percentage positive survey sites	No significant decline.	The proposed project may result in the disturbance of otter due to the presence of onsite vehicles and construction machinery associated with the proposed project. There are no instream works proposed, however HDD could result in noise and vibration disturbance. Works will take place during daylight hours (and as such no temporary lighting will be required during the works). Otter is known to be relatively tolerant of disturbance (Bailey and Rochford, 2006) and are generally more active at night, this temporary disturbance would not be considered to have an adverse effect on the distribution of otter within the SAC.
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along riverbanks / around ponds.	The proposed project will take place within predominantly improved agricultural grassland, which is deemed unfavourable habitat for this species. The proposed project habitat loss will be outside of the Lower River Shannon SAC. Due to the low value and unsuitability of the habitat (improved grassland) for otter within the TWA, there is no potential for impact on the extent of terrestrial and/or marine habitat for otter.
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 4,461.6 ha.	The proposed project will not result in any decline in marine habitat, as no works will occur outside the proposed project site. There is, therefore, no potential for adverse effects.
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 500.1km.	No activities are proposed for the proposed project that could cause erosion or destabilisation of watercourses or riverbanks within the Lower River Shannon SAC.
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6 ha.	The proposed project will not result in any decline in the freshwater lake habitat, as no works will occur outside the proposed project site. There is, therefore, no potential for adverse effects.

Attributes	Measures	Target	Potential for Adverse Effects
Couching sites and holts	Number	No significant decline.	No holts or couching sites were recorded within or in the vicinity of the proposed project site. The proposed project will not result in the loss or decline in couching sites or holts, as none were recorded within the proposed project site, and there are no instream works proposed. There is, therefore, no potential for adverse effects.
Fish biomass available	Kilograms	No significant decline.	The potential degradation of water quality within the Urlan Beg_010 and the Cloverhill Stream_010 which flows into the SAC could affect the availability of fish biomass to otter. The runoff or discharge of bentonite to this waterbody could result in a decline in available feeding resources for otter. A significant decline in fish biomass available for otter would constitute an adverse effect on the integrity of the site.
Barriers to connectivity	Number	No significant increase	The proposed project will not result in any barriers along the Urlan Beg_010 or the Cloverhill Stream_010. The works will occur outside the proposed project site. There is, therefore, no potential for adverse effects.

Table 9.5 Evaluation of Potential Adverse Effects on the Conservation Objectives of the River Shannon and River Fergus Estuaries SPA as a Result of the Proposed Project

Attributes	Measures	Target	Potential for Adverse Effects
Cormorant (<i>Phalacrocorax carbo</i>) [A017] Shelduck (<i>Tadorna tadorna</i>) [A048] Teal (<i>Anas crecca</i>) Pintail (<i>Anas acuta</i>) [A054] Scaup (<i>Aythya marila</i>) [A062] Ringed Plover (<i>Charadrius hiaticula</i>) [A137] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Knot (<i>Calidris canutus</i>) [A143] Dunlin (<i>Calidris alpina</i>) [A149]			
Population trend Percentage change Long term population trend	Percentage change	Long term population trend stable or increasing	There is suitable foraging habitat within the proposed project site, however, the loss of this habitat would not be substantial due to the availability of this habitat within the surrounding area and therefore will not result in an adverse effect on the species population.
Distribution Range, timing and	Range, timing and intensity of use of Areas	There should be no significant decrease in the range, timing or intensity of use of areas by species other than that occurring from natural patterns of variation	The suitable habitat within the proposed project is minimal, the loss of this habitat would not be substantial and will not result in an adverse effect on the species population.
Wetland and Waterbirds [A999]			
Wetland habitat area	hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation	No loss of this habitat is anticipated and therefore there will not result in an adverse

Table 9.6 Evaluation of Potential Adverse Effects on the Conservation Objectives of the Ratty River Cave SAC as a Result of the Proposed Project

Attributes	Measures	Target	Potential for Adverse Effects
[1303] Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)			
Population per roost	Number	Minimum number of 165 bats for the winter roost (roost id. 51 in NPWS database); minimum number of 100 bats for the summer roost (roost id. 05).	The proposed project is located 4.1km from the maternity roost. Due to the distance there is no potential for adverse effects on the population or condition of the summer or winter roost.
Winter roosts	Condition	No decline	
Summer roosts	Condition	No decline	
Auxiliary roosts	Number and condition	No decline	
Extent of potential foraging habitat	Hectares	No significant decline within 2.5km of qualifying roosts	The proposed project site is outside of the 2.5km buffer set out in the SSCO target therefore, there is no potential for adverse effects on the extent of the foraging habitat or linear features within the SAC.
Linear features	Kilometres	No significant loss within 2.5km of qualifying roosts	
Light pollution	Lux	No significant increase in artificial light intensity adjacent to named roosts or along commuting routes within 2.5km of those roosts	There is no proposal to install artificial lighting within the site. Therefore, there is no potential for adverse effects as a result of artificial lighting.

9.3 IN COMBINATION EFFECTS

9.3.1 Overview

As described in Section 7.3, the potential in-combination effects were screened out for the following:

- GP Joule (Planning Ref: 24435): the application for this project has been withdrawn, consequently, the project will not proceed.
- John Callinan Munster Footgolf (Planning Ref: 2460459): No significant in-combination effects are anticipated; in-combination effects on European sites can be excluded.
- Kieran Kelly Haulage Ltd. (Planning Ref: 2360568): No significant in-combination effects are anticipated; in-combination effects on European sites can be excluded.
- Other Small-Scale Developments: No potential for significant in-combination effects; in-combination effects on European sites can be excluded.
- Relevant Plans: No plans were identified that would result in likely significant in-combination effects negative effects with the proposed project.

In contrast, the following two projects have been brought forward here to the Stage Two AA NIS (see Section 9.3.2 below):

- Terra Solar (Planning Ref: 1731)
- Terra Solar (Planning Ref: 18585)
- GP Joule (Planning Ref: 25260)

9.3.2 Assessment of In-Combination Effects: BNRG Project and Nearby Solar Developments (Planning Refs: 25260, 1731, 18585)

The proposed BNRG solar project is located within a broader area of solar development in County Clare. Three nearby projects have been considered for potential in-combination effects:

- **GP Joule – Mogullaun, Crossagh, Rathlaheen South, Culleen, Drumline, and Ballycasey Beg (Planning Ref: 25260)**
GP Joule submitted a planning application in August 2025 for a 95-hectare solar PV farm designed to operate for 35 years. A Screening for Appropriate Assessment (AA) and Natura Impact Statement (NIS) were submitted to evaluate potential effects on local biodiversity and nearby European sites, including SACs and SPAs. These assessments addressed direct impacts (habitat loss, disturbance to species) and indirect impacts (changes to water quality, hydrological connectivity, and availability of foraging or roosting habitats), along with potential in-combination effects with nearby developments.
- **Terra Solar – Firgrove, Sixmilebridge (Planning Ref: 1731)**
Planning permission was granted for a 34,300 m² solar farm, comprising ground-mounted panels on steel frames, a substation, underground cabling, and the demolition of a derelict cottage. The project will connect to the national grid via the Drumline 110kV Substation. The site is located immediately north and west of the proposed BNRG project site.
- **Terra Solar – Clonloghan, Caherteige (Planning Ref: 18585)**

Planning permission was granted for a 63,000 m² development, including ground-mounted solar panels, a substation, four inverter/transformer stations, a battery storage module, security fencing, CCTV, internal access tracks, an agricultural bridge, drainage works, and a new site entrance from the R472. A 10-year permission period was granted to facilitate project delivery and commissioning.

Assessment of Potential In-Combination effects Impacts

While there is some limited hydrological and ecological connectivity between the BNRG project site and the nearby GP Joule and Terra Solar projects, this connectivity is minimal and does not result in overlapping impacts on SACs or SPAs. Key considerations include:

- **Hydrology and Water Quality:** Some connections via local drainage and watercourse patterns exist, but each development has independent surface water management, drainage design, and sediment control measures in place. These measures prevent any additive effects on hydrologically connected habitats or water-dependent species.
- **Habitat Loss or Disturbance:** The projects occupy separate land parcels. Habitat modification and vegetation clearance are confined to individual sites. Even with limited ecological connectivity, mitigation measures such as habitat retention, enhancement, and strategic placement of buffers ensure there is no cumulative loss of critical habitats.
- **Ornithology and Ecology:** Bird foraging, roosting, and commuting ranges, as well as qualifying interests of nearby SACs (e.g., bats, flora), are largely site-specific. Where minor overlap in usage may occur, careful timing of works, habitat protection, and species-specific mitigation prevent compounding effects. With regard birds Area 4 of the proposed project provides only limited and non-critical habitat for SPA species, and while some habitats may be used opportunistically by species such as Curlew, they are not key intertidal foraging areas and are widely available in the surrounding landscape. Surveys confirm that Curlew occurrence within the site is infrequent and low in number, and no other SPA qualifying species were recorded. The project will not affect population trends or distribution patterns of SPA species, and therefore will not compromise conservation objectives. Similarly, no impacts on SAC habitats or species are predicted. In-combination effects with other nearby solar project have been assessed and ruled out, as these projects are spatially separate and lie outside the typical foraging range of relevant species. Overall, the project is not expected to result in any significant effects either alone or in combination the integrity or conservation status of the SPA or SAC
- **Mitigation Measures:** Each project includes robust mitigation measures, including controlled construction timing, erosion and sediment management, habitat enhancement, and ecological monitoring. The implementation of these measures across all sites ensures that indirect or cumulative pressures are avoided.

Conclusion

Despite the presence of some limited hydrological and ecological connectivity between the BNRG project and nearby GP Joule and Terra Solar projects, the combination of site-specific mitigation and spatial separation ensures that no in-combination effects are anticipated. All projects operate effectively independently regarding their potential impacts on SACs, SPAs, and other ecological receptors, and no significant in-combination effects on European sites are expected



9.4 MITIGATION MEASURES

The assessment concluded that the proposed project, in the absence of appropriate mitigation measures, could result in an adverse effect on the Lower River Shannon SAC, the River Shannon and River Fergus SPA and River Ratty SAC.

For the purpose of Article 6(3) of the Habitats Directive, the mitigation measures prescribed hereunder will avoid and/or reduce the significance of the potential impacts from the proposed project and prevent the occurrence of significant adverse effects on European sites (Section 9.1.1 through Section 9.1.3).

The mitigation measures are prescribed with regards to the EC Guidance (EC 2021a) which requires mitigation by avoidance as a first approach, the guidelines states that:

‘The hierarchy of mitigation measures suggests first avoidance (i.e. preventing significant impacts from happening in the first place) and then reduction of impact (i.e. reducing the magnitude and/or likelihood of an impact)’.

In addition, the guidelines further states that:

- *‘Each mitigation measure must be described in detail, specifying how it will eliminate or reduce the adverse impacts identified, and how, when and by whom it will be implemented. The following aspects must be indicated:*
- *The impacts concerned that the mitigation measures aim to address, including information on relevant parameters (e.g. the area of the habitats of Community interest subject to deterioration and their conservation degree in the site, the species population subject to disturbance).*
- *The expected results from implementing the proposed mitigation measures, with reference to each parameter (e.g. habitat area, species population numbers or structure and functions).*
- *Technical-scientific feasibility and degree of effectiveness expected of the proposed measures.*
- *The person or body in charge of implementation.*
- *The management of the area where the mitigation measures will be implemented (methods, duration).*
- *The location and timing of the measures with relation to the plan or project.*
- *The methods for checking implementation of the measures.*
- *The financing of the measures.*
- *The monitoring programme to verify the effectiveness of the measures and adapt them if necessary.’*

The above guideline recommendations have been considered within the proposed mitigation measures, which are outlined hereunder.

9.4.1 Habitats and Protected Fauna

9.4.1.1 Habitats and Fauna

The Biodiversity Enhancement Management Plan (BEMP) included as APPENDIX E in this report, is designed to protect and strengthen local habitats while supporting a wide range of species, in line with national and regional biodiversity strategies. The approach prioritises the



safeguarding of existing high-value habitats such as woodlands, scrub and hedgerows, while introducing targeted measures to enhance biodiversity across the site.

Hedgerows and treelines, which are vital corridors for birds, bats and other wildlife, will be protected by a 5-metre buffer. Any sections that must be removed will be reinstated with native Irish provenance species, and existing hedgerows will be bolstered with additional planting of shrubs and trees that provide food and shelter. These will be managed on a rotational cycle to maximise their value for nesting birds, pollinators and insects.

Areas of woodland and scrub that remain untouched (parcel 2 and parcel 3) will allow natural succession to occur, while new woodland pockets will be planted to improve habitat connectivity.

Grassland areas will be diversified, with some managed as species-rich hay meadows, others as wet grassland to benefit breeding waders, and grassy verges maintained to support butterflies, invertebrates and small mammals.

Fauna will be supported through specific interventions. Nest boxes will provide safe breeding opportunities for a range of bird species, while bat boxes will be installed to create additional roosting sites alongside enhanced foraging and commuting routes. Known badger areas will be protected, and hedgerow planting will include food-bearing shrubs such as elder to sustain them. Invertebrates will benefit from a chemical-free management regime, along with the creation of log piles, bee scrapes, insect hotels and specially designed bee posts to encourage pollinators and other beneficial species.

Biosecurity is a key component of the plan, with strict measures in place to prevent the introduction or spread of invasive species during construction and site management. Finally, a comprehensive monitoring programme will track the success of these measures at intervals over the life of the development.

9.4.1.2 *Bats*

Bat mitigation (as outlined by Eire Ecology in the Bat Report included in APPENDIX A) is proposed as follows:

- Buffer zones around the SAC
- Buffer zones around the hedgerows
- Hedgerow creation and enhancement

With the implementation of the above mitigation as detailed in APPENDIX A, any negative impacts on bats in the surrounding environment will be temporary, with positive end results, once existing hedgerows are bolstered and new hedgerows are planted.

It should be noted that in response to concerns raised by Clare County Council regarding the potential short- to medium-term impacts on bats arising from temporary hedgerow loss and the time lag before replacement planting becomes effective, BNRG has committed to implementing appropriate mitigation measures. These impacts will be addressed through targeted interim measures designed to maintain ecological connectivity during the construction and early operational phases. Key mitigation measures include the installation of temporary windrows along sections of removed hedgerows to immediately replicate linear features used by bats for commuting and foraging, and the use of semi-mature planting to accelerate the establishment of replacement hedgerows. Together, these measures ensure continuity of habitat structure and reduce the timeframe required for full ecological functionality to be restored.



In addition, while some uncertainty remains regarding potential impacts on species such as Leisler's bat, available research is limited and inconclusive. Accordingly, a precautionary, site-specific mitigation approach has been adopted. In addition, solar farm management practices, including increased plant diversity and reduced pesticide use, may provide enhanced foraging opportunities for bats.

Overall, the proposed measures will maintain bat connectivity, minimise short-term impacts, support long-term habitat function, and provide a robust and precautionary mitigation strategy in line with best practice.

9.4.2 Protection of Aquatic Habitats – Sediment Control

The following mitigation measures are prescribed to ensure the prevention of water quality degradation due to the runoff of construction pollution during the construction works:

- Works within and adjacent to watercourses will be suspended during periods of heavy rainfall (i.e. greater than 10mm/hour or greater than 25mm in a 24-hour period);
- Excavations will be covered with tarp or similar material, during high rainfall to avoid the creation of surface water with high concentrations of suspended solids that would require dewatering;
- During lighter rain periods, the time period over which excavations are left open will be reduced;
- Excavated materials temporarily stockpiled will be stored away from watercourses and drainage paths during the installation works to minimise generating sediment laden runoff during the works;
- Silt fences will be constructed within the immediate vicinity of the proposed works to prevent the runoff of sediment entering the river;
- Silt fences will be constructed using a permeable filter fabric (Hy-Tex Terrastop Premium silt fence or similar) and not a mesh. The silt fences will be positioned to allow an appropriate working area, but should not occur within areas prone to flood, or below the high-water mark. Silt fencing will be installed as per the manufacturer's guidelines and shall be maintained until vegetation on the disturbed ground has been re-established. Once installed, the silt fence will be inspected regularly during construction and more frequently during heavy rainfall; and
- Dewatering of excavations will be avoided where possible. If required, this will be achieved by pumping excess water to settlement tanks or filtration systems located at the construction site, where the water will be retained for a sufficient length of time to allow particles to settle. Silt de-watering bags will be used when water is being discharged to ground. This discharged water will be within prescribed water quality limits (i.e. $\leq 25\text{mg/L}$ Total Suspended Solids [TSS] in accordance with the Freshwater Fish Directive [2006/44/EC] and Salmonid Waters Regulations [1988]).

9.4.3 Protection of Habitats – Pollution Control

- All works must align with the guidance set out in the Guidance document entitled: Control of Water Pollution from Construction Sites. Guidance for consultants and contractors (C532) (CIRIA, 2001);
- A 24-hour, seven day week Emergency Response protocol will be drawn up, included in the CEMP and implemented. This Protocol must be implementable in the unlikely event of an accidental spillage of chemicals, hydrocarbons or release of sediment to the surface



or groundwater system. A spill method statement will be drawn up which all personnel must adhere to and receive training in;

- Storage locations for excavated materials, equipment, hydrocarbons (including fuels for machinery) will be designated prior to commencement of works. Excavated materials will not be stored within 50 m of any ditches, dry or wet, watercourses or wetland areas. Site compounds must also be located at least 20 m from an aquatic feature;
- Transformers and all fuel will be stored in bunded areas, exclusively at a marked area within the construction compound. The bund capacity will be sufficient to accommodate 110% of the largest tank's maximum capacity or 25% of the total maximum capacities of all tanks, whichever is the greater. The exception to this being double walled tanks equipped with leak detection, which do not require additional retention;
- Spill-kits and hydrocarbon absorbent packs will be stored in the cabin of each vehicle and operators will be fully trained in the use of this equipment. An oil spill response plan will be developed for the construction works and included as a part of contractor Tool box talks;
- Refuelling of construction equipment and the addition of hydraulic oil or lubricants to vehicles/equipment will take place in designated hard surface bunded areas within the construction compound, and not on-site. If it is not possible to bring machinery to the refuelling point, fuel will be delivered in a double-skinned mobile fuel bowser. A drip tray will be used beneath the fill point during refuelling operations in order to contain any spillages that may occur;
- All machinery will be regularly maintained and checked for leaks. Servicing must be undertaken at the construction compound which is located offsite. In emergency situations where services need to occur onsite, they will not be undertaken within 50 m of aquatic features, including dry drainage ditches;
- All concrete will be mixed off site and imported into the site. All concrete browsers will be washed down at a dedicated concrete washout offsite at least 50 m from a drainage ditch or watercourse. Concrete washings must not be disposed of onsite to any surface or ground water feature. All washings will be removed offsite and treated at a licensed facility;
- No chemicals that are deleterious to aquatic organisms are to be used in cleaning works. All raw, uncured waste concrete must be cured at a designated location, offsite and at least 50 m from any aquatic feature or dry drainage ditch; and
- On completion of the works, all apparatus, plant, tools, offices, sheds, surplus materials, rubbish and temporary erections or works of any kind will be removed from the site.

9.4.4 Dust and Air Pollution Control

Potential impacts during the construction stage arising from dust emissions and air pollution will be minimised through the provision of mitigation measures which include:

- Minimisation of extent of working areas.
- Use of a self-contained wheel wash.
- Stockpiling of excavated materials will be limited to the volumes required to practically meet the construction schedule.
- Daily inspections by site personnel to identify potential sources of dust generation along with implementation measures to remove causes where found.

- Use of dust suppression measures (e.g., sweeps / covers/ water bowzers) on stockpiles and the road surface during periods of extended dry weather.
- All machines shall be suitably maintained to ensure that emissions of engine-generated pollutants shall be kept to a minimum in accordance with 'Measures Against the Emission of Gaseous and Particulate Pollutants from Internal Combustion Engines to be Installed in Non-Road Mobile Machinery' (2002/88/EC) and 'Emissions of Pollutants from Diesel Engines' (2005/21/EC).
- Vehicles will not be left running unnecessarily and low emission fuels will be used where possible.

9.4.5 Noise Management

To minimise disturbance to wildlife and reduce the risk of behavioural changes in sensitive species, a series of targeted mitigation measures will be implemented throughout the construction and operational phases.

- Construction Phase
 - Construction Scheduling:
 - Limit high-noise activities (e.g. excavation, machinery operation) to daytime hours to avoid disturbance to nocturnal wildlife.
 - Avoid early morning, late evening, and night-time operations where feasible.
 - Equipment Management:
 - Use machinery and vehicles with low-noise specifications and maintain equipment to prevent unnecessary noise.
 - Position stationary machinery as far as possible from sensitive habitats.
- Operational Phase
 - MV Station Placement:
 - Locate MV stations, and other operational plant away from sensitive habitats to minimise noise impact.
 - Noise-Optimised Equipment:
 - Use low-noise MV stations where possible, and maintain equipment regularly to prevent noise escalation over time.
 - Buffer Zones:
 - Maintain buffer zones between operational equipment and wildlife habitats. Vegetation can be enhanced to provide additional acoustic screening.

9.4.6 Monitoring

Monitoring is a key component of biodiversity management, aimed at of enhancement measures and ensuring habitats and species are maintained or improved over time. A qualified ecologist will carry out monitoring, establish baseline conditions, and report findings to the planning authority.

Key Elements and Activities:

- Hedgerows and Treelines: Check for damage, gaps, and species diversity to maintain structurally dense, species-rich corridors (Years 1, 5, 10, 20; summer).

- New Woodland: Assess tree health, growth, and habitat development to ensure connectivity with existing woodland (Years 1, 5, 10, 20; summer).
- Grasslands: Inspect vegetation condition and advise on stocking rates to maintain flower-rich, semi-natural grassland (Years 1, 5, 10, 20; summer).
- Bird Boxes: Annually inspect for occupation, integrity, and cleanliness (winter).
- Bat Boxes: Annually check for occupation and structural condition (summer).
- Invertebrates: Inspect bee posts, log piles, and scrapes for use by target species and other invertebrates (annually; summer).

The monitoring programme ensures that biodiversity measures, identifies any issues early, and supports adaptive management throughout the life of the development

9.4.7 Biosecurity Measures

Although no non-native invasive plant species included in the Third Schedule Part 1 of the European Communities Regulations (S.I. 477/2011) were recorded during baseline surveys, the spread and introduction of alien invasive species and noxious weeds will be avoided by adopting appropriate mitigation measures as per guidance issued by the NRA (2010) and IFI with respect to the protocols developed for the control of the spread of alien species to the aquatic environment. The presence of alien invasive species and requirement for actions will be confirmed by the ECoW. The following measures to reduce the risk of the spread of alien species will be incorporated into the CEMP:

- Prior to arrival on site the contractor's vehicles and equipment must be thoroughly cleaned at the entrance to the site. High-pressure steam cleaning, with water > 60 °C, is recommended for vehicles and equipment where reasonably feasible. If it is not possible to steam clean the equipment, a normal power hose must be used. After cleaning, the operator should visually inspect the equipment to ensure that all adherent material and debris have been removed;
- Each individual entering/leaving the site should visually inspect all equipment (including footwear) that has come into contact with water or soils for evidence of attached plant or animal material, or adherent mud or debris. This should be done before entering and leaving the site. Remove any attached or adherent material before entering or leaving the site of operation;
- All Contractors will be required to sign a prepared form detailing the nature of the cleaning process carried out and the date on which this was conducted; and
- The ECoW will be responsible for keeping a logbook with records of all the inspections and all relevant information.

9.4.8 Mitigation Specific to Horizontal Directional Drilling

- A competent Contractor will be appointed to undertake the trenchless construction works;
- The Contractor will prepare a trenchless construction Method Statement which will outline the standard approach for the construction. The Method Statement will include a contingency plan for break-out and for excessive ground settlement;
- The Contractor will undertake the trenchless construction in accordance with industry best practice including British Standard EN 16191:2014 Tunnelling machinery, safety

requirements and CIRIA C648 “Control of water pollution from linear construction projects Technical Guidance”;

- To prevent loss of bentonite or ‘frac-out’ from occurring, a series of actions will be implemented. The drill fluids operator will monitor drill fluid density, viscosity and solids content on an ongoing basis, to ensure that the fluid does not increase in viscosity, requiring additional pressure to maintain mobility;
- In critical cases, viscometers will be used to measure drill fluid gel strength and shear strength. Filtrate can also be measured to calculate the amount of filter cake building up on the internal wall of the bore. Any increases in pump pressure experienced by the drill operator will be investigated immediately to prevent the risk of pressure build up within the annulus. In some circumstances, dependant on the drilling equipment used, the pilot drill borehole assembly will be fitted with a down hole pressure monitor to measure pressure in the annulus between the drill and the bore wall. This will give an early indication of pressure build up in the hole and allow the drill operator to prevent a ‘break-out’. If there is a risk of a ‘frac-out’ a number of measures will be implemented including (1) pumping a pill of drilling fluid with a higher density to the risk zone (2) circulate and pump loss circulation material (typically cork or manufactured inert polymers) to the risk zone to seal the risk zone, grouting of the risk zone, and, or launch a packer before the risk zone;
- The Contractor will implement procedures to maximise the recirculation or reuse of drilling mud to minimise waste disposal;
- Disposal of drilling fluids will be the responsibility of the Contractor to an approved and licenced waste facility;
- Monitoring of the drilling operations will be undertaken at all times by the Contractor. The monitoring will include visual inspection of the pits and monitoring of the volume of returns flowing back to the entry pit. The monitoring personnel will be in constant communication with the drilling rig operator and thus will be able to immediately cease drilling if necessary;
- Buffer strips of natural uncleared vegetation shall be preserved between construction activity. The launch and reception pits will be situated outside of the riparian zone. A buffer zone width for smaller channels (< 10m) of 20m or greater will be maintained; and
- In addition, the ECOW will undertake sediment monitoring both upstream and downstream of the trenchless construction works.

9.4.9 Management of Material Disposal

Some minor material waste will be generated as a result of the proposed project. This waste will be removed to a licenced facility or will be reinstated into the landscaping where possible. All waste will be removed from the site and disposed of by an approved waste contractor in accordance with prevailing waste management regulations.

9.5 MITIGATION EFFECTIVENESS

The appointed Contractor will be responsible for ensuring all mitigation measures listed above, including any additional planning conditions, are fully implemented prior to the proposed project commencing and undertaken throughout the duration of the works.

The above outlined mitigation measures are best practice and are proven technologies/methods. The mitigation measures, once correctly applied, will avoid or reduce the magnitude of potential impacts on the receiving environment.

10. CONCLUSION

This NIS has been prepared following the Department of the Environment, Heritage and Local Government guidance '*Appropriate Assessment of Plans and Projects in Ireland; Guidance for Planning Authorities*'. The function of this report is to assist and provide sufficient objective scientific information to the competent authority with undertaking an Appropriate Assessment in accordance with the Habitats Directive, Part XAB of the Planning and Development Act 2000 and case law.

The assessment considers whether the proposed development, alone or in-combination with other projects or plans, will result in likely adverse effects on the integrity of any European site within the ZOI of the proposed development and includes any mitigation measures necessary to avoid or reduce the risk of such adverse effects.

In absence of mitigation, the potential risk to the Lower River Shannon SAC, the River Shannon and River Fergus Estuaries SPA, and Ratty River SAC is the potential for habitat loss, degradation of water quality and disturbance. However, following the application of the detailed mitigation measures, any adverse effects will be avoided. Consequently, it is concluded that no adverse effects will occur on the QIs or SCIs of European site, nor on the overall integrity of European sites, and the conservation objectives will not be compromise.

In line with the provisions of Article 6 of the Habitats Directive 92/43/EEC, an analysis and evaluation of the relevant information including, in particular, the nature of the proposed development, including mitigation measures, characteristics of the QIs, the potential link between the proposed development and the European Sites, no adverse effects on the integrity of any European sites during the proposed development at Ballycunneen, County Clare is anticipated, either alone or in-combination with any other plans or projects, and there is no scientific doubt in relation to this conclusion.

11. REFERENCES

Bailey, M. and Rochford J. (2006) Otter Survey of Ireland 2004/2005. Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Clare County Council (2023). Clare County Development Plan 2023-2029. Available at: <https://www.clarecoco.ie/services/planning/plans/clarecountydevelopmentplan23-2029/> [Accessed July 2025]

Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine

CIRIA (2001). Control of water pollution from construction sites. Guidance for consultants and contractors (C532).

Department of the Environment, Heritage and Local Government (DEHLG) (2010). Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities.

European Commission [EC] (2000). Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg.

European Commission [EC] (2006). Nature and Biodiversity Cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg.

European Commission [EC] (2007). Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg.

European Commission [EC] (2013). Interpretation Manual of European Union Habitats. Version EUR 28. European Commission.

European Commission [EC] (2018). Managing Natura 2000 Sites – The Provisions of Article 6 of the Habitats Directive 92/43/EEC. Brussels. [online] Available here: https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf

European Commission [EC] (2021a). Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg.

European Commission [EC] (2021b). Guidance document on the strict protection of animal species of Community interest under the Habitats Directive. Publications Office of the European Union, Luxembourg.

European Commission [EC] (2021c). Guidance document on the strict protection of animal species of Community interest under the Habitats Directive. Publications Office of the European Union, Luxembourg.

Fossitt (2000). A Guide to Habitat in Ireland. The Heritage Council.



Gallagher, T., O’Gorman, N.M., Rooney, S.M., Brett, A., and O’Leary, C. (2022) National Programme: Habitats Directive and Red Data Book Species Summary Report 2021. Inland Fisheries Ireland, 3044 Lake Drive, Citywest, Dublin 24, Ireland.

Gallagher, T., O’Gorman, N., Rooney, S.M., Brett, A., and O’Leary, C. (2023) National Programme: Habitats Directive and Red Data Book Species Summary Report 2022. Inland Fisheries Ireland, 3044 Lake Drive, Citywest, Dublin 24, Ireland.

Holman, C., R. Barrowcliffe, D. Birkenshaw, H. Dalton, G. Gray, G. Harker, P. Brett, D. Laxen, B. Marner, and D. Marsh. (2014). IAQM Guidance on the Assessment of Dust from Demolition and Construction. Institute of Air Quality Management: London, UK.

Maitland, P.S. (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

NBDC (2025) ‘National Biodiversity Data Centre map viewer.’, available: <https://maps.biodiversityireland.ie/Map> [Accessed July 2025]

NPWS (2012a). Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012b) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013) Site Synopsis: Lower River Shannon SAC 002165. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2014) Site Synopsis: Ratty River Cave SAC 002316. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2015) Site Synopsis: River Shannon and River Fergus Estuaries SPA 004077. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2017) Conservation Objectives: Lough Gash Turlough SAC 000051. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018a) Conservation Objectives: Ratty River Cave SAC 002316. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018b) Conservation Objectives: Kilkishen House SAC 002319. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018c) Conservation Objectives: Poulmagordon Cave (Quin) SAC 000064. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018d) Conservation Objectives: Danes Hole, Poulnalecka SAC 000030. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018e) Conservation Objectives: Old Domestic Building (Keevagh) SAC 002010. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018f) Conservation Objectives: Newhall and Edenvale Complex SAC 002091. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.



NPWS (2018g) Conservation Objectives: Newgrove House SAC 002157. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2022) Conservation Objectives: Slieve Aughty Mountains SPA 004168. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NPWS (2023) Conservation Objectives: Curraghchase Woods SAC 000174. Version 2. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NPWS (2025) Conservation Objectives: Ballyallia Lough SPA 004041. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority.

NRA (2010). The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads. National Roads Authority.

OPR (2021). Office of the Planning Regulator. OPR Practise Note PN01 Appropriate Assessment Screening for Development Management.

Scottish Natural Heritage (SNH) (2016) Assessing Connectivity with Special Protection Areas (SPAs). Version 3 – June 2016.



APPENDIX A. FIRE RISK BESS



GREENFIRE SOLUTIONS

SUPPORTING RENEWABLE ENERGY

FIRE RISK MANAGEMENT PLAN AND COMPLIANCE REPORT FOR BALLYCUNNEEN SOLAR & BESS PL-500676-CE-26

JUNE 2026

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GREENFIRE SOLUTIONS

APPROVAL AND REVISION RECORD				
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Glossary of Terms

Term	Definition
ALARP	As Low As Reasonably Practicable; a principle requiring risk to be reduced so far as reasonably practicable, balancing risk reduction against time, trouble and cost.
An Coimisiún Pleanála	The Irish planning commission responsible for determining certain strategic planning matters and appeals.
Applicant	Tobin Environmental Services Ltd, acting in relation to the proposed BNRG Ballycunneen Ltd. development.
Application Site	The lands associated with the proposed development across the townlands of Ballycunneen, Drumline, Ballycasey More, Clonmoney West, Firgrove and Ard Kyle, Co. Clare.
BESS	Battery Energy Storage System; an electrochemical energy storage installation used to store electrical energy for later use.
BMS	Battery Management System; the control and monitoring system that supervises battery condition, performance and protective responses, including voltage, current and temperature.
Burn policy	Operational approach whereby, if a unit enters sustained thermal runaway, the affected unit may be allowed to burn out under controlled conditions while defensive cooling protects surrounding assets.
Container / Enclosure	Factory-assembled housing containing battery modules, monitoring and protection systems, ventilation, and associated electrical and fire safety equipment.
DBSMP	Detailed Battery Safety Management Plan; sets out final safety measures, design controls, operational procedures, emergency interfaces and management arrangements for the installed BESS.
Deflagration	Rapid combustion causing a pressure rise that can result in an explosion within an enclosure if flammable gases ignite.
DESNZ	Department for Energy Security and Net Zero (UK); its grid-scale electrical energy storage guidance is referenced as non-statutory good practice.
ERP	Emergency Response Plan; sets out reactive arrangements, actions, roles and communications to be followed in the event of fire or other emergency.
Fire authority	The relevant local authority fire service or statutory fire authority with responsibility for emergency response and fire safety functions in the area of the proposed development.
Fire Risk Management Plan (FRMP)	Plan requested by An Coimisiún Pleanála to identify fire hazards, evaluate associated risks and set out preventative and mitigation measures for the BESS.

Term	Definition
FRS	Fire and Rescue Service; term used in some UK guidance. For this report, equivalent functions are undertaken by the relevant fire authority / local authority fire service in Ireland.
GS	Greenfire Solutions Ltd, author of the report.
Hazard Mitigation Analysis (HMA)	Structured assessment used to identify hazards and determine measures needed to prevent, control or mitigate their consequences.
HF	Hydrogen fluoride; a toxic and corrosive gas that may be generated during lithium-ion battery thermal runaway.
HSWA	Health and Safety at Work etc. Act 1974; UK legislation referenced as comparative good practice only, not as the governing statute in the Republic of Ireland.
IEC	International Electrotechnical Commission; international standards body responsible for the IEC 62933 series and other relevant electrical standards.
IDLH	Immediately Dangerous to Life and Health; a concentration threshold used when assessing hazardous gas exposure during emergency incidents.
LFL / LEL	Lower Flammable Limit / Lower Explosive Limit; the lowest concentration of a flammable gas or vapour in air capable of ignition.
LiFePO4	Lithium iron phosphate; a lithium-ion battery chemistry commonly used in stationary battery energy storage systems.
MVPS	Medium Voltage Power System; electrical equipment associated with conversion, transformation and export of power between the BESS and the wider electrical system.
NFCC	National Fire Chiefs Council (UK); publisher of the Grid-Scale BESS Planning Guidance used as a technical benchmark.
NFPA	National Fire Protection Association; publisher of fire safety standards including NFPA 68, NFPA 69 and NFPA 855.
NFPA 68	Standard on Explosion Protection by Deflagration Venting; provides requirements for venting explosion overpressures from enclosures.
NFPA 69	Standard on Explosion Prevention Systems; addresses active and passive measures for preventing explosion conditions and controlling ignition risks.
NFPA 855	Standard for the Installation of Stationary Energy Storage Systems; key benchmark for design, installation, operation and safety of stationary ESS.
Off-gas	Gases released from a battery during abnormal conditions, including overheating, cell failure or thermal runaway.
PCS	Power Conversion System; converts power between DC and AC and interfaces the BESS with the electrical network.
Planning Authority	County Clare, acting as the local planning authority for the proposed development.

Term	Definition
RFI	Request for Further Information issued by An Coimisiún Pleanála under the Planning and Development Act 2000 (as amended).
Shannon Estuary	Estuarine environment identified as a relevant receptor in relation to potential fire-water runoff and downstream contamination.
SPAR	Smoke Plume Analysis Report; site-specific assessment of dispersion and effects of smoke and hazardous combustion products on surrounding receptors.
Thermal runaway	Self-heating, self-accelerating failure process within a battery cell that can lead to fire, gas release, explosion hazards and propagation to adjacent cells or modules.
TRPT	Thermal Runaway Propagation Time; time taken for thermal runaway to spread from the initiating cell to adjacent units, used as a performance metric in UL 9540A:2025.
UL 9540	Standard covering energy storage systems and equipment.
UL 9540A	Standard test method for evaluating thermal runaway fire propagation behaviour in battery energy storage systems at cell, module, unit and installation level.
Ventilation system	Engineered mechanical system used to manage enclosure temperature, remove off-gases and prevent build-up of flammable atmospheres within the BESS enclosure.

Executive Summary

TOBIN (under the instruction of BNRG Ballycunneen Ltd.) (the Applicant) has commissioned Greenfire Solutions (GS) to prepare an independent Fire Risk Management Plan and Compliance Report for the proposed Ballycunneen Solar & Battery Energy Storage System (BESS) development, located across the townlands of Ballycunneen, Drumline, Ballycasey More, Clonmoney West, Firgrove and Ard Kyle, Co. Clare (the Application Site). The report responds to a Request for Further Information from An Coimisiún Pleanála, specifically in relation to fire risk management, emergency response arrangements and fire-water runoff control for the BESS component of the scheme.

The assessment is based on the current indicative design for a containerised BESS installation, integrated with the proposed solar farm infrastructure. It evaluates the design and layout, operational safety management proposals, and site-specific environmental protections against a structured framework of criteria drawn from the Irish planning and fire-safety regime, relevant international standards (including BS EN IEC 62933, IEC 62619, NFPA 855:2026, UL 9540/9540A, NFPA 68 and NFPA 69), and the NFCC Grid-Scale Battery Energy Storage System Planning Guidance (Version 2) where used as good-practice benchmark guidance.

The report addresses three principal questions: whether the inherent fire and explosion risks associated with the proposed BESS can be reduced to a level that is tolerable and as low as reasonably practicable; whether the configuration and operation of the Application Site provides appropriate separation, access, water supply and environmental protection to manage a credible worst-case incident; and whether the information required by An Coimisiún Pleanála in respect of the Fire Risk Management Plan, Emergency Response Plan and fire-water runoff control has been adequately addressed for planning purposes. To answer these, GS has reviewed the proposed technology characteristics, the preliminary safety functions of the battery management, thermal management and suppression systems, the spatial arrangement of enclosures and infrastructure, and the proposed approach to operational safety management and liaison with the fire authority.

The analysis identifies a series of design and management measures that are already incorporated or conceptually allowed for within the current scheme, including separation distances between BESS enclosures and adjacent receptors, provision for dedicated firefighting water storage on site, bunding and drainage measures to contain contaminated runoff, and a commitment to develop a Detailed Battery Safety Management Plan and Emergency Response Plan in consultation with the relevant fire authority prior to commissioning. It also sets out further recommendations to be secured through the procurement process, detailed design and planning conditions, such as requirements for technology certification and performance evidence, configuration of off-gas detection and ventilation,

confirmation of hydraulic capacity and resilience of firefighting water supplies, and completion of any necessary plume and impact assessments for sensitive receptors.

On the basis of the current stage of design, and subject to the implementation of the recommended measures and conditions, GS considers that the Ballycunneen Solar & BESS development can be designed, specified and operated in a manner that aligns with relevant Irish legislative requirements and recognised industry best practice for grid-scale BESS. The framework and recommendations in this report are intended to enable the Applicant, County Clare planning authority, the relevant fire authority and An Coimisiún Pleanála to secure the remaining design detail and operational controls needed to ensure that fire-related risks to people, property and the environment are appropriately identified, managed and mitigated throughout the life of the installation.

1 Introduction

Overview

- 1.1 TOBIN have commissioned Greenfire Solutions (GS) to provide an independent Verification and Compliance Report for the Battery Energy Storage System (BESS) as part of a proposed solar farm development which is located across the townlands of Ballycunneen, Drumline, Ballycasey More, Clonmoney West, Firgrove and Ard Kyle, Co. Clare (the Application Site).
- 1.2 This report assesses and evaluates the Development and Application Site against material planning considerations specifically related to batteries and fire safety and is in response to a request for more information (RFI) from An Coimisiún Pleanála.

The Application Site

- 1.3 The Commission has examined the appeal and is of the opinion that certain information is necessary for the purpose of enabling it to determine the appeal. In accordance with Section 132 of the Planning and Development Act, 2000, (as amended), the Applicant is required to submit the following information in respect of the proposed battery energy storage system component of the development, as set out below:
 - 1.4 *Further detail is required in the form of a **Fire Risk Management Plan (FRMP)**. The FRMP should be prepared by a suitably qualified technical expert / advisor and set out preventative measures for potential causes of fire hazard and evaluate the associated risk of same. It should also include specific measures to reduce the risk of a fire occurring onsite including, for example, the safe storage and maintenance of flammable substances and materials, the intended method(s) of extinguishment, and the installation of fire safety equipment and apparatus (fire alarms, detection systems, methods of suppression, etc.). The FRMP should explicitly demonstrate how the potential risk of a fire occurring on the site would be addressed and minimised – **this report addresses this requirement.***
 - 1.5 *Further detail is required in the form of an **Emergency Response Plan (ERP)**. The ERP should be prepared by a suitably qualified technical expert / advisor. It should outline a reactive strategy with clear procedures to follow in the event of a fire, detailing the specific actions the facility operator must take to respond quickly and effectively in the event of fire or similar emergency – **a separate document from GS addresses this requirement.***
 - 1.6 *A key environmental consideration during a fire event is the **run-off of fire water** into onsite and adjoining watercourses, including the Shannon Estuary. Further detail and mitigation is therefore required demonstrating that there will be no contamination of surface water or groundwater, that suitable catchment and containment measures would be in place for firewater runoff, and other potential firefighting substances and chemicals (such as foam), and that consideration has been given to potential downstream impacts – **s4.17-4.18 of this report assess the proposed provision to deal with this requirement.***

Greenfire Solutions

- 1.7 Greenfire Solutions (GS) is led by former senior officers of fire and rescue services with over three decades of operational and strategic experience in fire safety, emergency response and risk management. Drawing on this experience, we provide high-quality, bespoke and ethically

sound advice to fire authorities, planning authorities and private sector clients across the UK and the Republic of Ireland, including projects determined under the Irish planning and fire safety regime.

1.8 Our work is founded on independence, objectivity, and uncompromising integrity. While commissioned and remunerated by clients, our professional judgment is never influenced by commercial interests; the protection of life, property, and community safety remains central to everything we do, whether advising on projects in the Republic of Ireland or elsewhere. This includes:

- Operational Advice and Assurance;
- Fire Safety Strategies, including Protection and Prevention;
- Legal Advice in Relation to UK Fire Legislation;
- Our services include:
- Liaison with local authority fire services and fire authorities in the Republic of Ireland and the UK on behalf of third parties.
- Liaison with planning authorities, including elected members and officers, in both the Republic of Ireland and the UK on behalf of third parties.
- Liaison with insurers, investors and other stakeholders with an interest in fire and life safety.

1.9 Since the launch of GS, we have enjoyed considerable growth, built upon the foundations of a solid reputation for delivering high quality outcomes. We work with multiple energy companies, helping to shape projects from inception through to delivery on the ground. Our extensive strategic, operational experience of the fire sector and local authorities enables GS to support developers and planners by:

- In respect of planning applications, reviewing designs and plans to prepare for fire service consultation in line with:
 - The planning and fire safety regime of the Republic of Ireland, including the Planning and Development Acts, relevant County Development Plan policies, the Building Regulations (in particular Part B – Fire Safety and associated Technical Guidance), and national energy and electrical storage policy for Ireland;
 - The Electrical Energy Storage Policy Framework for Ireland and any relevant guidance issued by Government departments or national agencies in relation to grid-scale energy storage and associated infrastructure;
 - Experience with analogous guidance used in other jurisdictions, including National Planning Policy and associated guidance in England, National Planning Framework 4 in Scotland, Planning Policy Wales and “Future Wales – The National Plan 2040”, and the Planning (Development Management) Regulations (Northern Ireland) 2015. These are not determinative for developments in the Republic of Ireland, but provide useful comparative good practice for the design and assessment of battery energy storage schemes;
- Creating site-specific fire risk assessments and environmental fire risk assessments;
- Creating bespoke Fire Risk and Emergency Response Plans, plus Outline and Detailed Battery Safety Management Plans;
- Supporting the creation of bespoke Integrated Fire Risk Management Strategies (IFRMS);

- Creating bespoke Environmental Impact Assessments input in compliance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017;
- Working with Scientific Advisors (who provide advice to UK Fire and Rescue Services) to provide Smoke Plume Analysis Reports (SPAR);
- Generating solutions for site specific challenges through working alongside developers, engineers and planners when in discussions with third parties such as Fire and Rescue Services;
- Supporting liaison during engagement with Fire and Rescue Services to create a positive and open collaborative approach;
- Providing feedback, and updates to future design, from any lessons learned emerging from national and international incidents;
- In the UK, our support includes assisting Fire and Rescue Services to meet their statutory duties, for example in relation to the gathering of site-specific risk information. In the Republic of Ireland, we align our support with the statutory responsibilities of fire authorities under Irish fire safety legislation and associated guidance;
- Supporting liaison with Local Resilience Forums;
- Providing ongoing support to energy companies and local Fire and Rescue Services through the regular testing of procedures and stimulated exercises; and,
- Working with other professional institutions and associations such as the NFCC, Institute of Fire Engineers and the Fire Industry Association .

1.10 Our experience shows that to work effectively with fire authorities, local authority fire services and planning authorities, a collaborative and cohesive approach works best. For projects in the Republic of Ireland, this includes early and structured engagement with the relevant fire authority and the planning authority for the area, so that fire safety considerations can be fully integrated into the planning and design process. Our focus is to build trusting relationships with our clients to become their preferred partner of choice into the future and ensure that each site is as safe as is possible for the community in which it is located.

Objectives

- 1.11 This report assesses and evaluates the Development and Application Site against material planning considerations specifically related to batteries and fire safety, in the context of the planning and fire safety regime of the Republic of Ireland. The report is intended to assist County Clare, as the planning authority, and the relevant fire authority and statutory consultees, in understanding the fire-related risks and the measures proposed to manage them.
- 1.12 Accordingly, the objectives of this report are to:
- 1.13 Determine whether the fire risks, because of the Development, are reasonable;
- Assess the design of the Development in terms of fire safety and mitigation measures for fire risks;
- 1.14 Assess the location of the Application Site in terms of whether the potential impacts of a fire are mitigated as far as possible, including potential fire spread to neighbouring sites / receptors; and,

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- Evaluate the above against the material planning considerations specifically related to batteries and fire safety.
- 1.15 To facilitate the above objectives, this report presents specific assessment criteria to address procurement and design considerations, safety systems, operational procedures, and regulatory compliance. These criteria are used as a framework to:
- 1.16 Evaluate the Development and Application Site against the existing NFCC V2 Guidance, relevant legislation / regulation and current industry best practice / standards;
- 1.17 Identify potential gaps in safety measures;
- Assess the overall fire risks; and,
- 1.18 Make any relevant recommendations.
- 1.19 Taken together, the assessment criteria and recommendations provide a comprehensive framework for evaluating fire risks and serve as a tool for stakeholders to undertake ongoing assessment and evaluation to ensure the continuing safety and compliance of the Development and Application Site throughout the further development and operational phases.

Author

- 1.20 The author of this document is Martin Blunden, awarded the Queen's Fire Service Medal (QFSM) by her late Majesty, Queen Elizabeth II, in the 2021 New Years Honours list, a Member of the Institute of Fire Engineers (MIFireE) and a former Chief Fire Officer of the Scottish Fire & Rescue Service, with over 34 years' experience in the UK Fire and Rescue sector. His career experience also includes roles as the strategic lead for the National Fire Chiefs Council on Health and Safety, National Operational Learning, and the Joint Emergency Services Interoperability Programme.

2 Use of Legislation, Standards and Design Guidance

Overview

- 2.1 The design, construction, operation and decommissioning of the proposed BESS are governed primarily by the safety, health and welfare at work and fire safety legislation of the Republic of Ireland, supplemented by European technical standards that apply in Ireland by virtue of adoption by the European Committee for Electrotechnical Standardisation (CENELEC) and international standards that represent current industry best practice. This section sets out the legislative and standards framework that has been applied in the preparation of this report, in order of normative priority.
- 2.2 The framework operates on four levels:

Tier 1 — Irish primary legislation and regulation (mandatory);

Tier 2 — European Standards adopted as EN standards (normative technical standards applicable in Ireland);

Tier 3 — International standards applied as technical benchmarks (NFPA and UL, used to demonstrate compliance with Tier 1 and Tier 2 requirements where no equivalent European standard exists at the same level of technical detail);

Tier 4 — Sector guidance (NFCC V2 and DESNZ, applied as good practice reference material).

Irish Primary Legislation and Regulation

- 2.3 The Safety, Health and Welfare at Work Act 2005 (the 2005 Act) and associated Regulations constitute the primary mandatory framework governing the design, construction, operation and decommissioning of the proposed BESS in the Republic of Ireland. The 2005 Act requires employers and those in control of places of work to ensure, so far as is reasonably practicable, the safety, health and welfare of employees and others who may be affected by their undertakings, through the identification of hazards, the assessment of risks and the implementation of appropriate control measures. These duties extend to the design and operation of high-hazard installations such as grid-scale battery energy storage systems.
- 2.4 The Safety, Health and Welfare at Work (Construction) Regulations 2013 establish duties on clients, designers, project supervisors and contractors during the design and construction phases, including the need to eliminate or reduce risks at source and to coordinate health and safety across the project lifecycle.
- 2.5 The Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (as amended) and the Safety, Health and Welfare at Work (Exposure to Chemical Agents) Regulations 2001 require the assessment and control of risks arising from hazardous substances, including flammable and toxic gases that may be generated during battery thermal runaway events. The Safety, Health and Welfare at Work (Explosive Atmospheres) Regulations 2003 (transposing ATEX Directive 1999/92/EC) impose specific duties where flammable off-gases accumulate in sufficient concentration to create an explosive atmosphere, including requirements for

hazardous area classification, ignition source control, and provision of appropriate explosion protection equipment. Together these instruments establish the mandatory Irish framework for the assessment and management of off-gas, deflagration and explosion risks associated with BESS installations.

- 2.6 The Fire Services Acts 1981 and 2003 and the Building Regulations (Part B – Fire Safety) and associated Technical Guidance Documents impose duties on building owners and occupiers and establish the functions of fire authorities in the Republic of Ireland. The relevant fire authority for this development is Co Clare Fire and Rescue Service. These instruments inform the expected operational engagement between the Applicant and the fire authority and the requirements for emergency planning and response.
- 2.7 The Planning and Development Act 2000 (as amended) governs the consideration of the proposed development by An Coimisiún Pleanála and Clare County Council as planning authority. The requirements addressed in this report respond directly to the Request for Further Information issued by An Coimisiún Pleanála under Section 132 of that Act.
- 2.8 Together, this Irish legislative framework provides the primary mandatory basis for the fire safety and risk management strategy set out in this report. All standards, guidance and good practice benchmarks referenced in the sections that follow are applied to support and demonstrate compliance with these overarching legislative duties.

European Standards — EN IEC 62933 Series: Electrical Energy Storage Systems

- 2.9 The IEC 62933 series of standards is published by the International Electrotechnical Commission (IEC) and has been adopted by CENELEC as a series of European Standards (EN). As European Standards, the EN IEC 62933 series is applicable in the Republic of Ireland and constitutes the principal European technical standards framework against which grid-integrated electrical energy storage systems are evaluated in this report. The parts of greatest relevance to BESS fire safety and planning are as follows.
 - **EN IEC 62933-1** — Electrical Energy Storage (EES) Systems: Vocabulary;
 - **EN IEC 62933-2-1** — Unit Parameters and Testing Methods;
 - **EN IEC 62933-4-3** — Protection Requirements of Battery-Based EES Systems — Environmental Conditions;
 - **EN IEC 62933-5-2:2020** — Safety Requirements for Grid-Integrated EES Systems — Electrochemical-Based Systems.
- 2.10 EN IEC 62933-5-2 is of particular significance. It establishes the primary European performance-based safety requirements for grid-integrated electrochemical energy storage systems, including requirements for risk assessment, hazard identification and mitigation, battery management, fire safety, thermal management, ventilation, and the control of electrical and chemical hazards across the full lifecycle of the system. Compliance with EN IEC 62933-5-2 is the principal European technical benchmark for demonstrating that the proposed BESS meets the safety performance objectives required by Irish safety, health and welfare at work legislation.
- 2.11 EN IEC 62619:2022 (Safety Requirements for Secondary Lithium Cells and Batteries for Use in Industrial Applications) is similarly adopted as a European Standard and establishes cell and module-level safety requirements for the lithium iron phosphate (LFP) technology proposed for

this development. Battery cells, modules and packs supplied for the proposed BESS should demonstrate compliance with EN IEC 62619:2022 as part of the procurement and certification evidence base.

European Standards — Explosion Venting and Suppression

- 2.12 The following European Standards (CEN/CENELEC publications, adopted by NSAI as Irish Standards) are applicable to the design of deflagration venting and explosion protection systems for the proposed BESS, and are applied in this report as normative technical standards:
- EN 14797:2007 — Explosion Venting Devices;
 - EN 16009:2011 — Flameless Explosion Venting Devices;
 - EN 14373:2021 — Explosion Suppression Systems.
- 2.13 These standards address the requirements for the specification, design, testing and marking of explosion venting and suppression equipment. They establish the normative European technical basis for demonstrating compliance with the explosive atmosphere and deflagration control duties imposed by the Safety, Health and Welfare at Work (Explosive Atmospheres) Regulations 2003, and are referenced in the assessment of deflagration venting arrangements in Section 3 of this report.

NFPA 855:2026 — Standard for the Installation of Stationary Energy Storage Systems

- 2.14 NFPA 855:2026, published by the National Fire Protection Association (NFPA) in the United States, provides minimum requirements for mitigating the hazards associated with stationary energy storage systems across a wide range of technologies and deployment scales. The 2026 edition represents a significant evolution from previous versions, incorporating expanded battery chemistry coverage, mandatory Hazard Mitigation Analysis requirements, and strengthened fire and explosion testing protocols that reference UL 9540A testing and large-scale fire testing to characterise thermal runaway propagation under realistic worst-case conditions.
- 2.15 NFPA 855:2026 is applied in this report as an international technical benchmark, in the absence of any equivalent European or Irish installation code offering the same scope and level of technical detail for grid-scale BESS. Its use is justified on the following basis:
- 2.16 NFPA 855:2026 provides a systematic, performance-based methodology for demonstrating that the fire and explosion safety performance objectives required by EN IEC 62933-5-2 are met at the installation level;
- 2.17 It is applied internationally, including by developers, regulators and competent authorities across EU member states, as the most comprehensive installation-level standard currently available for grid-scale BESS;
- 2.18 Its risk-based approach to separation distances, thermal runaway propagation, explosion control and emergency response is consistent with the ALARP principles required by the 2005 Act and associated Regulations.
- 2.19 NFPA 855:2026 does not replace or supersede EN IEC 62933-5-2 or the applicable Irish legislative requirements. It is applied alongside those instruments to provide additional technical rigour and specificity at the installation design and operational planning level.

UL 9540 / UL 9540A — Testing the Fire Safety Hazards Associated with Propagating Thermal Runaway within Battery Systems

- 2.20 UL 9540A:2025 provides a standardised methodology for evaluating thermal runaway fire propagation behavior in battery energy storage systems and is widely regarded internationally as the most comprehensive fire safety test protocol currently available for BESS installations. It is explicitly referenced in NFPA 855:2026 as the required evaluation procedure for demonstrating ESS fire propagation performance and is applied globally — including in EU member state projects — as the evidential basis for demonstrating that thermal runaway will not propagate between battery enclosures.
- 2.21 UL 9540A employs a four-level hierarchical testing approach that progressively evaluates thermal runaway propagation at cell, module, unit and installation level. The updated UL 9540A:2025 edition introduces the concept of Thermal Runaway Propagation Time (TRPT), defined as the duration from initiation of thermal runaway in the first cell until propagation to adjacent units, providing a quantitative performance metric that can be aligned with detection, notification and evacuation objectives. For grid-scale installations, a TRPT of at least 30 minutes is sought to provide adequate time for detection, fire authority notification and personnel evacuation.
- 2.22 UL 9540A testing provides the technical evidence required to demonstrate compliance with the propagation performance requirements of EN IEC 62933-5-2 and with the installation requirements of NFPA 855:2026. Compliance with UL 9540A:2025 is a required procurement and certification condition for the final selected battery technology under this report's recommendations.
- 2.23 UL 9540 is the overarching product standard for energy storage systems and equipment, establishing system-level safety requirements for the BESS as an installed unit. Combined with UL 9540A test results, it provides the fire authority and planning authority with independently verified, test-based assurance on fire propagation and system safety behaviour.

NFPA 68 — Standard on Explosion Protection by Deflagration Venting

- 2.24 NFPA 68 provides detailed requirements and methodologies for deflagration venting, including calculation of vent areas, sizing criteria and design requirements for venting arrangements to manage explosion overpressures in enclosures. In the context of BESS, NFPA 68 is applied to evaluate the potential for and consequences of deflagration arising from thermal runaway events, off-gas releases and ignition within enclosures. It is used in this report as a technical benchmark to supplement and complement the European Standards EN 14797:2007 and EN 16009:2011, providing detailed design methodology for demonstrating that deflagration venting arrangements meet the performance outcomes required by EN IEC 62933-5-2 and by the Safety, Health and Welfare at Work (Explosive Atmospheres) Regulations 2003.
- 2.25 NFPA 68 is recognised and applied internationally and is explicitly referenced by NFCC V2 Guidance alongside EN 14797:2007 and EN 16009:2011 as an acceptable means of evidencing explosion protection design. Its use in this report is consistent with the internationally accepted position that it provides complementary technical methodology to the European Standards, rather than a substitute for them.

NFPA 69 — Standard on Explosion Prevention Systems

- 2.26 NFPA 69 sets out requirements for the design, installation, operation, maintenance and testing of explosion prevention systems, covering active and passive methods including explosion suppression, inerting (oxidant concentration control), combustible concentration control, ignition source control and deflagration pressure containment. For the proposed BESS, NFPA 69-compliant combustible gas concentration control — maintaining enclosure atmosphere below 25% of the Lower Explosive Limit (LEL) — is applied as the primary active explosion prevention mechanism.
- 2.27 NFPA 69 is used in this report as a technical benchmark to supplement and complement the European Standard EN 14373:2021, providing detailed design methodology for demonstrating that active explosion prevention systems meet the performance outcomes required by EN IEC 62933-5-2 and by the Safety, Health and Welfare at Work (Explosive Atmospheres) Regulations 2003. Its use alongside EN 14373:2021 represents current international good practice for BESS explosion control design and is consistent with the requirements of NFPA 855:2026.

NFCC — Grid-Scale Battery Energy Storage System Planning — Guidance for FRS

- 2.28 The National Fire Chiefs Council (NFCC) in the United Kingdom has published "Grid-Scale Battery Energy Storage System Planning — Guidance for Fire and Rescue Services" (NFCC Version 2, approved December 2025 and published February 2026). NFCC V2 is the current UK sector guidance used by Fire and Rescue Services and recognised by UK planning authorities for the assessment of BESS installations.
- 2.29 NFCC V2 has no formal statutory status in the Republic of Ireland and is not binding on Co Clare Fire and Rescue Service, County Clare as planning authority, or on An Coimisiún Pleanála. It is applied in this report as a good practice technical benchmark only, on the basis that it represents a comprehensive, evidence-based synthesis of current knowledge on BESS fire and explosion hazards, emergency response requirements and incident impact assessment. In particular, its structured approach to fire communication frameworks, incident impact assessment, sensitive receptor identification, emergency water provision and firefighting strategy is applied as a framework of good practice principles to supplement the mandatory Irish legislative and EU standards requirements.
- 2.30 On 26 March 2026, NFCC published a Planning Policy Position Statement recommending that fire safety infrastructure, including firefighting water supplies and hydrants, should be secured through the planning system and funded by developers. While this Position Statement reflects planning processes in England and is not binding in Ireland, the underlying principles are consistent with good practice for high-risk infrastructure developments in any jurisdiction, and the approach of funding and securing firefighting water supply details by planning condition is adopted in this report as a reasonable precautionary measure.

DESNZ — Health and Safety in Grid-Scale Electrical Energy Storage Systems

- 2.31 The "Health and Safety in Grid-Scale Electrical Energy Storage Systems" guidance published by the UK Department for Energy Security and Net Zero (DESNZ) provides lifecycle risk management guidance across the design, construction, operation and decommissioning stages of grid-scale BESS projects. This guidance has no statutory status in the Republic of Ireland. It is referenced in this report only where it provides useful supplementary commentary on lifecycle

risk management methodology, and where its emphasis on design-stage risk reduction, early fire authority engagement and emergency planning is consistent with good practice obligations under the 2005 Act. In particular, the guidance's endorsement of EN IEC 62933-5-2 as the primary safety assessment framework for electrochemical-based BESS reinforces the Tier 2 position accorded to that standard in this report.

Applicability in the Republic of Ireland and EU Context

- 2.32 The standards and guidance referenced in this section have been selected and positioned to reflect their normative status in the Irish and European regulatory context. The primary basis for all fire safety and risk management conclusions in this report is the mandatory Irish legislative framework set out in paragraphs 3 to 8 above. The EN IEC 62933 series and the applicable European explosion protection standards constitute the normative technical framework within which compliance with that legislation is demonstrated.
- 2.33 NFPA 855:2026, UL 9540/9540A, NFPA 68 and NFPA 69 are applied not because they are accepted in the UK, but because they represent the most detailed and internationally recognised installation-level technical tools currently available for demonstrating that the safety performance objectives of EN IEC 62933-5-2 are met and that BESS fire, explosion and thermal runaway risks are reduced so far as is reasonably practicable in accordance with the 2005 Act. Their use reflects current good practice among competent persons advising on grid-scale BESS across the EU and internationally.
- 2.34 NFCC V2 and DESNZ guidance are applied as supplementary good practice references only. No conclusion in this report is dependent solely on NFCC V2 or DESNZ guidance where that conclusion would not also be supported by the Irish legislative framework, the EN IEC 62933 series or the NFPA/UL standards applied as benchmarks.

3 Assessment and Evaluation: Proposed Development Design

Overview

- 3.1 The assessment and evaluation in this section covers the Development's current design based on Lithium Iron Phosphate (LFP or LiFePO₄) technology. The Site Layout Plan is shown in *Appendix 1 – 12099 2032 rev A*. This section will be written using this battery type, the specific battery storage unit/cabinet has not been selected for the project which is not unusual at such an early stage in the design process. As a result, there is no specific detail or confirmation concerning the exact type of battery unit/cabinet, how they are to be arranged e.g. a cell-module-rack-cabinet arrangement or how many cabinets there will be in each unit.
- 3.2 This report draws, in part, on indicative or sample-based information. While the inputs may not in all cases represent definitive data, the analysis and conclusions presented are based on professional judgment, proven methodology, and extensive operational experience. The indicative nature of some data does not diminish the validity, independence, or robustness of the findings and recommendations contained within this report.
- 3.3 The assessment and evaluation of the Development (which is dependent on proposed fire safety provisions and emergency response / recovery strategies) is considered in later sections.

Proposed Development: Summary

- 3.4 As noted above, the Development design is based on LiFePO₄ technology and the procurement process for the battery enclosure has not yet been started. *Appendix 1* shows upto 20no. BESS containers and upto 5no. Medium Voltage Power Systems (MVPS) incorporating the inverters and transformers for the BESS containers.
- 3.5 The Site Layout will become fixed once approved, therefore controlling the distances, water provision and the access point, however as above it does not constitute a final decision or commitment to any manufacturer or battery model.
- 3.6 The ultimate selection of battery technology will be determined through a rigorous procurement process, considering the most up-to-date technology and safety standards available at the time of implementation, and the battery technology will be confirmed as part of the expected Detailed Battery Management Plan. It is expected that this will be likely controlled and required by condition prior to the operation of the Development submitted to and approved in writing, by the Local Planning Authority, in consultation with the Co Clare Fire and Rescue Service.
- 3.7 Whilst the technical specifications have not yet been finalised, and the procurement process has not commenced, this approach ensures that the relevant criteria are taken into account at the earliest possible opportunity such that the final Development and Application Site will meet or exceed current standards and design guidance requirements, thus allowing adaptability to future technological advancements in the rapidly evolving field of energy storage.
- 3.8 This process also ensures that the fundamental spacing, provision, and access requirements set out in NFCC V2 Guidance are approved and fixed at the time the Planning Authority grants permission. The specific technology can then be confirmed at a later stage, allowing the incorporation of any advancements in safety measures and regulatory testing. This approach

ensures a robust and safe Development prior to operation. LiFePO₄ technology offers several significant benefits:

- LiFePO₄ technology provides excellent thermal stability, making it one of the safest lithium-ion battery chemistries currently available, reducing the risk of thermal runaway and fire hazards;
- 3.9 LiFePO₄ batteries, offer a long service life, maintaining 80% state of health (SOH) after more than 2,500 cycles at room temperature;
- The LiFePO₄ chemistry ensures stable performance over time, contributing to the overall reliability of the energy storage system;
- 3.10 LiFePO₄ batteries are substantially cobalt-free, making them more environmentally friendly and less dependent on scarce resources; and,
- 3.11 LiFePO₄ technology provides adaptability to a broad range of operating temperatures, thereby providing versatility in various environments.

Assessment Criteria 1: Management Systems

The final Development should be equipped with Management Systems compliant with the relevant standards and design guidance requirements, also meeting any wider health and safety requirements of the Republic of Ireland and the European Union.

- 3.12 Through our discussions with the Applicant, it has been confirmed that ultimately each battery container will have its own Battery Management System (BMS) which will monitor and manage the performance, safety, and health of the batteries within each container, ultimately providing an effective method for early identification of potential faults.
- 3.13 The following paragraphs provide information on the management systems for containerised BESS.

Battery Management System

- 3.14 The BMS will monitors and manages various aspects of the battery's operation. It continuously monitors critical parameters such as voltage, current, and temperature of the battery cells. It also provides various protection features including overcharge protection, over-discharge protection, and short circuit protection.
- 3.15 Working in conjunction with the liquid-cooled system, the BMS manages the thermal conditions of the battery pack and includes algorithms for estimating the state of charge (SOC) and state of health (SOH) of the batteries.
- 3.16 The BMS in each cabinet connects with other cabinets and the overall site BMS through a combination of communication protocols and network interfaces. This is how it typically works:
- Internal Communication: Each cabinet has its own BMS which has been outlined above.

- **Inter-Container Communication:** The BMS in each cabinet communicates with the BMS in other cabinets using standardised communication protocols or Ethernet which allows for coordinated operation and data sharing between containers.
- **Site-Level BMS:** All container BMS units are connected to a central site-level BMS. This central BMS aggregates data from all cabinets, providing a comprehensive overview of the entire energy storage system and therefore ensures optimal performance, safety, and efficiency across the site.
- **Real-Time Monitoring and Control:** The site-level BMS enables real-time monitoring and control of the entire energy storage system. It can adjust based on the aggregated data to balance loads, manage charging and discharging cycles, and ensure overall system stability.

3.17 In relation to battery design fire safety provisions for the cabinets to comply with industry best practice, smoke, heat and flammable gas detection systems should be included in the technical specification/requirements of the procurement documentation. GS can see that a range of detection, warning and ventilation systems are to be installed as standard. The specific operating parameters of detectors and emergency alarms for the cabinets should be defined in the DBSMP

Thermal Management Systems

It is expected that the chosen container will use a Thermal Management System that continuously monitors temperature at the cell level. This system works to prevent conditions that could lead to thermal runaway by maintaining optimal operating temperatures.

Summary

Overall, the combination of real-time monitoring, smart cooling and automatic safety responses is designed to ensure a safe operating environment, mitigate thermal risks within the BESS and prevent conditions that could lead to thermal runaway, and ensure a safe operating environment.

Assessment Criteria 1: Recommendations

GS recommends that:

- *During the procurement process, the Applicant should specify management system requirements – including any associated installation, test methods and certification standards – for all elements of the final Development – including the batteries, BESS containers and associated components; and,*
- *During the detailed design, the Applicant should provide the specification of the selected management systems and demonstrate how these are compliant with the relevant standards and design guidance requirements, and how these meet any wider UK health and safety requirements.*
- *These should be done through a Detailed Battery Safety Management Plan.*

Assessment Criteria 2: Embedded Detection and Protection Systems

The final Development should be equipped with embedded detection and protection systems compliant with the relevant standards and design guidance requirements.

- 3.18 Alongside management systems, detection and protection systems provide an effective method for early identification of potential faults.
- 3.19 The following paragraphs provide information on the detection and protection systems for the chosen technology.

Integrated Design and Safety Features

- 3.20 It is expected that the chosen container will use advanced lithium iron phosphate (LiFePO₄) cells which are engineered to deliver high energy density and system efficiency. The technology solution is based on a modular, liquid-cooled design for flexibility and site-specific customisation, and it includes early fire hazard detection and suppression systems, which meet **UL 9540, UL 9540A, and NFPA 855:2026**.
- 3.21 The fire safety features will include compartmentalised ventilation, gas and temperature detectors, early smoke detection, explosion venting, aerosol fire suppression, which work together to extinguish fires and prevent propagation to surrounding battery containers.

Assessment Criteria 2: Recommendations

GS recommends that:

- *During the procurement process, the Applicant should:*
 - *Specify detection and protection system requirements, including any specific operating requirements such as:*
 - *How the systems should be monitored; and,*
 - *How the systems should respond to a detection event e.g. the identification of a potential fault or issue that could lead to a safety hazard, such as thermal runaway and / or, the early identification of gases released by the LiFePO₄ cells leading to the initiation of suppression measures;and,*
 - *Confirm the published Thermal Runaway Propagation Time (TRPT) of the selected BESS enclosure (as per UL 9540A:2025), and that a minimum TRPT of 30 minutes is achieved to provide adequate time for detection, FRS notification, and defensive strategy initiation. The TRPT result should be documented in the DBSMP.*
- *During the detailed design, the Applicant should provide the specifications of the selected detection and protection systems and demonstrate how these compliant with the relevant standards and design guidance requirements.*

Assessment Criteria 3: External Protection Systems (inc. Spacing Considerations)

The final Development should be equipped with external protection system as appropriate for the final layout (including any spacing considerations) and should be compliant with the relevant standards and design guidance.

- 3.22 Regarding external protection systems, to comply with NFPA 855:2026, fire protection should be provided between the cabinets in the unit to limit thermal runaway and fire spread. Additionally, the outer steel enclosure of each battery cabinet should be designed with a thermal barrier to mitigate fire spread to and from neighbouring battery containers.
- 3.23 In terms of inter-enclosure spacing, the NFCC V2 Guidance now explicitly confirms that where a BESS enclosure has been tested to a standard such as UL 9540A:2025 and that testing demonstrates that thermal runaway propagation does not occur between BESS cabinets or enclosures, it is possible to reduce the separation distance to a minimum of 3 ft (0.914 m) in accordance with NFPA 855: Standard for the Installation of Stationary Energy Storage Systems (2026).
- 3.24 The guidance further states that any reduction beyond 0.914 m should only be made on the basis of technical advice from a competent person, and that NFPA 855:2026 must be considered in its entirety to ensure that separation distances are not taken out of context. In order to demonstrate that a reduction to 0.914 m is appropriate, the following must be satisfied:
- A fire involving one ESS unit will not propagate to an adjacent unit, as demonstrated by large-scale fire testing;
 - Complete UL 9540A test reports, including cell, module and unit level testing, are provided to the Authority Having Jurisdiction; and
 - Testing evaluates thermal runaway propagation potential, heat and gas release rates, radiant heat flux measurements, and potential for deflagration or re-ignition.
- 3.25 Where the developer cannot demonstrate that a thermal event or fire can be contained to the BESS enclosure or cabinet of origin, the developer should refer to the separation distance guidance within the current edition of NFPA 855:2026.
- 3.26 NFCC V2 Guidance also clarifies that suppression systems cannot compensate for reduced spacing, the no-propagation performance must be demonstrated by fire testing alone. The FM Global Data Sheet 5-33 is no longer the primary reference for separation distances under NFCC V2 Guidance; NFPA 855:2026 and UL 9540A:2025 are the governing standards.
- 3.27 The current site layout positions the containers side-to-side at 6m spacing within arrays, with 6m between the containers and the MVPS. Each array consists of 4no. containers and 1no. MVPS. The 6m inter-array separation substantially exceeds the 0.914m minimum and provides an additional defensive barrier. Final confirmation that the chosen equipment's UL 9540A test certificate covers the proposed layout configuration will be required as part of the procurement process and must be documented in the Detailed Battery Safety Management Plan.
- 3.28 The container separation distance will be independently validated during the Large-Scale Fire Test that is required as part of **NFPA855:2026** and **UL9540A:2026**.

Assessment Criteria 3: Recommendations

GS recommends that:

- *During the procurement process, the Applicant should specify that external protection systems should be appropriate for the proposed layout, including any spacing considerations; and,*
- *During the detailed design, the Applicant should provide the specifications of the selected external protection systems (including for both the BESS enclosure and the partitions between BESS enclosures) and demonstrate how these are appropriate for the final layout when considering the final proposed spacing. GS further recommends that this demonstration should include risk assessment / modelling considering the possibility of fire spread from a BESS enclosure to other site-critical infrastructure.*

Assessment Criteria 4: Fire Suppression Systems

The final Development should be equipped with fire suppression systems compliant with the relevant standards and design guidance.

- 3.29 Any fire suppression system should be chosen based on its effectiveness and suitability for the specific environment, and the nature of the potential fire risks associated with the battery technology. Further, any fire suppression system should ensure rapid response and minimal disruption whilst maintaining the safety and integrity of the overall facility and the surrounding area and be effective at suppressing thermal runaway events as well as other combustible materials e.g. wiring looms within the battery cabinets.
- 3.30 The following paragraphs provide information on the expected fire suppression systems for the chosen technology.

Fire Suppression System

- 3.31 GS understands that, in the event of a thermal anomaly, the fire suppression system deploys aerosol agents for 22 seconds to extinguish any fire. This system is integrated with other safety features, including advanced ventilation and gas detection systems, to ensure comprehensive protection.

Assessment Criteria 4: Recommendations

GS recommends that:

- *During the procurement process, the Applicant should specify fire suppression system requirements, including any specific operating parameters; and,*
- *During the detailed design, the Applicant should provide the specification of the selected fire suppression systems and demonstrate how these are compliant with the relevant standards and design guidance requirements, and how they will be effective for any fire within the Proposed Development / at the Application Site.*

Assessment Criteria 5: Deflagration Venting / Explosion Prevention

The final Development shall be equipped with deflagration venting and explosion protection systems appropriate to the hazard and compliant with relevant Republic of Ireland, European, UK and international standards and design guidance, including:

- *BS EN 14797:2007 - Explosion Venting Devices*
- *BS EN 16009:2011 - Flameless Explosion Venting Devices*
- *BS EN 14373:2021 - Explosion Suppression Systems*
- *NFPA 68 - Standard on Explosion Protection by Deflagration Venting*
- *NFPA 69 - Standard on Explosion Prevention Systems*
- *NFPA 855:2026 - Standard for the Installation of Stationary Energy Storage Systems*

All designs shall be developed by competent persons with demonstrable evidence of design suitability. Where exhaust systems are designed to prevent deflagration, they shall maintain the environment below 25% of Lower Explosive Limit (LEL).

Flames and materials discharged through venting shall be directed to safe locations and shall not contribute to fire propagation beyond the affected unit or present risk to persons.

During detailed design, the Applicant should commission a cable route vapour migration assessment covering all conduit and cable trunk connections between BESS enclosures, PCS units, and the substation, in accordance with NFCC V2 Guidance Section 9 and DSEAR 2002, with mitigation measures documented in the DBSMP.

Secondary Vapour Cloud Explosion Risk — Cable Route Leakage Paths

- 3.32 The NFCC V2 Guidance (Section 9, published February 2026) introduces a specific new requirement that designs for BESS installations must give consideration to the potential for explosive vapour to migrate via cable trunks, conduits, and cable routes connecting BESS enclosures to associated infrastructure such as Power Conversion Systems, substations, and control buildings. Migration of off-gas through these pathways could result in a secondary remote vapour cloud explosion at a location removed from the primary thermal event, which was a failure mode identified in the 2021 Dahongmen BESS fire in Beijing, resulting in firefighter fatalities.
- 3.33 GS recommends that, during procurement and detailed design, the Applicant requires the Principal Contractor and specialist fire engineer to undertake a cable route vapour migration risk assessment in accordance with NFCC V2 Guidance and DSEAR 2002, covering: (a) identification of all cable routes and conduits connecting BESS enclosures to the PCS units, substation, and control building; (b) assessment of the potential for explosive vapour to migrate along these routes under thermal runaway conditions; and (c) specification of appropriate engineering controls to prevent such migration (including, where necessary, fire-stopping, gas-

tight cable entry seals, or pressure-relief measures at penetration points), to be documented in the DBSMP.

- 3.34 The following paragraphs provide information on the deflagration venting / explosion prevention systems for the chosen technology.

Deflagration Venting and Off-Gas Pressure Relief

- 3.35 It is expected that the chosen technology will incorporate comprehensive active and passive safety features to prevent and manage deflagration risks, compliant with:
- BS EN 14373:2021 - Explosion Suppression Systems
 - NFPA 69 - Standard on Explosion Prevention Systems (active measures)
 - NFPA 68 - Standard on Explosion Protection by Deflagration Venting (passive measures)
 - NFPA 855:2026 - Standard for the Installation of Stationary Energy Storage Systems
- 3.36 It is expected that the system will use **NFPA 69**-compliant active explosion prevention measures as the primary control mechanism. The design will be evaluated through deflagration studies conducted in accordance with **NFPA 68** methodologies and supported by **UL 9540A:2025** testing to assess full-scale and partial-volume deflagration scenarios within the battery enclosure. This integrated approach ensures the chosen technology is equipped with robust active safety measures to manage and mitigate potential explosion hazards effectively through combustible gas concentration control and, where appropriate, supplementary passive protection.

Active Explosion Prevention (Primary Mechanism)

- 3.37 It is expected that the primary explosion control strategy shall comply with **NFPA 69** and will include:
- Continuous combustible gas monitoring and detection systems designed to maintain gas concentrations below 25% of Lower Explosive Limit (LEL).
 - Active mechanical ventilation systems for purging dangerous gases and preventing off-gas buildup.
 - Automatic system shutdown capability in response to detected anomalies.
- 3.38 It is expected that these active measures will be designed as the primary control mechanism for explosion prevention, with supporting design evidence and performance validation. Backup power capabilities shall be provided to maintain ventilation system operation during grid disconnection.

Passive Deflagration Venting (Supplementary Protection)

- 3.39 In support of the primary **NFPA 69** active explosion prevention system, passive deflagration venting in accordance with **BS EN 14797:2007** or **NFPA 68** may be incorporated as supplementary protection. However:
- Deflagration venting alone does not constitute acceptable explosion control under NFPA 855:2026 and should not be relied upon as the sole means of explosion protection.
 - Where passive venting is incorporated, it should complement (not substitute for) active prevention measures.

- Passive venting systems must direct discharge safely, without contributing to fire propagation beyond the affected unit or presenting risk to persons.

Advanced Off-gas Detection and Pressure Management

- 3.40 It is expected that the technology will incorporate the following integrated off-gas detection and pressure management mechanisms:

Gas Detection and Monitoring

- 3.41 The system should be equipped with continuous sensors monitoring combustible gas density (hydrogen, carbon monoxide, and volatile organic compounds) with the following characteristics:
- Trigger alarms when gas density exceeds predefined thresholds
 - Activate the ventilation system upon detection of off-gassing events
 - Maintain concentrations below 25% of the Lower Flammable Limit (LFL) during normal operation
 - Provide early detection and rapid response capability to thermal runaway events
 - Integrate with the Battery Management System for coordinated response

Active Ventilation Systems

- 3.42 The active ventilation system shall be designed to:
- Purge dangerous gases through controlled exhaust.
 - Maintain a safe operating environment by preventing combustible gas buildup.
 - Maintain combustible gas concentrations below hazardous levels as specified by NFPA 69.
 - Provide the primary mechanism for achieving NFPA 69 compliance in explosion prevention.
 - Mitigate thermal runaway risks by rapidly removing off-gas products
 - Remain operational during the critical period of battery failure and gas release.
 - Include backup power capabilities to remain functional during grid disconnection.

System Monitoring and Shutdown Capability

- 3.43 In the event of detected anomalies (thermal, electrical, or gas-related), the system shall:
- Automatically shut down to prevent further risks and thermal runaway propagation
 - Maintain high levels of safety and reliability in operation
 - Provide backup capability in the event of primary ventilation system failure
 - Integrate alarms and notifications with site control systems and emergency response protocols

Assessment Criteria 5: Recommendations

GS recommends that:

- *During the procurement process, the Applicant should specify active explosion prevention systems compliant with UK, European, and international standards, including:*

Primary Standards:

- *NFPA 69 (Standard on Explosion Prevention Systems) - active measures*
- *BS EN 14373:2021 (Explosion Suppression Systems)*

Supporting Framework:

- *NFPA 855:2026 (Standard for the Installation of Stationary Energy Storage Systems)*
- *DSEAR 2002 (UK regulatory requirement for explosive atmospheres)*

*The specification must include design methodology for combustible gas concentration control maintaining levels below **25% of Lower Explosive Limit (LEL)**. Any supplementary deflagration venting should be specified with reference to:*

- *NFPA 68 (Explosion Protection by Deflagration Venting)*
- *BS EN 14797:2007 (Explosion Venting Devices)*
- *BS EN 16009:2011 (Flameless Explosion Venting Devices - where applicable)*

Assessment Criteria 6: Medium Voltage Power System (MVPS)

The final Development should be based on appropriate installation and maintenance practices to ensure the safe and reliable operation of the Inverters and Transformers (PCS) and any associated electrical components.

- 3.44 A MVPS allows for integration between the BESS enclosures and the transformer equipment. The following paragraphs provide information on the PSs for the chosen technology.

Power System (PS)

- 3.45 GS understands that mineral or synthetic oils are likely to be used to insulate and cool the electrical components in the PCS. Such oil will be stored in an independent reservoir that is bunded to 110% capacity and fitted with a polycarbonate filter. This filter will trap hydrocarbon contaminants while allowing rainwater to drain freely into the environment.
- 3.46 Regular inspection and maintenance of insulation oil storage will be essential to ensure the oil quality and integrity. Further, pre-operation, a suitable monitoring system will need to be established to track oil levels, temperature, and condition to facilitate prompt maintenance and replacement as required.

Assessment Criteria 6: Recommendations

GS recommends that:

- *During the detailed design, the Applicant should establish the installation and maintenance practices required to ensure the safe and reliable operation of the PCS and the associated electrical components.*

4 Assessment and Evaluation: Application Site

Overview

- 4.1 The assessment and evaluation in this section covers the Application Site, including proposed fire safety provisions and emergency response / recovery strategies.

Assessment Criteria 7: Access Arrangements

The final Development should incorporate appropriate access arrangements, both from the main motorway network and around the site, to support Fire and Rescue access requirements.

- 4.2 Appendix 1 shows two, separate, access points to the eastern and western sides of the Application Site, which are, in turn accessed from internal tracks.
- 4.3 In the BESS compound, *Appendix 1* shows the two access points joining a 'through' internal track with short spurs off of it to access the BESS arrays. A minimum design width of the internal tracks is 6m, which is therefore capable of accommodating a Co Clare FRS appliance. The overall size of the BESS compound is approximately 75m long x 16m wide.
- 4.4 In the event of a fire at the BESS facility, Co Clare FRS will likely establish a 50-metre safety exclusion zone (inner cordon) around the container suffering a thermal event. The inner cordon is measured from the location of the fire itself.
- 4.5 For a site measuring this size, the exclusion zone will extend beyond the site's perimeter boundary on all sides. This means the safety cordon will necessarily encompass the main access gates and extend onto adjacent land.
- 4.6 The cordon is established to protect emergency responders and the public from the hazards of a BESS fire, including potential explosions, toxic gases, intense heat, and flying debris. During an incident, the area beyond this cordon serves as the operational base for fire crews, command facilities, and emergency coordination – ensuring all personnel remain at a safe distance from life-threatening hazards.

Assessment Criteria 7: Recommendations

GS recommends that:

- *The Applicant should:*
 - *Engage with Co Clare Fire and Rescue Service, provide details of the proposed access arrangements; and,*
 - *Seek an appropriate condition to be applied whereby the access arrangements will be agreed as part of the Emergency Response Plan / site-specific Tactical Fire Response Plan.*

Assessment Criteria 8: Raw Water Availability Requirements

The final Development should incorporate appropriate fire safety provisions, including (if required) appropriate raw water availability requirements.

Water Storage Capacity

- 4.7 Several BESS manufacturers now advocate that should a BESS unit have a thermal event and progress to thermal runaway; the BESS unit should be allowed to consume itself i.e. burn itself out. This 'burn' policy is recognised within the existing NFCC V2 Guidance and also accepted by many insurers. GS experience is that the vast majority of applicants also adopt a burn policy across their sites, and we also advocate such an approach.
- 4.8 Furthermore, an increasing number of BESS manufacturers suggest that applying firefighting branches (water) to a BESS unit undergoing the thermal event will have no effect and could prolong the duration of the thermal event unnecessarily.
- 4.9 Therefore, should water be required / used, the recommended firefighting tactic is for water to be used defensively via water fog or spray pattern branches. These branches should be directed onto areas adjacent to the BESS container undergoing the thermal event, to minimise the likelihood of an incident developing beyond the BESS unit of origin.
- 4.10 This is commonly known as boundary cooling, and is intended to significantly reduce overall water requirements, and thus the associated drainage / environmental protection requirements. This tactic is currently recognised as an appropriate operational approach by the UK fire and rescue services.
- 4.11 Regarding the site requirements, the NFCC V2 Guidance specifies that private fire hydrants should be capable of achieving a flow rate of no less than 25 L/s (1,500 L/min) in accordance with the current Water UK/LGA guidance. Where a flow rate of 25 L/s cannot be achieved from hydrant infrastructure, it is prudent to provide an equivalent static water supply sufficient to deliver that flow rate for a duration of 120 minutes, equating to a minimum static supply of approximately 180,000 litres.
- 4.12 Private fire hydrants and any connections to dry pipe systems should be installed in accordance with BS 9990 (Non-automatic fire-fighting systems — Code of Practice) and identified in accordance with BS 3251 (Indicator plates for fire hydrants and emergency water supplies).
- 4.13 The Site Layout provides 4no. 50m³ on-site water tanks and therefore is in excess of the NFCC V2 Guidance minimum static supply requirement of 180,000 litres.
- 4.14 GS believe that it is unlikely that provisions for fire hydrants to be installed will be required by Co Clare FRS.

Assessment Criteria 8: Recommendations

GS recommends that:

- *As part of any planning permission, the Applicant should seek an appropriate condition to be applied whereby the exact details of any raw water availability requirements will be agreed as part of the Emergency Response Plan / site-specific Tactical Fire Response Plan;*
- *During the procurement process, the Applicant should specify:*
 - *That the BESS units should be IP65/6 rated to ensure boundary cooling risks can be mitigated; and,*
- *During operation, the Applicant should ensure the selected BESS technology instructions are followed (and incorporated into any Emergency Response Plan / site-specific Tactical Fire Response Plan) to ensure any incident is able to be brought to a safe and swift conclusion with minimal damage to the local environment.*

Assessment Criteria 9: Used Water Storage Requirements

The final Development should incorporate appropriate fire safety provisions, including (if required) appropriate used water storage requirements.

- 4.15 Whilst the technical specifications have not yet been finalised, and the procurement process has not commenced, (as previously noted) GS expects that in the unlikely event of a fire, the affected BESS unit will be allowed to consume itself i.e. burn itself out.
- 4.16 Therefore, should water be required / used, this water would be used defensively on areas adjacent to the BESS unit undergoing the thermal event to prevent an incident developing beyond the BESS unit of origin. Consequently, any runoff generated is highly unlikely to create a contamination risk.
- 4.17 In order to address the council's concerns, drainage details are added to the proposed BESS layout shown in *Appendix 1*. The underground piped system will be connected to an attenuation structure with a capacity of 36m³. Water generated during boundary cooling of BESS containers adjacent to the one having a thermal event (damping down) will flow into the drainage network. Water generated can be recycled (reused) repeatedly to reduce overall water demand and this is an operational tactic that is used across the fire services in the ROI and UK.
- 4.18 The water collected will be tested at the collection sump following the cessation of any fire event. Based on the testing water will either be reused in the tanks on site or sent for disposal. All water will be contained on site within an a.
- 4.19 The BESS location was identified to maximise the distance to any surface water stream. The BESS is over 430 m from the nearest stream and over 125 m from the nearest drainage channel.

- 4.20 In addition, all BESS units and Transformer Units will be bunded, with a separate Class 1 retention system to add an extra layer of security in preventing contamination of local water supplies. The bunding will be lined with an impermeable membrane, ensuring that any contaminants would be captured within the associated bunding, preventing any contamination of local water supplies.

Assessment Criteria 9: Recommendations

GS recommends that:

- *As part of any planning permission, the Applicant should seek an appropriate condition to be applied whereby the exact details of any used water storage requirements will be agreed as part of the Emergency Response Plan / site-specific Tactical Response Plan. Such details should include:*
 - *Calculations made for the specification of any runoff storage capacity, demonstrating how this meets requirements during normal and emergency operations;*
 - *Measures for pumping out individual catchments following an incident; and,*
 - *Measures to be implemented for failure / loss of containment events, and a description of the potential environmental damage for such events.*

Assessment Criteria 10: Incident Impact Assessment and Sensitive Receptor Plan

The application for planning permission should be accompanied by a plan identifying all sensitive receptors within a 1km radius of the development area, together with a compass rose indicating the prevailing wind direction(s). Where a credible worst-case BESS fire could generate a toxic vapour plume affecting nearby sensitive receptors, a site-specific fire gas plume assessment (Smoke Plume Analysis Report) should be commissioned from a competent person

- 4.21 NFCC V2 Guidance (Section 17–18) requires that applications are accompanied by a plan identifying all sensitive receptors within 1km of the BESS installation, together with a compass rose showing prevailing wind directions. This enables the local FRS and the planning authority to assess the directional risk from fire-generated gas plumes under realistic wind scenarios. The assessment should also cover business continuity, neighbourhood disruption, and potential economic disruption arising from a credible worst-case incident, including impacts on the local road network, commercial activities, and community infrastructure within the 1km radius.

Assessment Criteria 10: Recommendations

GS recommends that:

- *The Applicant should prepare a 1km sensitive receptor plan in accordance with NFCC V2 Guidance Sections 17-18, identifying all receptor categories and including a compass rose showing the prevailing wind direction(s) for the site. This plan should be submitted with the application for planning permission or, where agreed with the Local Planning Authority and Co Clare Fire and Rescue Service, secured by way of a pre-commencement planning condition.*

-
- *Where the 1km receptor plan identifies residential, ecological, or other sensitive receptors within a credible fire gas plume zone, the Applicant should commission a site-specific Smoke Plume Analysis Report (SPAR) from a competent person, evaluating hazardous gas concentrations under representative meteorological conditions and confirming that IDLH (Immediately Dangerous to Life and Health) thresholds for CO and HF are not exceeded at receptor locations. If required, the SPAR should be secured by planning condition prior to construction commencing.*
 - *The findings of the sensitive receptor plan and, where required, the SPAR should be incorporated into the site-specific Emergency Response Plan and used to inform any community notification protocols agreed with Co Clare Fire and Rescue Service.*

5 Assessment and Evaluation: Operational Safety Management, Liaison and Emergency Response / Recovery

Overview

- 5.1 The assessment and evaluation in this section covers operational safety management, liaison and emergency response / recovery strategies.

Assessment Criteria 11: Operational Safety Management

Prepare and implement a Detailed Battery Safety Management Plan, alongside relevant Emergency Response Plans.

- 5.2 As previously noted, whilst the technical specifications have not yet been finalised, and the procurement process has not commenced, the assessment and evaluation in this report is based on current indicative scheme designs to ensure that the relevant criteria are taken into account at the earliest possible opportunity such that the Development and Site will meet or exceed current standards and design guidance requirements, thus allowing for adaptability to future technological advancements in the rapidly evolving field of energy storage.

Assessment Criteria 11: Recommendations

GS recommends that:

- *As part of any planning permission, the Applicant should seek an appropriate condition to be applied whereby a Detailed Battery Safety Management Plan will be agreed prior to commencement of construction / operation to ensure that any outstanding matters are addressed in full either through fire safety provisions or appropriate emergency response / recovery plans.*

Assessment Criteria 12: Liaison

Prepare and implement a Fire Communication Framework to ensure that relevant information is communicated to / developed in consultation with Co Clare Fire and Rescue Service.

- 5.3 To promote transparency and joint understanding with Co Clare FRS, and to support their understanding and mitigation of risk, the NFCC V2 Guidance recommends that a Fire Communication Framework (FCF) is established between the developer or operator and the local Fire and Rescue Service, and that this engagement is maintained throughout all stages of the project lifecycle. The NFCC V2 Guidance emphasises that this liaison process should be

consistent and ongoing, without placing an undue burden on the developer of the BESS installation.

- 5.4 It now places the communication and coordination obligations within the framework of a comprehensive risk management process. This process requires the developer and operator to develop, implement, maintain and review risk controls in consultation with the local Fire and Rescue Service, and should cover all project development stages including pre-planning, site commissioning, site operations and site decommissioning. The outcome of this process should be a robust Battery Safety Management Plan (BSMP) and an Emergency Response Plan (ERP), both developed in conjunction with the local Fire and Rescue Service.
- 5.5 Regarding the information requirements, the NFCC V2 Guidance sets out several categories of information that should be communicated to, or developed in consultation with, the local Fire and Rescue Service to support operational pre-planning and enhance safety and preparedness. This information includes:
- **Installation and Location Details**, to aid in operational pre-planning and to ensure that the local Fire and Rescue Service requirements are aligned with the hazards and risks involved, including battery chemistry, form factor, unit type, number and layout of BESS containers or cabinets, and evidence that site geography such as prevailing wind conditions has been taken into account;
 - **Site Access Details**, including access routes and hard standing capable of accommodating fire service vehicles in all weather conditions, a perimeter road with passing places, and details of any site access arrangements such as key codes to be provided to the Fire and Rescue Service;
 - **Fire Safety Provision and Emergency Response and Recovery Strategies**, including details of any fire suppression systems, detection systems, gas detection systems, deflagration venting systems, and confirmation of the firefighting strategy to be adopted in the event of a thermal event;
 - **Emergency Response Plan (ERP)**, presenting the detailed emergency response actions to be taken, supported by a Risk Management Plan that addresses all credible hazards and risks. The ERP should be supported by a site-specific Tactical Fire Response Plan (TFRP) and should include site evacuation procedures, up-to-date contact details for facility and off-site personnel, and details of dangerous goods stored on site; and
 - **Secure Information Box (SIB) Contents**, which should include the ERP and TFRP, details of water supplies for firefighting, signage details, runoff drainage plans, and any other information of relevance to Fire and Rescue Service crews attending an incident at the site.

Assessment Criteria 12: Recommendations

GS recommends that: the Applicant should prepare and implement a Fire Communication Framework to ensure the required information is communicated to / developed in consultation with Co Clare FRS, in particular the Emergency Response Plan to be supported by a site-specific Tactical Fire Response Plan.

6 Information Accompanying the Application for Planning Permission

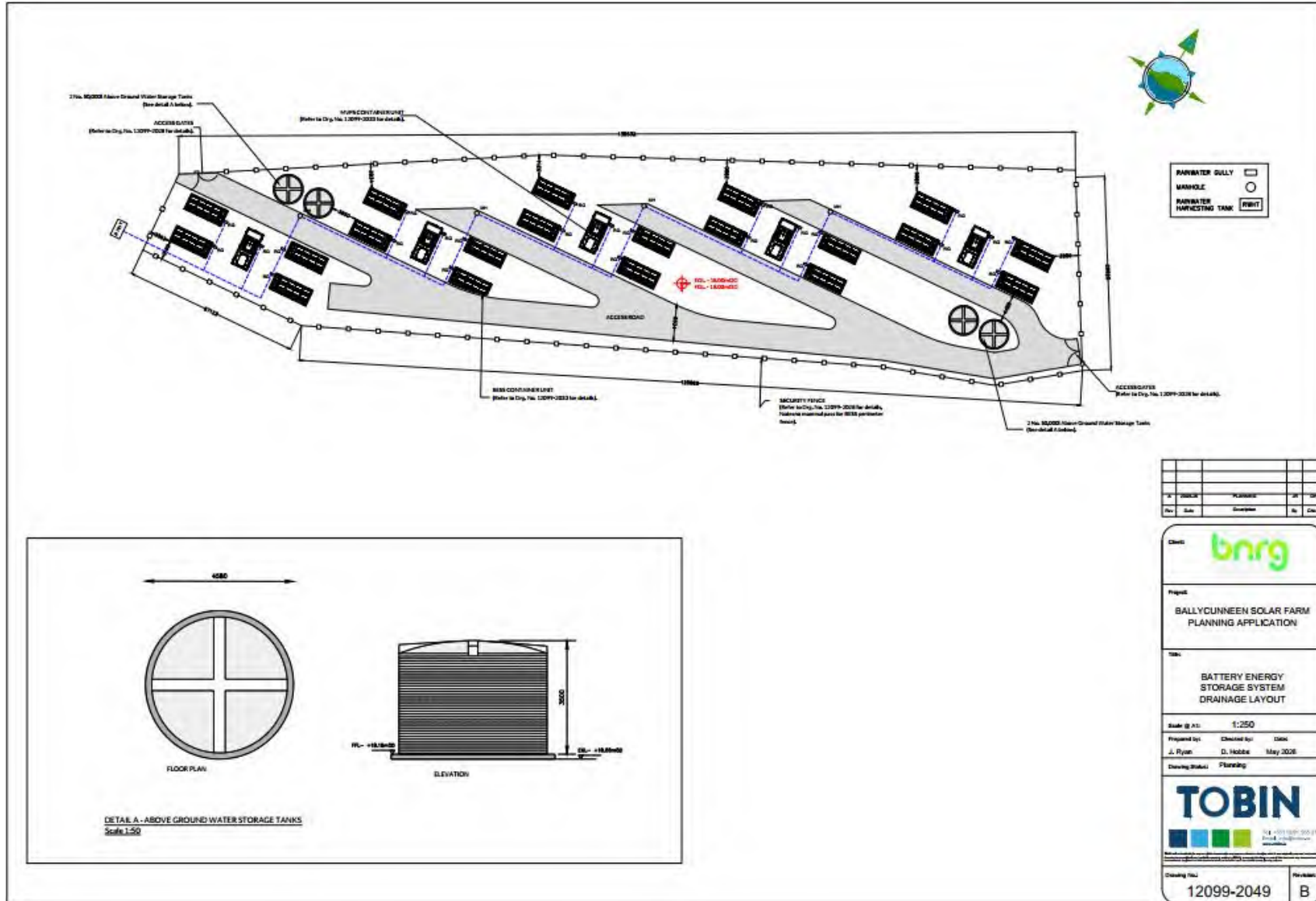
- 6.1 The application for planning permission for the Proposed Development on the Site has been developed in strict accordance with the NFCC V2 Guidance, relevant legislation / regulation and current industry best practice / standards.
- 6.2 This approach has ensured that relevant criteria – including regulatory compliance, fire safety provisions and required emergency response / recovery strategies – are taken into account at the earliest possible opportunity, and are embedded from the outset, such that the final Development and Site will meet or exceed current standards and design guidance requirements. Furthermore, that the application for planning permission can be robustly supported by technical evidence / information and stakeholder engagement.
- 6.3 Relevant information to accompany the application for planning permission is anticipated to include:
- This Risk Management and Compliance Report
 - An Emergency Response Plan

7 Conclusions

- 7.1 This report has assessed the proposed Ballycunneen Solar & BESS development, insofar as the BESS element is concerned, against the material planning considerations relating to battery and fire safety identified by An Coimisiún Pleanála in its request for further information. The assessment has been undertaken in the context of the planning and fire safety regime of the Republic of Ireland, informed by relevant international standards and by NFCC Version 2 guidance as a technical benchmark where this provides useful good-practice support.
- 7.2 At the current stage of the project, the final battery enclosure manufacturer and the detailed technical specification have not yet been fixed. That is not unusual for a development at this phase, provided that the application establishes, and any permission secures, the fundamental parameters necessary to ensure that the final scheme is selected, designed, installed and operated in a manner that is demonstrably safe and compliant. In this case, the report considers that the proposed layout, access arrangements, indicative technology basis, and the framework for fire safety management provide a sufficient basis for the fire-related effects of the BESS to be assessed at planning stage.
- 7.3 The assessment indicates that the principal fire and explosion risks associated with the proposed BESS can be appropriately managed through a combination of technology selection, container-level monitoring and protection systems, thermal management, gas detection, ventilation, segregation, emergency water provision, drainage and containment measures, and structured operational controls. In particular, the report identifies the need for the final selected system to demonstrate compliance through recognised testing, certification and design standards, and for the detailed configuration of safety systems to be fixed through procurement and detailed design rather than left undefined.
- 7.4 The report also concludes that the site can be supported by an appropriate operational safety and emergency planning framework, provided that this is formalised prior to construction and operation through a Detailed Battery Safety Management Plan, an Emergency Response Plan and a site-specific Tactical Fire Response Plan developed in consultation with the relevant fire authority. These documents should confirm, among other matters, the selected battery technology and enclosure specification, firefighting strategy, alarm and detection set-points, water supply arrangements, runoff containment measures, emergency communications, and the information to be made available to responding crews.
- 7.5 With regard to environmental protection, the report recognises that fire-water runoff and potential contamination of surface water and groundwater are key considerations for this site, particularly given the reference to adjoining watercourses and the Shannon Estuary in the further information request. Subject to the confirmation of final hydraulic and containment details at detailed design stage, and the securing of suitable planning conditions in relation to raw water availability, used water storage and drainage containment, the report considers that these risks can be addressed through the proposed bunding, impermeable retention measures and drainage strategy.
- 7.6 Overall, GS considers that the Ballycunneen Solar & BESS development can be brought forward in a manner that is consistent with relevant planning, fire safety and risk management expectations, provided that the recommendations in this report are carried through into procurement, detailed design, construction and operation. On that basis, and subject to the

imposition of appropriate planning conditions and the agreement of the outstanding technical detail with the relevant stakeholders, the fire-related risks arising from the BESS element of the proposed development are capable of being reduced to an acceptable level.

Appendix 1 – Proposed Site Layout plan





APPENDIX B. EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN

BALLYCUNNEEN BATTERY ENERGY STORAGE SITE



JUNE 2026

GREENFIRE SOLUTIONS

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1. Introduction

TOBIN (under the instruction of BNRG Ballycunneen Ltd) (the Applicant) have commissioned Greenfire Solutions (GS) to provide an Emergency Response Plan (ERP) for the proposed Ballycunneen Battery Energy Storage System (BESS), located across the townlands of Ballycunneen, Co. Clare (the Application Site). The BESS forms part of a larger proposed solar farm and associated infrastructure development, which is the subject of a planning appeal before An Coimisiún Pleanála (Case No. PL-500676-CE-26; Clare County Council Planning Reference No. 2560560). This ERP relates solely to the BESS component of the proposed development.

Greenfire Solutions

GS is led by former Senior Officers from the UK Fire and Rescue Service, and we work with fire and rescue services across the UK, the Republic of Ireland, Local Authorities and private sector applicants. We pride ourselves on providing a wide range of high-quality, bespoke, and ethically sound advice and support. Since the launch of GS, we have enjoyed considerable growth, built upon the foundations of a solid reputation for delivering high quality outcomes. We work with over 45 energy companies and planning consultancies helping to shape projects from inception through to delivery on the ground. We provide an end-to-end solution in relation to the management of fire risk.

Author

The author of this document is David Pemberton, a former strategic manager in the UK Fire & Rescue Service (FRS). David has 30 years' experience as a risk management and leadership professional and delivering community safety and resilience in challenging and complex environments. David has a reputation for forming powerful collaborative relationships and delivering excellence.

Purpose

This Emergency Response Plan (ERP) is a framework which will be fully populated once the exact scheme design and technology is procured, and more detailed information available. The Final ERP will be populated after planning consent is granted and further information and detail is available. The Final Emergency Response Plan will be provided so that all Ballycunneen BESS site personnel understand the practices that are to be followed to be prepared for and to provide immediate and effective response to emergencies that might arise at the facility.

The primary objectives of this ERP are to:

- Safeguard human life and the safety of emergency responders attending the site;
- Protect property and critical infrastructure;
- Prevent and mitigate environmental contamination; and,
- Ensure consistent coordination with Co. Clare Fire and Rescue Service and other principal response agencies (PRAs) under the Framework for Major Emergency Management.

This ERP has been prepared in compliance with, and with reference to, the following:

- NFCC Grid-Scale Battery Energy Storage System Planning Guidance (December 2025);
- NFPA 855:2026 — Standard for the Installation of Stationary Energy Storage Systems;
- Health and Safety Executive (HSE) grid-scale energy storage safety guidance (2024); and,
- PAS 63100:2024 — Protection Against Fire of Battery Energy Storage Systems.

Scope

This ERP covers the commissioning, operation, maintenance and decommissioning phases of the Ballycunneen BESS. The ERP relates solely to the BESS compound; separate arrangements apply to the wider solar farm development. Foreseeable incidents addressed include: thermal runaway and fire within BESS containers; fire involving ancillary electrical infrastructure (including Power Conversion

Systems and Medium Voltage Power Systems); explosion and gas release; environmental contamination from fire-water runoff; and interface risks with the co-located solar farm infrastructure. The ERP will be supported by a commitment for an ongoing Fire Communications Framework (FCF). The FCF will outline an agreed approach to ongoing communication / coordination strategies between the ultimate BESS operator and the local Co. Clare Fire and Rescue Service Fire Station, and should cover all project development stages, including pre-planning; site commissioning; site operations; and site decommissioning.

The ERP will be supported by a Site-Specific Tactical Fire Response Plan (TFRP) developed in agreement with Co. Clare Fire and Rescue Service and other key stakeholders. The TFRP provides detailed operational information to emergency crews attending the premises, including specific firefighting tactics, access routes, isolation procedures and hazards particular to the Development. Information from the TFRP will be made available electronically to Co. Clare Fire and Rescue Service for integration into their internal operational information systems and, should GS be commissioned to undertake a Site-Specific Risk Information (SSRI) Pack, will be housed in a Security Information Box (SIB) at the site vehicular access point, of a type recommended by Co. Clare Fire and Rescue Service.

Life safety of personnel shall be the highest priority during any event.

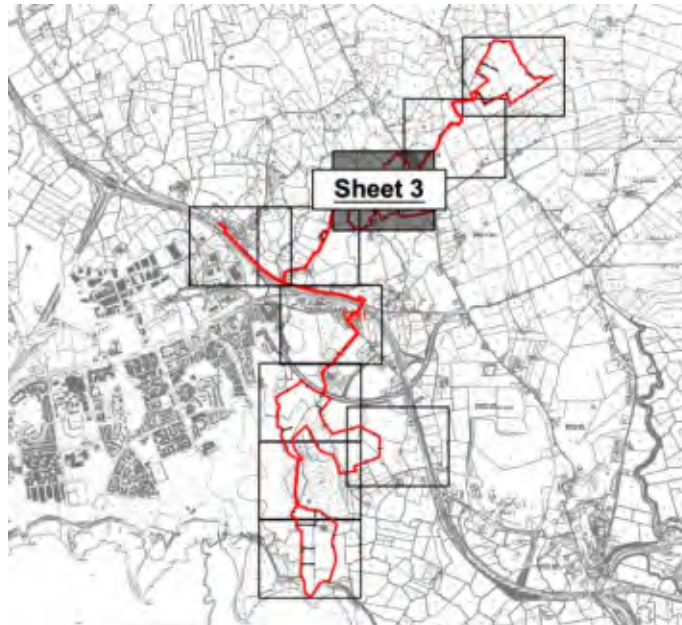
Review

The success or failure of all emergency plans depends upon effective training, continual e.g. annual, review of this response plan, and execution of the response. Successful implementation of this plan depends on timely identification of capabilities, available resources at the time of the incident and a thorough information exchange between responding organisations and the facility.

This ERP will be reviewed on at least an annual basis and updated as required to ensure that it remains current, accurate and fit for purpose.

2. Site Layout

The proposed Ballycunneen BESS is located at approximately 52.725612°N, 8.842984°W, approximately 5 km east-northeast of Shannon town, Co. Clare. The BESS compound forms part of a wider solar farm development situated on a predominantly rural site to the east of Shannon town. The Application Site lies in relative proximity to the Shannon Estuary, which is designated as a Special Protection Area (River Shannon and River Fergus Estuaries SPA; BirdLife Site Code 004077). The southernmost parcel of the wider development (Land Parcel 4) lies immediately adjacent to the SPA. The nearest fire station to the Application Site is Shannon Fire Station, operated by Co. Clare Fire and Rescue Service (a local authority fire service operating under Clare County Council). Shannon Fire Station is crewed on an on-call basis.



Location of Solar Farm site (see below for Sheet 3; location of BESS)



Sheet 3 – location of BESS compound

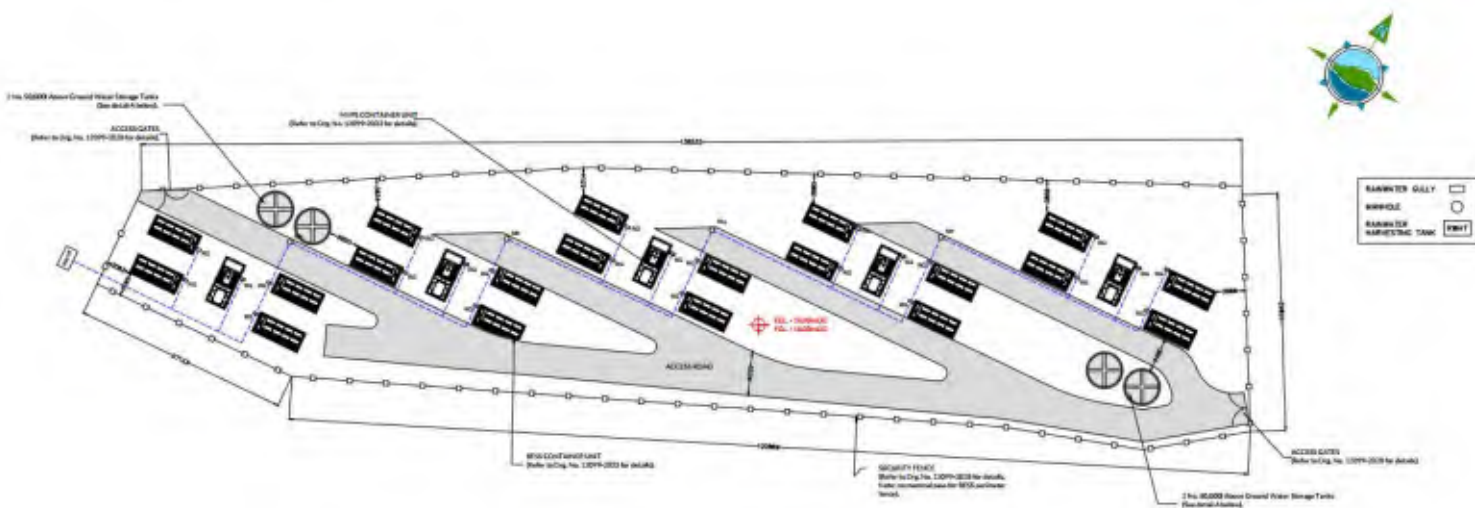
3. Description of Facility

The proposed Ballycunneen BESS is based on Lithium Iron Phosphate (LiFePO₄ or LFP) technology. The final battery enclosure manufacturer and precise technical specification have not yet been determined, as the procurement process has not commenced. The proposed development comprises the following principal components:

- Up to 20 no. containerised BESS units;
- Up to 5 no. Medium Voltage Power Systems (MVPS) incorporating inverters and transformers for the BESS containers;
- Internal access tracks, turning areas and hardstanding;

- Site security fencing, access gates and associated perimeter infrastructure; and,
- Associated electrical, communications, drainage and environmental protection infrastructure.

The BESS compound is approximately 75 m long by 16 m wide. BESS containers are arranged in arrays of four containers, each associated with one MVPS unit. Inter-container spacing within arrays is 6 m, with a further 6 m separation between containers and the associated MVPS. Two separate access points are provided to the eastern and western sides of the compound, connected by a through-track with short spurs to each array. The inter-array separation of 6 m substantially exceeds the 0.914 m minimum specified in NFPA 855:2026 and provides an additional defensive buffer against fire propagation between arrays.



Proposed BESS compound layout

Battery Chemistry and System Architecture

LiFePO₄ technology offers several significant benefits:

- Excellent thermal stability, making it one of the safest lithium-ion battery chemistries available, reducing the risk of thermal runaway and fire hazards;
- Substantially cobalt-free, more environmentally friendly and less dependent on scarce resources; and,
- Adaptability to a broad range of operating temperatures, providing versatility in various environments.

Each BESS container will be equipped with its own Battery Management System (BMS), which will monitor and manage the performance, safety and health of the batteries within each container, providing an effective method for early identification of potential faults. Individual container BMS units will communicate with a central site-level BMS, which aggregates data from all containers, enabling real-time monitoring, control and coordinated response across the site. It is expected that the selected technology will incorporate a liquid-cooled Thermal Management System (TMS) that continuously monitors temperature at the cell level to prevent conditions that could lead to thermal runaway. The precise operating parameters of the TMS will be confirmed through the procurement process and documented in the Detailed Battery Safety Management Plan (DBSMP).

The ultimate selection of battery technology will be determined through a rigorous procurement process, considering the most up-to-date technology and safety standards available at the time of

implementation. The battery technology will be confirmed as part of the DBSMP, which is expected to be required by planning condition prior to operation of the development, submitted to and approved in writing by Clare County Council in consultation with Co. Clare Fire and Rescue Service.

4. Site Contacts / Roles and Responsibilities

Once planning consent has been granted, and prior to site construction commencing, up-to-date contact information for facility personnel, off-site technical support personnel, and emergency contact numbers will be compiled and included in the Final ERP and TFRP. This will include, as a minimum:

- Site operator / O&M contractor and 24/7 emergency contact number;
- On-call engineering support;
- Keyholding arrangements and site access contacts;
- Co. Clare Fire and Rescue Service control room;
- Environmental Protection Agency (EPA) emergency contact;
- Applicant / Owner senior responsible officer; and,
- Any other relevant emergency contacts identified through the FRHA process.

The site is anticipated to be operated remotely during normal operation, with periodic visits by operations and maintenance (O&M) staff. A security operative or on-call engineer will be the primary point of contact for emergency services attending the site. During the construction phase, contacts and responsibilities will be managed through the Construction TFRP. The contacts and responsibilities information from the TFRP will be made available electronically to Co. Clare Fire and Rescue Service for use in their internal operational information systems.

5. Hazard Identification

Once planning consent has been granted, and prior to site construction, a full Fire Risk and Hazard Assessment (FRHA) will be created. The FRHA will ensure compliance with the Safety, Health and Welfare at Work Act 2005 and the Fire Services Acts 1981 and 2003. The information from the FRHA will directly feed the Final ERP and TFRP. Such an approach will ensure a systematic way to identify all potential sources of ignition, mitigation approaches and response strategies to fire risk.

The main hazards associated with a BESS site primarily revolve around fire, explosion, and electrical risks, particularly when using lithium-ion technology. These risks are most prevalent during construction and the first two years of operation. The key hazards of a BESS site are:

1. Thermal Runaway and Fire

- **Thermal Runaway:** Uncontrolled self-heating of battery cells, potentially leading to fire and gas release within a BESS container.
- **Self-Sustaining Fires:** Fires that continue to propagate within a BESS container independent of external ignition sources.
- **Reignition:** Risk of re-ignition of a BESS container following apparent extinguishment, due to residual thermal energy.
- **Fire propagation pathways between BESS units:** Risk of fire spreading between adjacent BESS containers via radiant heat, direct flame impingement, or migration of hot gases.

2. Explosion and Gas Release

- **Toxic/Flammable Gases:** Release of hydrogen fluoride (HF), carbon monoxide (CO), hydrogen (H₂) and volatile organic compounds (VOCs) during thermal runaway events.

- **Vapour Cloud Explosions:** Risk of deflagration or detonation arising from accumulation of flammable gases, including secondary explosion risk via cable route vapour migration pathways to associated electrical infrastructure.

3. Electrical Hazards

- **High-Voltage Shock:** Risk of contact with high-voltage conductors within BESS containers, MVPS, grid connection infrastructure and associated cabling.
- **Arc Flash:** Risk of electrical arc flash from BESS containers, MVPS, Medium Voltage (MV) switchgear and associated equipment.
- **Electrical fire hazards:** Fire risk from Power Conversion Systems (PCS), MV switchgear, transformers and HV substation apparatus, including dielectric fluid fires.

4. Environmental and Physical Hazards

- **Toxic Water Run-off:** Risk of contaminated firewater runoff entering watercourses, groundwater or the Shannon Estuary SPA.
- **Structural Risks:** Potential structural failure of containers or support infrastructure during a fire or explosion event.
- **Burnt/unburnt products of combustion:** Deposition of particulate matter and combustion by-products in the local area.
- **Environmental contamination:** Potential release of transformer dielectric oil or thermal management cooling fluid.
- **Interface risks:** Risks arising from the co-location of the BESS with the wider solar PV farm infrastructure.

5. Hazardous Materials

- **Electrolyte Leaks:** Release of battery electrolyte, which may be flammable or chemically reactive and may contribute to fire or environmental contamination.
- **Chemical Burns:** Risk of chemical burns from contact with battery electrolyte or other hazardous materials present on site.

6. Site Access and Evacuation Routes

The Application Site will be accessed via two separate access points on the eastern and western sides of the BESS compound. Both access points connect to an internal through-track with short spurs to each BESS array. The minimum design width of internal access tracks is 6 m, which is capable of accommodating Co. Clare Fire and Rescue Service appliances.

Access design will have regard to Technical Guidance Document B (Fire Safety) to the Irish Building Regulations 1997 (as amended) and the NFCC Version 2 Guidance (December 2025). A swept path analysis for emergency vehicles will be undertaken at detailed design stage to confirm that the proposed access arrangements are suitable for fire appliance access and manoeuvring across the site in all weather conditions.

In the event of a fire at the BESS compound, Co. Clare Fire and Rescue Service will likely establish a 50-metre safety exclusion zone (inner cordon) around the BESS container(s) undergoing a thermal event. Given the dimensions of the BESS compound (approximately 75 m × 16 m), this cordon may extend beyond the perimeter boundary of the compound on some or all sides. The area beyond the inner cordon will serve as the operational base for attending crews, command facilities and emergency coordination, ensuring all personnel remain at a safe distance from the primary hazards.

Matters such as the detailed locations of Rendezvous Points (RVP), Forward Control Points (FCP), assembly points for facility personnel, evacuation routes, access codes, keyholding arrangements and hard standing areas for emergency appliances will be confirmed in the Construction TFRP and incorporated into the Final ERP and TFRP.

7. Site Water Supplies

An increasing number of BESS manufacturers suggest that applying firefighting branches (water) to a BESS unit undergoing a thermal event will have limited effect and could prolong the duration of the thermal event unnecessarily.

Therefore, should water be required / used, the recommended firefighting tactic is for water to be used defensively via water fog or spray pattern branches directed on areas adjacent to the BESS unit undergoing the thermal event to prevent an incident developing beyond the BESS unit of origin. This is commonly known as boundary cooling, and is intended to significantly reduce overall water requirements, and thus the associated drainage / environmental protection requirements. This tactic is currently recognised as an appropriate operational approach by the UK fire and rescue service.

Several BESS manufacturers now advocate that should a BESS unit have a thermal event and progress to thermal runaway; the affected unit should be permitted to consume itself (i.e. burn itself out). This 'burn' policy is recognised within the NFCC Version 2 Guidance (December 2025) and is accepted by many insurers. GS experience is that the majority of applicants adopt a burn policy across their sites, and GS advocates such an approach.

The NFCC Version 2 Guidance (December 2025) specifies that private fire hydrants should be capable of achieving a flow rate of no less than 1,500 litres per minute. Where a flow rate of 1,500 litres per minute cannot be achieved from hydrant infrastructure, it is prudent to provide an equivalent static water supply sufficient to deliver that flow rate for a sustained duration of 120 minutes, equating to a minimum static supply of approximately 180,000 litres. The proposed layout includes the provision of 4no. static water tanks each containing 50m³ of water.

Co. Clare Fire and Rescue Service will be consulted on water supply requirements for the site as part of the engagement process. The detailed water supply arrangements, including any requirement for on-site static water storage and private fire hydrants, will be agreed with Co. Clare Fire and Rescue Service and captured within the TFRP. Private fire hydrants and any connections to dry pipe systems would be installed in accordance with BS 9990 (Non-automatic Firefighting Systems — Code of Practice) and identified in accordance with BS 3251 (Indicator plates for fire hydrants and emergency water supplies). Operational advice and site information on water supplies, operational tactics and considerations will be captured in the TFRP and agreed with Co. Clare Fire and Rescue Service prior to commissioning.

8. Communication Protocols

Once planning consent has been granted, and prior to site construction, a full Fire Risk and Hazard Assessment (FRHA) will be created. The FRHA will ensure compliance with the Safety, Health and Welfare at Work Act 2005 and the Fire Services Acts 1981 and 2003. The information from the FRHA will directly feed the Final ERP and TFRP. Such an approach will ensure a systematic way to identify all potential sources of ignition, mitigation approaches and response strategies to fire risk.

The final and fully populated ERP will be supported by a Site-Specific Tactical Fire Response Plan (TFRP) developed in agreement with Co. Clare Fire and Rescue Service and other key stakeholders. The TFRP provides detailed operational information to emergency crews attending the premises and will include, inter alia, details of site access, water supplies, firefighting tactics, drainage and environmental protection measures, and emergency contact information. Information from the TFRP will be made available electronically to Co. Clare Fire and Rescue Service for integration into their internal operational information systems.

The ERP and TFRP will be supported by a commitment for an ongoing Fire Communications Framework (FCF). The FCF will outline an agreed approach to ongoing communication / coordination strategies between the ultimate BESS operator and the local Co. Clare Fire and Rescue Service Fire Station, and

should cover all project development stages, including pre-planning; site commissioning; site operations; and site decommissioning.

Through the Final ERP and TFRP, details of the Operators Control Centre emergency call response process will be established, including a copy of the call response form.

Clear communication processes will be established to include: how, in the event of a fire incident occurring on site, on-site detection systems will alert site operatives (on-site or remote) of the incident; the process for the site keyholder to provide Co. Clare Fire and Rescue Service with access to the site; the means by which relevant incident information and the TFRP documents contained within the Secure Information Box (SIB) are made available to attending crews; and protocols for communication between the on-call engineer and Co. Clare Fire and Rescue Service, both remotely and on-site, to ensure accurate and current information is provided to emergency responders at all stages of an incident.

The Secure Information Box (SIB) will be located at the site entrance and will contain the ERP, TFRP, site layout plans, details of water supplies, signage information, drainage and runoff containment plans, emergency contact details and any other information of relevance to Co. Clare Fire and Rescue Service crews attending an incident at the site.

9. Major Incident Emergency Services Briefing (METHANE)

During operation, the proposed Ballycunneen BESS is anticipated to be controlled remotely, with only periodic visits from operations and maintenance staff. In the event of an emergency, a security operative or on-call engineer will be the primary point of contact for attending emergency services.

A major incident occurs when the location, number, severity or type of casualties requires extraordinary resources. The declaration of a major incident by emergency services results in the implementation of a multi-service structured response based on the key principles of: command and control; safety; and communications.

The Emergency Services use the METHANE acronym to build a structured report for alerting others about a major incident. METHANE stands for:

- **M**ajor Incident Declared
- **E**xact location
- **T**ype of incident
- **H**azards
- **A**ccess
- **N**umber and type of casualties
- **E**mergency services present and required

METHANE is the recognised model for passing incident information between emergency services and their control rooms. All site staff will receive appropriate awareness training to ensure they are able to provide relevant information to the emergency services in the event of an incident at the site.

10. Directions to Hospital

The nearest acute hospital to the Application Site is **University Hospital Limerick (UHL)**, which is the principal Emergency Department serving County Clare and the Mid-West region of Ireland.

Address: Dooradoyle, Limerick, V94 F858

Telephone: (061) 301 111

Approximate distance from site: Approximately 20 km / 25 minutes by road

Directions from Site to University Hospital Limerick

From the Ballycunneen BESS site, proceed west / south-west toward Shannon town. Join the N19 / N18 dual carriageway southbound in the direction of Limerick. Continue on the N18 / M18 motorway toward Limerick city. Take the exit signposted for Dooradoyle / University Hospital Limerick and follow signs for University Hospital Limerick (UHL). The Emergency Department is clearly signed on arrival at the hospital campus.

11. Firefighting and Fire Mitigation Facilities

Proposed Safety Measures

Detailed information and specifications for the fire safety and mitigation systems are not yet available, as the battery enclosure procurement process has not commenced. Requirements have been identified and general principles have been outlined in the Risk Management and Compliance Report prepared for the planning appeal. The following sections describe the expected provisions, which will be confirmed and detailed in the DBSMP and Final ERP post-consent.

Internal Safety Measures

Each BESS container is expected to incorporate the following internal safety measures as a minimum requirement of the procurement specification:

- **Battery Management System (BMS):** Continuous cell-level monitoring of voltage, current, temperature, State of Charge (SoC) and State of Health (SoH), with overcharge, over-discharge and short circuit protection. BMS alarms are classified as follows: **Level I** alarm leads to a 50% power reduction; **Level II** alarm places the PCS into standby mode; **Level III** alarm results in the cutoff of the relay.
- **Overcurrent and Ground Fault Protection:** Electrical protection systems to detect and interrupt fault conditions before they can develop into thermal events.
- **Remote Shutdown Capability:** Emergency shut-down capability accessible remotely and locally, including from the site-level Energy Management System (EMS) / SCADA system.
- **Overpressure Vents:** Passive pressure relief venting to safely manage gas build-up within the container enclosure during a thermal event.
- **Thermal Management System:** Liquid cooling system maintaining optimal operating temperatures at the cell level, with backup power capability to remain operational during grid disconnection events.

External Safety Measures

The following safety measures are proposed to be installed external to the BESS containers:

- Access to and egress from the site at two locations (eastern and western), providing an alternative route in the event that one access point is compromised.
- Site lighting (sensor-activated and/or manually triggered) to support safe night-time access by emergency services.
- Smoke and heat detection systems external to the BESS containers, including at the MVPS units, to provide early warning of fire events.
- A site drainage system designed to contain contaminated firewater runoff, preventing discharge to the Shannon Estuary or other watercourses (see Section 14).
- Signage in visible locations indicating the type of infrastructure, relevant hazards, installed mitigations and 24/7 emergency contact information.
- Unobstructed access to the site (at both access points) maintained at all times.
- On-site CCTV

Fire Detection and Suppression

Each BESS container is expected to be equipped with advanced smoke, heat and flammable gas detection systems — including sensors for hydrogen, carbon monoxide and volatile organic compounds — integrated with the BMS and site-level EMS, to provide early detection of thermal anomalies and off-gassing events.

Based on current indicative design, the internal fire suppression system within each BESS container is anticipated to comprise an aerosol or clean-agent suppression system. The specific suppression agent and deployment configuration will be confirmed through the procurement process. GS does not recommend the installation of water-based suppression systems (sprinklers, water mist, deluge or fixed water spray) inside BESS units, in line with current industry guidance and the position set out in Section 7 of this ERP. The fire detection and suppression systems will be designed to meet the requirements of BS EN 54 (series), BS 5839-1:2017 and, where applicable, BS EN 14972-1:2020+A1:2025, and validated through UL 9540A:2025 testing.

Deflagration Venting and Explosion Prevention

It is expected that the chosen technology will incorporate comprehensive active and passive safety features to prevent and manage deflagration risks. The primary explosion control strategy is anticipated to comply with NFPA 69 (Standard on Explosion Prevention Systems) as the primary active control mechanism, including:

- Continuous combustible gas monitoring to maintain concentrations below 25% of the Lower Explosive Limit (LEL) / Lower Flammable Limit (LFL);
- Active mechanical ventilation for purging dangerous off-gases, with backup power capability during grid disconnection; and,
- Automatic system shutdown in response to detected gas, thermal or electrical anomalies.

Passive deflagration venting in accordance with NFPA 68 (Standard on Explosion Protection by Deflagration Venting) and/or BS EN 14373:2021 (Explosion Suppression Systems) may be incorporated as supplementary protection. The procurement specification will also require a cable route vapour migration risk assessment, covering all cable routes and conduits connecting BESS containers to MVPS, substation and control building infrastructure, in accordance with NFCC Version 2 Guidance (December 2025).

Power Conversion / Medium Voltage Power Systems

Each MVPS is expected to incorporate a transformer using mineral or synthetic dielectric oil for insulation and cooling. Such oil will be stored in an independent reservoir that is bonded to 110% of the oil volume capacity. Regular inspection and maintenance of dielectric oil storage will be required to ensure oil quality and integrity.

Summary

The combination of real-time BMS monitoring with multi-tiered control hierarchy, active thermal management with liquid cooling, proprietary deflagration protection system, and automatic safety responses is designed to ensure a safe operating environment. The system has been validated through extensive UL 9540A testing and large-scale fire testing to demonstrate its ability to mitigate thermal risks within the BESS and prevent conditions that could lead to thermal runaway propagation.

12. Off-Site Smoke Plume Considerations

The prevailing wind direction at the Application Site is **south-westerly**, consistent with the prevailing conditions for the west of Ireland. The BESS compound is located approximately 5 km east-northeast of Shannon town and in relative proximity to the Shannon Estuary, designated as a Special Protection Area (River Shannon and River Fergus Estuaries SPA; BirdLife Site Code 004077).

Sensitive receptors within 1 km of the BESS compound are to be identified and assessed in the Final ERP, confirmed by detailed site survey.

Guidance published by the National Fire Chiefs Council (NFCC Version 2, December 2025) advises that smoke from lithium-ion battery fires should be considered potentially toxic and corrosive, and appropriate precautions should be taken. **Hydrogen Fluoride (HF) is generally considered the primary toxic hazard** associated with lithium-ion battery fires. During a fire event, smoke and combustion gases may migrate beyond the site boundary, with the potential to affect personnel, nearby receptors and the environment downwind of the site.

Potential off-site impacts may include:

- Exposure of persons downwind to irritant or toxic smoke;
- Reduced visibility in the local area due to dense smoke plume;
- Deposition of particulate matter and combustion by-products in the local area; and,
- Potential contamination of the Shannon Estuary SPA and associated habitats and species in the event of a significant fire, dependent on wind direction.

In the unlikely event of a significant battery fire, the Incident Commander from Co. Clare Fire and Rescue Service may consider appropriate public safety measures, which could include temporary cordons or exclusion zones; road closures in the immediate area; shelter-in-place advice for nearby receptors downwind of the incident; and evacuation of nearby properties if deemed necessary.

Given the proximity to the Shannon Estuary SPA, any significant fire event should prompt early notification of the Environmental Protection Agency (EPA) and the National Parks and Wildlife Service (NPWS), as appropriate. Contact details for these bodies will be included in the Final ERP and TFRP.

A formal smoke plume dispersion analysis has not been undertaken at this stage of development. The impact assessment outcomes, including Acute Exposure Guideline Level (AEGL) and Short-Term Exposure Limit (STEL) analysis for key toxic species (particularly HF), would be incorporated into the Final ERP and TFRP.

13. Incident Response Procedures / Emergency Action Checklists

Once planning consent has been granted, and prior to site construction, a full Fire Risk and Hazard Assessment (FRHA) will be created. The FRHA will ensure compliance with the Safety, Health and Welfare at Work Act 2005 and the Fire Services Acts 1981 and 2003. The information from the FRHA will directly feed the Final ERP and TFRP. Such an approach will ensure a systematic way to identify all potential sources of ignition, mitigation approaches and response strategies to fire risk.

This ERP is a framework which will be fully populated once the exact scheme design and technology is procured and more detailed information is available. The ERP will be further developed in consultation with Co. Clare Fire and Rescue Service through the TFRP process, to include site-specific emergency action checklists for use by facility personnel.

Once planning consent is granted, and prior to construction commencing, detailed emergency procedures will be provided for all credible hazards and risks, including:

- Building, infrastructure and vehicle fires;
- Environmental contamination from firewater runoff or BESS electrolyte release;
- Grassfire or wildfire approaching or affecting the site;
- BESS-specific scenarios (thermal runaway; gas release; deflagration / explosion); and,
- Incidents involving the co-located solar farm infrastructure.

Location and details of emergency resources to be included in the Final ERP:

- Emergency eyewash and shower facilities;
- Spill containment systems and equipment;

- Emergency warning systems (audible and visual);
- Communication systems (including radio, telephone and emergency contacts);
- Personal protective equipment (PPE) storage locations;
- First aid supplies;
- Procedures for manually activating fire suppression systems; and,
- Emergency stop (E-stop) facility locations and activation procedures.

Operational tactics, Emergency Action Checklists and detailed site-specific response information will be captured in the TFRP, developed and agreed with Co. Clare Fire and Rescue Service prior to commissioning.

14. Environmental Protection Plans

In line with NFCC Version 2 Guidance (December 2025), this ERP recommends no direct water application to a BESS unit undergoing a thermal event. Should water be required for boundary cooling of areas adjacent to the affected container, the drainage design must ensure that any contaminated firewater runoff is contained on site and does not enter any watercourse, drainage ditch, groundwater body or the Shannon Estuary SPA.

The proposed drainage and containment strategy for the Application Site incorporates the following measures:

- All BESS units and MVPS transformer units will be positioned on concrete rafts with impermeable bunded aprons to contain any leaks, spills or contaminated firewater runoff.
- A Class 1 oil/water separation system will be provided as an additional layer of protection to prevent contamination of surface water or groundwater from transformer dielectric oil releases.
- The site drainage strategy proposes an underground piped system connected to an attenuation structure where it will be contained during a fire event and can be used for recirculation as part of the water strategy. Final sizing will be confirmed at detailed design stage following infiltration testing.
- An emergency drainage shut-off (penstock or equivalent) will be incorporated into the drainage system to prevent contaminated runoff from leaving the site in the event of a significant fire or spill incident.
- Filter drains and drainage blankets will be incorporated where appropriate to manage surface water runoff across the site.

Given the proximity to the Shannon Estuary SPA, particular attention will be paid during detailed design to ensure that the drainage and containment system provides adequate protection for this designated site. The EPA, Clare County Council and the NPWS will be consulted as appropriate during the detailed design process.

The Environmental Protection Plans for the site, including detailed drainage and containment specifications, will be confirmed in the Final ERP and TFRP, developed in consultation with Co. Clare Fire and Rescue Service and the relevant environmental authorities.

15. Post-Incident Considerations and Stabilisation

Once planning consent has been granted, and prior to site construction, a full Fire Risk and Hazard Assessment (FRHA) will be created. The FRHA will ensure compliance with the Safety, Health and Welfare at Work Act 2005 and the Fire Services Acts 1981 and 2003. The information from the FRHA will directly feed the Final ERP and TFRP. Such an approach will ensure a systematic way to identify all potential sources of ignition, mitigation approaches and response strategies to fire risk.

Following any significant incident at the Ballycunneen BESS, the site will not be re-entered or operations resumed until the Incident Commander from Co. Clare Fire and Rescue Service has declared the scene safe and all immediate hazards have been mitigated. Post-incident stabilisation considerations will include:

- Assessment of residual thermal energy within affected BESS containers and the risk of reignition, which may require extended monitoring over a period of days;
- Assessment and management of toxic off-gas residues within containers and the surrounding area;
- Assessment of structural integrity of affected containers and adjacent infrastructure;
- Environmental assessment and monitoring of any contaminated firewater runoff, particularly in relation to the Shannon Estuary SPA; and,
- Safe storage, removal and disposal of affected battery materials in accordance with applicable Irish waste and environmental legislation.

A Detailed Battery Safety Management Plan (DBSMP) will be developed post-consent, which will include detailed post-incident procedures for site stabilisation, safe removal of affected BESS containers, and coordination with Co. Clare Fire and Rescue Service, the EPA and other relevant authorities. Further detail will be incorporated into the Final ERP and TFRP.

16. Procedures for Reviewing and Updating ERP

This ERP will be reviewed on at least an annual basis and updated as required. The ERP and TFRP will be maintained in alignment to ensure that the information available to Co. Clare Fire and Rescue Service and site personnel remains accurate and current throughout the operational life of the Ballycunneen BESS.

In addition to the annual review, this ERP will be reviewed and updated in response to the following triggers:

- Changes to personnel or contact details for key stakeholders;
- Changes to O&M contractor or responsibility allocation for the site;
- Changes to associated ERPs or emergency plans for other stakeholders in the vicinity;
- Commencement of construction on or adjacent to the site requiring liaison with emergency services;
- Addition, removal or significant modification of major equipment at the site;
- Changes to site infrastructure, access routes or site tracks; and,
- Improvements or corrective actions arising from audits, exercises, near-misses or incidents.

Co. Clare Fire and Rescue Service will be notified of any material changes to the ERP or TFRP and provided with updated copies for integration into their operational information systems.

17. Training and Plan Testing for Staff and Emergency Responders

All site personnel, O&M staff and security operatives with roles and responsibilities under this ERP will receive appropriate training prior to site commissioning and at regular intervals thereafter. Training and plan testing will be conducted using the following methods:

- **Tabletop exercises (discussion-based):** Structured discussion-based exercises involving key stakeholders, including site operators and Co. Clare Fire and Rescue Service, to review and test emergency procedures, communication protocols and decision-making processes without the need for physical deployment of resources.

- **Functional exercises (demonstrating specific procedures):** Exercises designed to demonstrate and test specific elements of the emergency response, such as site evacuation procedures, communication systems or activation of safety systems.
- **Full-scale drills (hands-on practice):** Exercises involving the full deployment of site personnel and, where appropriate, Co. Clare Fire and Rescue Service, to provide realistic, hands-on practice of emergency response procedures.

All training and exercises will test the following key aspects of the ERP:

- Roles and Responsibilities — ensuring all personnel understand their specific duties during an emergency;
- Procedures and Processes — testing the practicality and effectiveness of documented emergency procedures;
- Communication Systems — verifying that all communication channels function effectively under emergency conditions;
- Logistics and Resources — confirming the availability and accessibility of emergency equipment and resources; and,
- Equipment and Systems — testing the correct operation of safety systems, suppression equipment and detection systems.

Records of all training activities, exercises and drills will be maintained by the site operator and made available to Co. Clare Fire and Rescue Service on request. Lessons learned from exercises and any real incidents will be incorporated into the review and update process for this ERP as described in Section 16.

END

APPENDIX C. EIRE ECOLOGY BAT REPORT



Environmental Consultants

Bat Survey Report

Ballycunneen Solar and Battery
Energy Storage System

Note: report details locations of bat roosts. This information should be redacted.



DOCUMENT DETAILS

Client: BNRG

Project Title: Construction of solar farm and ancillary works.

Document Title: Bat Survey Report

Prepared By: John Curtin; Eire Ecology

Date: 03/09/2025

EXECUTIVE SUMMARY

This document reports on the findings of bat surveys conducted in 2025 for the proposed Ballycuneen Solar Farm and Battery Energy Storage System (herein referred to as the proposed project) in the townlands of Ballycuneen, Drumline, Ballycasey More, Clonmoney West, Firgrove, and Ardkyle, Co. Clare.

Surveys included preliminary roost assessment of trees and structures, walked surveys using bat detectors, and longer duration static monitoring focusing on representative habitats found within the proposed project site. The aim was to examine current bat usage within the proposed project site and identify the impact of the development on the species present.

Seven static detectors were placed within the proposed project site for a minimum of thirty nights covering Spring and Summer seasons, with four statics placed in open habitat and three placed by edge habitat, along linear connective features in different regions of the proposed project site. During static surveys, a total of seven species of bats were recorded: Common Pipistrelle, Soprano Pipistrelle, Nathusius Pipistrelle, Leisler's bat, Natterer's bat, Lesser Horseshoe Bat and Brown long-eared bat. In addition, several unidentified *Myotis* species were recorded; though without social calls or characteristic call features present these are only classified to a genus level. The most frequently recorded species was Leisler's Bat, followed by Common Pipistrelle and Soprano Pipistrelle, with lower levels of the *Myotis* species, lesser Horseshoe and Brown long-eared bat detected. Solar panels are proposed within open pasture with the majority of tree lines and hedges within solar lands being retained. The development in Section 2 will result in the loss of some tree lines utilised by bats.

Results show that without mitigation there will be a significant impact on feeding bats across the proposed project site, particularly in Section 2 and Section 3 of the proposed project site particularly Common and Soprano Pipistrelle and Leisler's Bat given the proximity to a roost.

All bats recorded during surveys are classified as 'Least Concern' on the Irish Red List No. 12 and protected under the EU Habitats Directive Annex IV and Wildlife Acts. The site is outside the typical geographical range for the EU Habitats Directive Annex II listed species lesser horseshoe bat.

Robust mitigation is proposed in order to negate potential impacts on bats including the creation of a woodland, creating veteran features in existing trees, limiting outdoor lighting, upgrades to bat roost and a post construction monitoring program designed to examine the effectiveness of these mitigation measures.

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1 INTRODUCTION

This report details the findings of bat surveys carried out for the proposed Ballycuneeen Solar Farm and Battery Energy Storage System (herein referred to as the proposed project) located east of Shannon town, Co. Clare.

1.1 SITE DESCRIPTION

The proposed project site lies in south County Clare, adjacent to the town of Shannon within the townlands of Ard Kyle, Ballycuneeen, Firgrove and Clonmoney West. The site consists of four distinct land parcels, all in a rural area, with much of the landscape consisting of pasture, hedgerows and treelines with one off housing. The layout of the project is shown in Figure 1-1. Areas of plantation and semi-natural scrubby woodland can also be found along the periphery of the project site.

1.2 PURPOSE OF THIS REPORT

This report aims to;

- Examine the area of works for the presence of bats or their roosts.
- Identify species of bats using the proposed project site and identify regions of higher bat activity to focus mitigation efforts on.
- Potential impacts of bats by the proposed project site.

In order to assess the presence and activity of bats within the proposed development grounds the following surveys were undertaken within and adjacent to the proposed planning boundary:

- Preliminary roost assessment of trees and buildings (undertaken in February 2025)
- Bat activity (emergence surveys) (undertaken in Spring and Summer 2025)
- Static detector (activity surveys) (undertaken in Spring and Summer 2025).

The surveys undertaken follow elements of the Bat Conservation Trust (BCT) 'Good Practice Guidelines, 4th edition, (Collins, 2023) and the Irish Wildlife Manual No. 134' (Marnell F. K., 2022).

1.3 SURVEYOR INFORMATION

The surveys were designed and carried out by John Curtin B.Sc. (Env.). John has over fifteen years' experience of carrying out bat surveys and has completed numerous surveys during this time.

John has also completed the Bat Conservation Ireland, Bat Detector Workshop and Bat Handling Workshop which are the standard training for the carrying out of bat surveys in Ireland. He follows the Bat Conservation Trust 'Good Practice Guidelines' (Aughney et al., 2008). In addition, John is a longtime active member of BCI, which monitor bat populations in Ireland, and facilitate the education of bat communities to the public.

John holds the following licenses.

Description	Licence No
Licence to capture protected wild animals for educational, scientific or other purposes (bats)	C014/2025
Roost disturbance (bats)	Der/Bat 2025-177
Licence to photograph / film wild animals (bats)	032/2025

Surveys were assisted by; Karolina Illien M.Sc Ecologist, Fionn O Neill and Rowan Curtin (assistants).

1.4 RELEVANT LEGISLATION

There are two main pieces of legislation which cover wildlife protection in Ireland – the Wildlife Act and the Habitats Regulations. These are outlined below, with particular reference to the protection afforded to bat species in Ireland.

The Wildlife Acts 1976 and 2000

The primary domestic legislation providing for the protection of wildlife in general, and the control of some activities adversely impacting upon wildlife is the Wildlife Act of 1976, as amended. The aims of the wildlife act according to the National Parks and Wildlife Service are “... to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims.” All bat species are protected under the act. The Wildlife (Amendment) Act of 2000 amended the original Act to improve the effectiveness of the Act to achieve its aims.

It is an offence to:

- Intentionally kill, injure or take a bat
- Possess or control any live or dead specimen or anything derived from a bat
- Wilfully interfere with any structure or place used for breeding or resting by a bat
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose

1.4.1 European Communities (Birds and Natural Habitats) Regulations 2011 to 2021

The EC (Birds and Natural Habitats) Regulations 2011-2021 provide strict protection for all of the Irish species listed on Annex IV of the EU’s Habitats Directive. It does so by prohibiting certain activities which could impact on the conservation status of those species. Those activities may only be permitted by way of a derogation license. All bat species found in Ireland are listed under Annex IV of the Directive, while the lesser horseshoe bat is afforded further protection under Annex II.



Figure 1-1: Site Layout

2 DESKTOP STUDY

2.1 SCOPE

As mentioned above, surveys undertaken follow elements of the BCT 'Good Practice Guidelines', (Collins, 2023) and the Irish Wildlife Manual No. 134' (Marnell F. K., 2022).

Emergence surveys were conducted in July 2025. Surveys were undertaken after an examination of Springs static data which provided an indication on proximity to potential roosts (by comparing the first recording of a species to its typical emergence times). A ground level tree assessments were conducted in February 2025. Static detector surveys were carried out in the Spring and Summer bat seasons of 2025. The survey types were determined appropriate to establish a baseline species assemblage, along with spatial and temporal distribution of species activity within the proposed planning boundary.

2.2 DESKTOP REVIEW

A desktop assessment is required in order to assign a risk level to the proposed project site and design future survey work. The appropriate level of survey effort for a site depends on the quality of habitat and the scale and likely impact of the development. Consideration should be given to the presence of suitable commuting and foraging habitat and the likely presence of bat roosts near the proposed site. An assessment was conducted for the proposed project by examining the BCI database, NBDC records, BCI landscape model for bat suitability, Ordinance survey, aerial photos and google street view.

A data search was conducted in January 2024 and again in July 2025 to revise existing information from the surrounds of the proposed planning boundary. The following sources of information were examined:

- Known bat records within a 6 km radius of the proposed sites from the BCI database
- Ad hoc and observational bat records from the National Bat Database held by the National Biodiversity Data Centre (www.biodiversityireland.ie)
- Review of Ordnance Survey mapping and aerial photography of the proposed solar farm boundaries and their environs.
- Records of designated sites within a 6 km radius of the proposed sites where bats form part or all of the reason for designation (<https://www.npws.ie/protected-sites>)
- Collation of data on known caves within a 4 km radius of the proposed sites from the Cave Database for the Republic of Ireland, compiled by Trinity College (http://www.ubss.org.uk/search_irishcaves.php)
- Review of bat survey data from Ecological Impact Assessments from proposed and permitted developments within the wider environs of the proposed project site.

2.2.1 Designated Sites

In order to determine the state of the preexisting bat landscape in the area, a desktop search was made for designated sites within 6km of the proposed planning boundary. These included sites designated at the European level (in the context for bats, this refers to Special Areas for Conservation or SACs) and the Irish level

(Natural Heritage Areas or NHAs and proposed Natural Heritage Areas or pNHAs). The Habitats Directive (Article 6) forms a basis for the designation of SACs.

NHAs are areas considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

All pNHAs were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, for the purposes of this assessment all pNHAs have been considered as fully designated sites. Both NHAs and pNHAs may be designated due to the presence of bats, so considerations are made for both.

11 SAC's can be found within a 15km of the proposed development, 8 of which are designated for Lesser Horseshoe bats; Ratty River Cave SAC (002316), Kilkishen House SAC (002319), Curraghchase Woods SAC (000174), Poulmagordon Cave (Quin) SAC (000064), Danes Hole, Poulmaglecka SAC (000030), Old Domestic Building (Keevagh) SAC (002010), Newhall and Edenvale Complex SAC (002091) and Newgrove House SAC (002157).

When examining distances to designated roosts, the proposed project site with closest connectivity to its designated roost is Ratty River Cave SAC (See Table 2-1 and Figure 2-1 below).

The closest recorded cave lies 4.5km to the NE and is associated with the Ratty River SAC. The next closest lies 6km to the NW by Caherkine Lough (Poulmagordon Cave 2). The Poulmagordon Cave associated with the Poulmagordon Cave (Quin) SAC is another cave of the same name found 8.7km from the proposed project site.

There are no NHA's within a 6km buffer of the proposed project site. A list of pNHA's within a 6km buffer of the proposed project site can be found in Table 2-1 below.

Ballycuneen Solar with surrounding SAC Sites

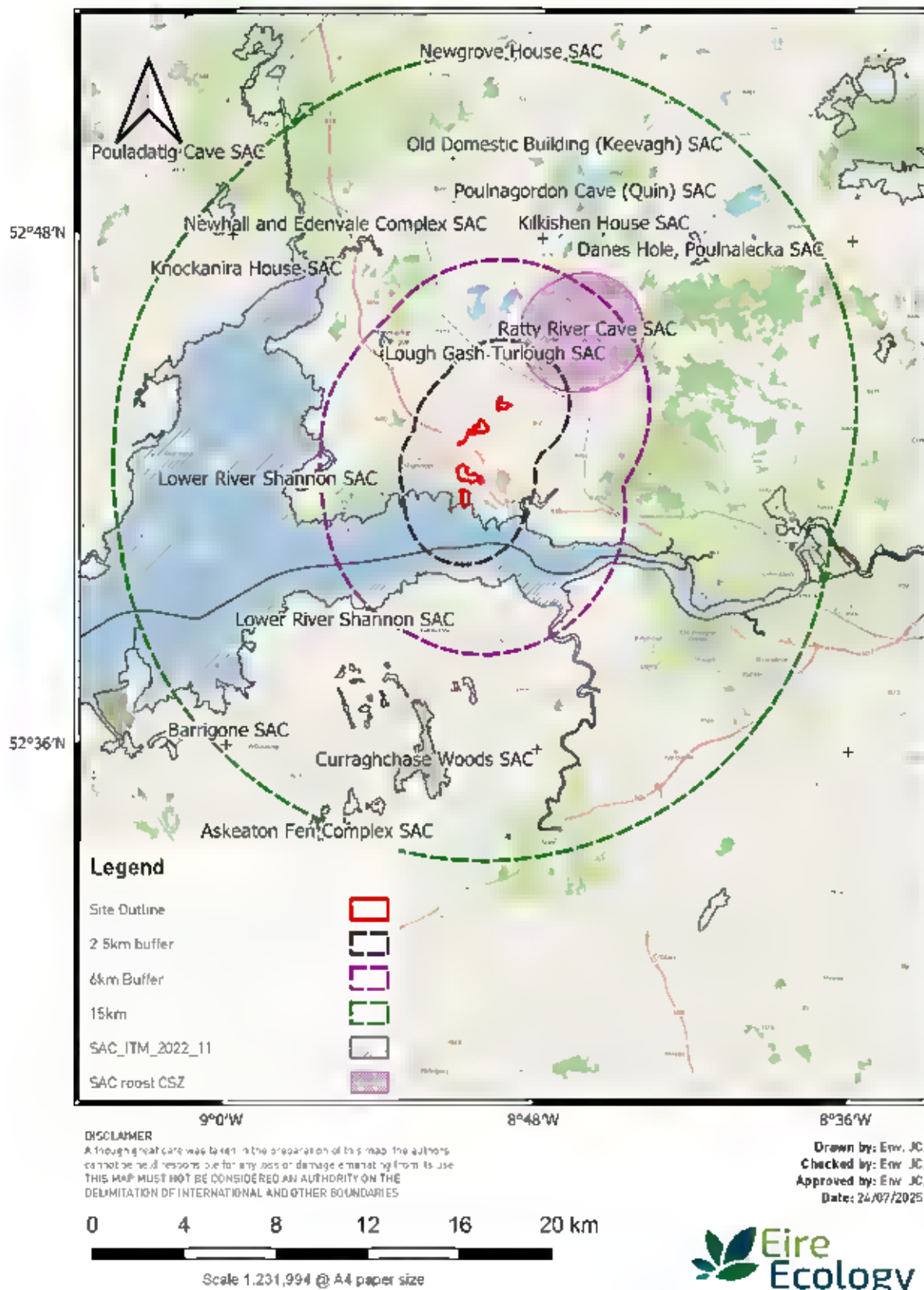


Figure 2-1: Location of proposed development in relation to SACs

Table 2-1: Designated sites surrounding site

Destination	Site Code	Distance	Designated for bats?	Details with respect to Bats	Potential Connectivity
Special Areas of Conservation within 15km					
Lower River Shannon SAC	002165	0.02km	No	Bats are not mentioned in site synopsis or CO documents.	N/A
Ratty River Cave SAC	002316	4.10km	Yes	Lesser Horseshoe is a QI of the site.	The Conservation Objectives (CO) document for the site provides a 2.5km buffer surrounding the site within which is considered the core sustenance zone (CSZ) for the roosts. The proposed project site lies a further 1.6km outside this zone. The proposed project site lies 4.1km from the Summer roost for this SAC and a network of hedgerows, treelines and woodlands provide connectivity.
Lough Gash Turlough SAC	000051	4.91km	No	Bats are not mentioned in site synopsis or CO documents	N/A
Askeaton Fen Complex SAC	02279	7.40km	No	Bats are not mentioned in site synopsis or CO documents	N/A
Kilkishen House SAC	02319	8.32km	Yes	Lesser Horseshoe is a QI of the site.	The proposed project site lies over 5km outside the CSZ for the designated roost for this SAC. While a network of hedgerows, treelines and woodlands provide some connectivity, given the distances, it is unlikely the proposed project would have a significant impact on the SAC roost.
Curraghchase Woods SAC	000174	8.60km	Yes	Lesser Horseshoe is a QI of the site.	This designated roost lies on the south side of the Shannon thus lacks connectivity.
Poulnagordon Cave (Quin) SAC	000064	8.73km	Yes	Lesser Horseshoe is a QI of the site.	The proposed project site lies over 6.23km outside the CSZ for the designated roost for this SAC. While a network of hedgerows, treelines and woodlands provide some connectivity, given the distances, it is unlikely the proposed project would have a significant impact on the SAC roost.
Danes Hole, Poulnalecka SAC	000030	9.89km	Yes	Lesser Horseshoe is a QI of the site.	The proposed project site lies over 7.39km outside the CSZ for the designated roost for this SAC. While a network of hedgerows, treelines and woodlands provide some connectivity, given the distances, it is unlikely the proposed project would have a significant impact on the SAC roost.
Old Domestic Building (Keevagh) SAC	002010	11.29km	Yes	Lesser Horseshoe is a QI of the site.	The proposed project site lies over 8.79km outside the CSZ for the designated roost for this SAC. While a network of hedgerows, treelines and woodlands provide some connectivity, given the distances, it is unlikely the proposed

Destination	Site Code	Distance	Designated for bats?	Details with respect to Bats	Potential Connectivity
Special Areas of Conservation within 15km					
					project would have a significant impact on the SAC roost.
Newhall and Edenvale Complex SAC	002091	13.41km	Yes	Lesser Horseshoe is a QI of the site.	The proposed project site lies over 10.91km outside the CSZ for the designated roost for this SAC. While a network of hedgerows, treelines and woodlands provide some connectivity, given the distances, it is unlikely the proposed project would have a significant impact on the SAC roost.
Newgrove House SAC	002157	14.615km	Yes	Lesser Horseshoe is a QI of the site.	The proposed project site lies over 12.15km outside the CSZ for the designated roost for this SAC. While a network of hedgerows, treelines and woodlands provide some connectivity, given the distances, it is unlikely the proposed project would have a significant impact on the SAC roost.
Nationally Designated Sites within 6km					
Destination	Site Code	Distance	Designated for bats?	Details with respect to Bats	Potential relevant connectivity
Rosroe Lough pNHA	002054	2.31km	No	Bats are not mentioned in site synopsis document. The site does contain some semi-natural scrub, suitable for bats	N/A
Fin Lough (Clare) pNHA	001010	2.48km	No	Bats are not mentioned in site synopsis document	N/A
Ballycar Lough pNHA	000015	4.12km	No	Bats are not mentioned in site synopsis document	N/A
Castle Lake pNHA	000239	4.79km	No	Bats are not mentioned in site synopsis document. The site does contain some mixed woodland suitable for bats	N/A
Garrannon Wood pNHA	001012	5.54km	No	Bats are not mentioned in site synopsis document. The site does contain some mixed woodland suitable for bats	N/A
Dromore & Bleach Loughs pNHA	001030	5.84km	No	Bats are not mentioned in site synopsis document. The site does contain some conifer woodland where old oak used to stand, suitable for bats	N/A

2.3 BAT SPECIES RECORDED IN THE SURROUNDING AREA

The BCI database was consulted for details on bat records held for the proposed project site and the surroundings. The database was consulted on 02/02/2025 and again on the 24/07/2025 for details on historical records from the proposed project site for the surrounding area. Results are outlined in Appendix A Table 1. Five species were recorded roosting within a 6km radius of the proposed project site, including Lesser Horseshoe bats, Common Pipistrelle, Soprano Pipistrelle, Brown Long-eared bats and Natterer's bat.

There are **19 known roosts** located within a 6km buffer of the proposed project site. 13 roosts contain Lesser Horseshoe bats, 4 unidentified *Pipistrellus* species, 3 Brown Long-eared bat, 1 Soprano Pipistrelle, 1 Common Pipistrelle, 1 Natterer's and an unidentified bat. The closest roost lies 1.01km to the west, a record over 27 years old.

Only 3 records are less than twenty years old, with many pre 2000. Many of the Lesser Horseshoe records date from this time where the Vincent Wildlife Trust (VWT) and NPWS conducted extensive searches mapping the range of this species.

2.3.1 Bat Landscapes

Lundy (2021) developed a landscape model by analyzing data contained in the Irish National Bat Database, maintained by BCI and the National Lesser Horseshoe Bat database maintained by NPWS. The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. The landscape model has been conducted for all of Ireland's nine resident species.

The proposed project site lies within a highly suitable landscape for bats and with highest suitability for Brown Long-eared bats (see Table 2-2).

Table 2-2 Risk assessment (green is low suitability for bats, red is high)

Shannon Solar development		Suitability index	
		S. section	NE section
Overall Suitability; BCI		41.78	39.33
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	53	46
<i>Plecotus auritus</i>	Brown Long-eared bats	60	59
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	55	49
<i>Rhinolophus hipposideros</i>	Lesser Horseshoe	18	19
<i>Nyctalus leisleri</i>	Leisler's Bat	56	48
<i>Myotis mystacinus</i>	Whiskered Bat	28	34
<i>Myotis daubentonii</i>	Daubenton's Bat	47	38
<i>Pipistrellus nathusii</i>	Nathusius's Pipistrelle	11	11
<i>Myotis nattereri</i>	Natterer's Bat	48	50

2.3.1.1 GP Joule Ltd – 2024

An application for consent was submitted to Clare County Council by GP Joule (pl ref: 24435) for a solar farm covering approximately 109 hectares, located at Ballycar, Lislea, Killulla, Mogullaan & Crossagh, Rathlaheen South, Culleen, Drumline & Ballycasey Beg Co Clare, approximately 750m west of the proposed project site. An ecological impact assessment accompanied the 2024 application, which included a ground level tree assessment (GLTA) carried out in July and September 2024 as well as transect surveys. The survey recorded seven bat species including two of Lesser Horseshoe bats. After the initial submission, an FI was requested which raised concerns regarding the level of bat surveys conducted, requesting additional static bat surveys as well as taking into

consideration roost locations. No further survey updates were submitted by GP Joule, and the application was ultimately withdrawn.

2.3.1.2 GP Joule Ltd 2025

In August 2025, GP Joule Ltd resubmitted an application for the same solar farm proposal. In total, 14 Static detectors were deployed between 19th to 30th May, with 12 successfully recorded. 10 Lesser Horseshoe bats registrations were recorded towards the North and Northwest of the site in two locations during this survey. Mitigation measures suggested by the report are focused on lighting impacts and habitat creation.

2.3.1.3 Terra Solar Ltd - 2017

A previously planning permission for a solar farm was granted in 2017 (pl ref: 1731) partially located within the proposed project site. For the application, a planning and environmental report was completed by MKO Ltd. The surveys included a brief bat survey consisting of a single walk over transect. Common Pipistrelle and Leisler's bat were recorded.

2.3.1.4 Lesser Horseshoe Bat *Rhinolophus hipposideros*

While the proposed project site **does not** sit within the 2.5km core sustenance zone¹ (CSZ) of any SAC designated Lesser Horseshoe roost, the Lesser Horseshoe Bat: Wildlife Manuals No. 85 (Roche N. A., 2015) shows the proposed project site sits immediately south of the Clare range.

BCI (Fialas, 2025) research paper where an updated Lesser Horseshoe favorability map was produced for Ireland. The model used roost records and landscape features to estimate areas the species could expand into. The proposed project site is included in an area *that is "subject to a high degree of disturbance with urbanisation, the N18 motorway, Shannon Airport and associated industrial developments. Nonetheless there is considerable habitat at Cratloe"* (see Figure 2-2 - Section 26). The report suggests various measures for potentially increasing connectivity for the species here including;

- A review of the existing Circuitscape model of landscape connectivity around the Shannon Estuary to determine where bats could cross so that any roost creation can be done in a targeted way (Finch & McAney, 2020).
- Roadstone Bunratty could be approached to determine whether the company would be willing to incorporate lesser horseshoe bat conservation measures by planting native species along boundaries of the quarry, facilitating bat-friendly rewilding of areas that are no longer in use, and/or creating suitable artificial roosts for the species along an undisturbed boundary.
- Creation of a Summer and Winter roost in suitable habitat.

1

A core sustenance zone (CSZ), as applied to bats, refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost (BCT, 2020). (NPWS, 2018) provides a 2.5km CSZ for Lesser Horseshoe designated roosts.

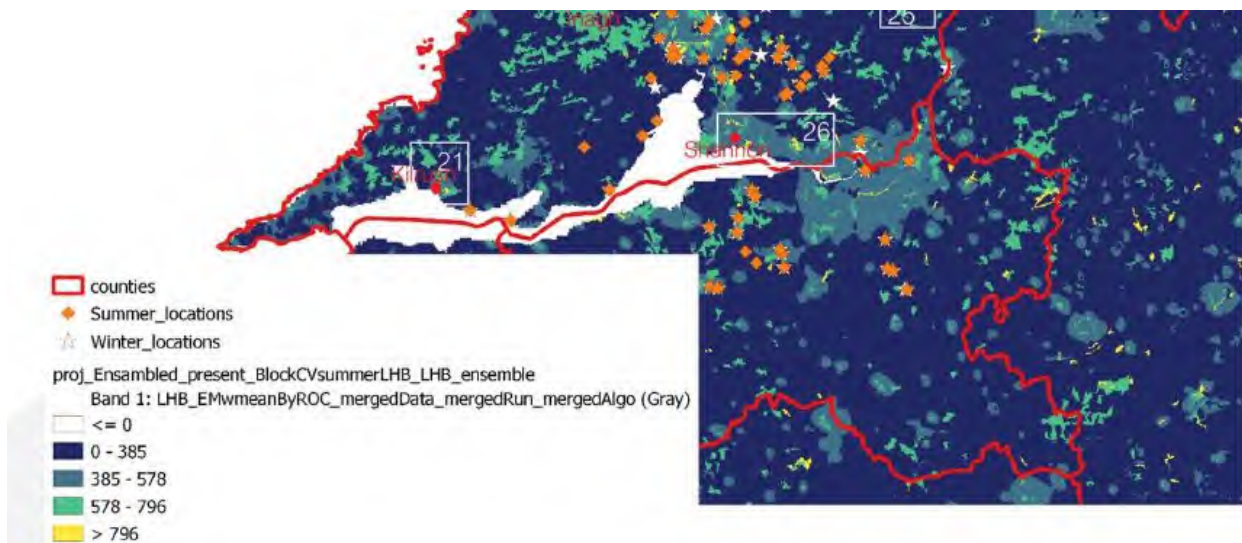


Figure 2-2: Extract from (Fialas, 2025). Shannon area including proposed project site noted in area 26.

The Lesser Horseshoe Bat Species Action Plan 2022-2026 (VWT, 2022) suggests the Shannon estuary possibly posing a barrier to movement (between the Clare and Limerick ranges). The document recommends;

- Existing linear landscape features should be retained within at least 2.5km but preferably 5km of lesser horseshoe bat roosts with 20 bats or more to counteract the documented genetic differential that has occurred within the species throughout its Irish distribution.
- No significant increase in artificial lighting adjacent to roosts of importance, or along commuting routes should occur within at least 2.5km of these roosts.

VWT (Finch, 2020), have conducted Circuitscape analysis attempting to identify pathways for the connection of Lesser Horseshoe roosts taking into account outdoor lighting, woodland and pother landscape features. This report shows the area to which the proposed project site resides has limited functional connectivity for the species.

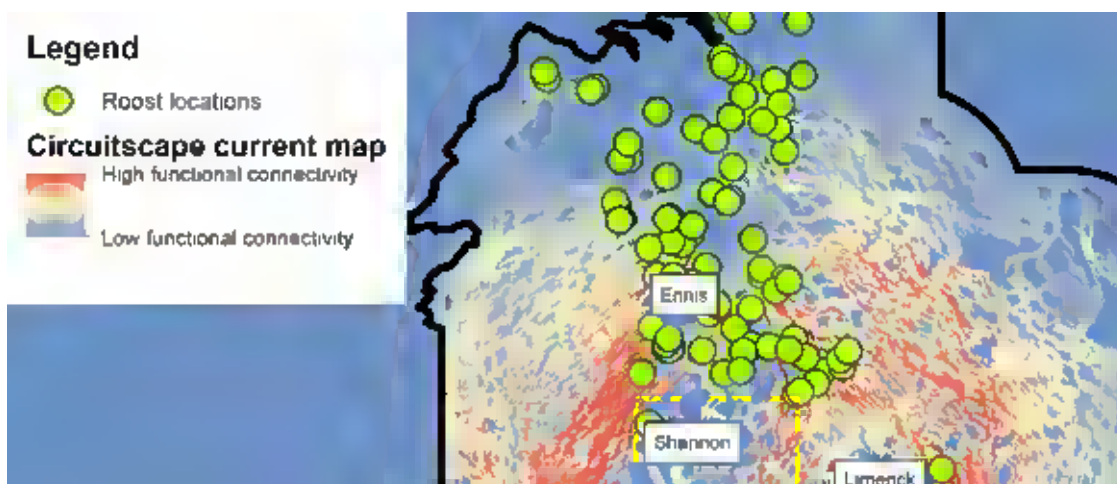


Figure 2-3: Extract (Finch, 2020), area surrounding site appears to have restricted connectivity

2.3.1.5 Preliminary Habitat Ranking

Much of the proposed project site consists of pasture fields with associated treelines, hedges and walls, however fields within the proposed project site are quite large and have fairly low quantity of good connective features internally. Bats use landscape features such as tree lines for commuting and feeding purposes. Large open fields are of less favorability than smaller ones. Some sections, however, do have scattered trees similar to parkland.

A desktop analysis of existing landscape features within and adjacent to the proposed project site is provided in Table 2-3.

Table 2-3: Habitat composition

Habitat	Length (m)	Width (m)	Area (m ²)	% of landscape
Hedge / treeline	7628	3	22,884	2.5
Woodland edge	4418	3	13,254	1.5
Wall / fence	1203	1	1,203	0.1
Scrub, scattered tree and woodland patches			17,522	1.9
Total landscape features (higher value) ²			17522	5.9%
Open pasture within site			913,739	94.1%

Much of the proposed project site is open, particularly the northern site, with scattered patches of wood and treelines along the edges of the proposed project site which provide good connectivity. While there is only a single shed within the proposed project site boundary, there are several buildings adjacent to the proposed project site with potential to host a bat roost. Notwithstanding the amount of open pasture, given the amount of historical bat roosts, edge habitats and potential links to designated SACs in the wider areas, the proposed project site is provisionally assigned a High risk site.

3 SURVEY METHODOLOGY

3.1 SURVEY METHODOLOGIES

3.1.1 Habitats on site

The proposed project site, as described in this report, comprises four distinct land parcels, herein referred to as Section 1 through Section 4 (see Figure 3-1). Overall, the sections mostly comprise Improved agricultural grassland, which is intersected by fences and walls with portions of treelines and hedges. Section 2 and Section 3 contain areas of scattered trees and scrub, while a conifer plantation can be found separating Section 1 and

² Doesn't include walls / fences

Section 2. The site is bordered by first, second and third class roads along with scattered farmsteads and residential properties.

3.1.2 Preliminary Ecological Appraisal (PEA)

The proposed project is not altering buildings onsite though it will require the removal of a number of linear features including small portions of hedgerow and also scrub to allow for the construction of access roads and buildings in Section 1 through Section 4.

Inspection of structures and ground level assessment of trees was undertaken on the 11th and 14th of February 2025 to evaluate the potential their potential to host bat roosts. Structures such as sheds can also offer shelter and breeding opportunities for bats, while trees are a highly important feature of landscapes that can provide roost sites throughout the year as well as being essential sources of insect prey. The removal of trees feature reduces the availability of shelter and feeding sites for bats (NRA 2005).

3.1.2.1 Structures.

Structures thought to be of high potential for bat roosts were identified onsite during desktop review and preliminary roost assessment by surveyors. In addition, analysis of recordings from the Spring static deployment was used to choose structures most likely to host bat roosts. A southern set of sheds and a tree with previously identified Potential Roost Features (PRF) were surveyed in Section 4 while a manor house associated sheds and another group of sheds were surveyed by Section 2 (see Figure 3-2).

3.1.2.2 Trees - GLTA

The use of trees as roost sites by bats is well established, as they provide essential shelter, breeding sites, and hibernation refuges throughout the year. Roosting opportunities are typically associated with structural features such as cavities, cracks, splits, or areas of lifted bark. These features are collectively referred to as Potential Roost Features (PRFs). The discovery of such roosts can be established through a variety of methods, including bat detector surveys to record bat activity during emergence or return flights, as well as close visual inspection of crevices, cavities, and other PRFs for evidence of bat use (e.g., droppings, staining, or scratch marks). Trees most likely to serve as bat roosts are identified by a bat specialist from a walk-through of the route, from aerial photography or from directed tree surveys.

PRF's used by bats include;

- Knot-Holes – dead branch
- Flush-Cuts – chainsaw cut of branch
- Tear-Outs – wind or snow, often well below canopy
- Double-Leaders - 2 stems of equal diameter emerge from same spot, cavity is located below split. Increased chance of roost where entrance hole is small
- Wounds & Cankers - Rough edge, indistinct shape of entrance

- Butt-Rot - decay at the base of a tree
- Hazard-Beams - longitudinal splits in lateral limbs and (less frequently) upright stems allowing light to be seen through the gap typically found on Quercus, Salix and horse chestnut
- Subsidence, Shearing & Helical-Splits - typically on the convex side of a bend
- Lightning-Strikes – from crown to base.
- Impact-Shatters – branch hit by falling tree etc.
- Desiccation-Fissures – dead wood
- Transverse-Snaps – branch / stem snapped however still attached
- Lifting-bark
- Unions – 2 independent branches (or double leader) fuses. Frequently Beech and Scots Pine
- Ivy - typically where the root forms a mat against the tree – rare for bat usage.

Trees were categorized following (Collins, 2023).

Table 3-1: Tree category (according to Table 4.2 of (Collins, 2023)).

Tree Category	Description
PRF	A tree with at least one potential roost feature (PRF)
FAR	Further assessment required to establish if PRF's are present in the tree.
None	Trees have no potential.

In total 181 trees (and hedge clusters) were surveyed from ground level for their potential to host individual bats or a maternity roost. Of these, a single tree was identified as having the potential to host a maternity roost (PRF-M). Assessment of 42 trees were categorised as having PRF features although their suitability for single bats or larger groups could not be determined at this stage. A total of 27 trees were identified as requiring further assessment to identify the presence or absence of PRF, while the remaining 111 had no potential to support roosts.

3.1.3 Bat activity and emergence surveys

Bat detectors used during emergence surveys were Wildlife Acoustics Inc. (Echometer Pro 2's) which are triggered to record when a bat call is emitted louder than 18dB for 1sec. The detectors use full spectrum sampling; detecting all frequencies simultaneously, meaning that multiple bat calls can be recorded at the same time.

In addition to audio recording, multiple Night Vision Assist's (NVA's) were used to assist the onsite surveyors. These include:

- Track IR Pro 19mm thermal imaging scope
- Track IR Guide Pro TK thermal imaging scope
- Pixfro Arc613
- Canon XA10 night vision camcorder supplemented with two Nightfox IR torches

Video footage was reviewed afterwards. Each contact with a bat was recorded. Where possible, a positive identification to species level was made by comparing onsite observations, audio recordings and night vision footage. Information on flight behaviour was also recorded where available.

A contact describes a bat observed by the surveyor. This contact can range from a commuter passing quickly to a foraging bat circling a feature lasting for several minutes. Some observations contain multiple bats. When several bats of the same species are encountered together, they are recorded under the one contact. A separate contact is recorded for each species. A contact finishes when the recorder assumes the bat is no longer present. It is likely that the same bat is recorded in several contacts throughout the night. This survey type cannot estimate abundance of bats, rather activity (i.e. the level of use bats make of a particular area or feature).

Bat activity is closely linked to the activity of their insect prey and abundance which is in turn governed by weather conditions and climate. Insects, and therefore bats, are unlikely to be present at temperatures below 7°C or during periods of strong winds or heavy rainfall so surveying in such conditions is not possible. All field surveys were undertaken within the active bat season and during good weather conditions (i.e. dry conditions and at temperatures of 8°C or greater).

Bats were identified by their ultrasonic calls coupled with behavioral and flight observations and by sound analysis of recorded echolocation and social calls with dedicated software (Wildlife Acoustic's Kaleidoscope Pro; version 5.6.8)³.

³ *The surveyor manually verified all calls rather than depending on auto identification. It is the surveyor's opinion that auto-id features frequently misidentify bat species*

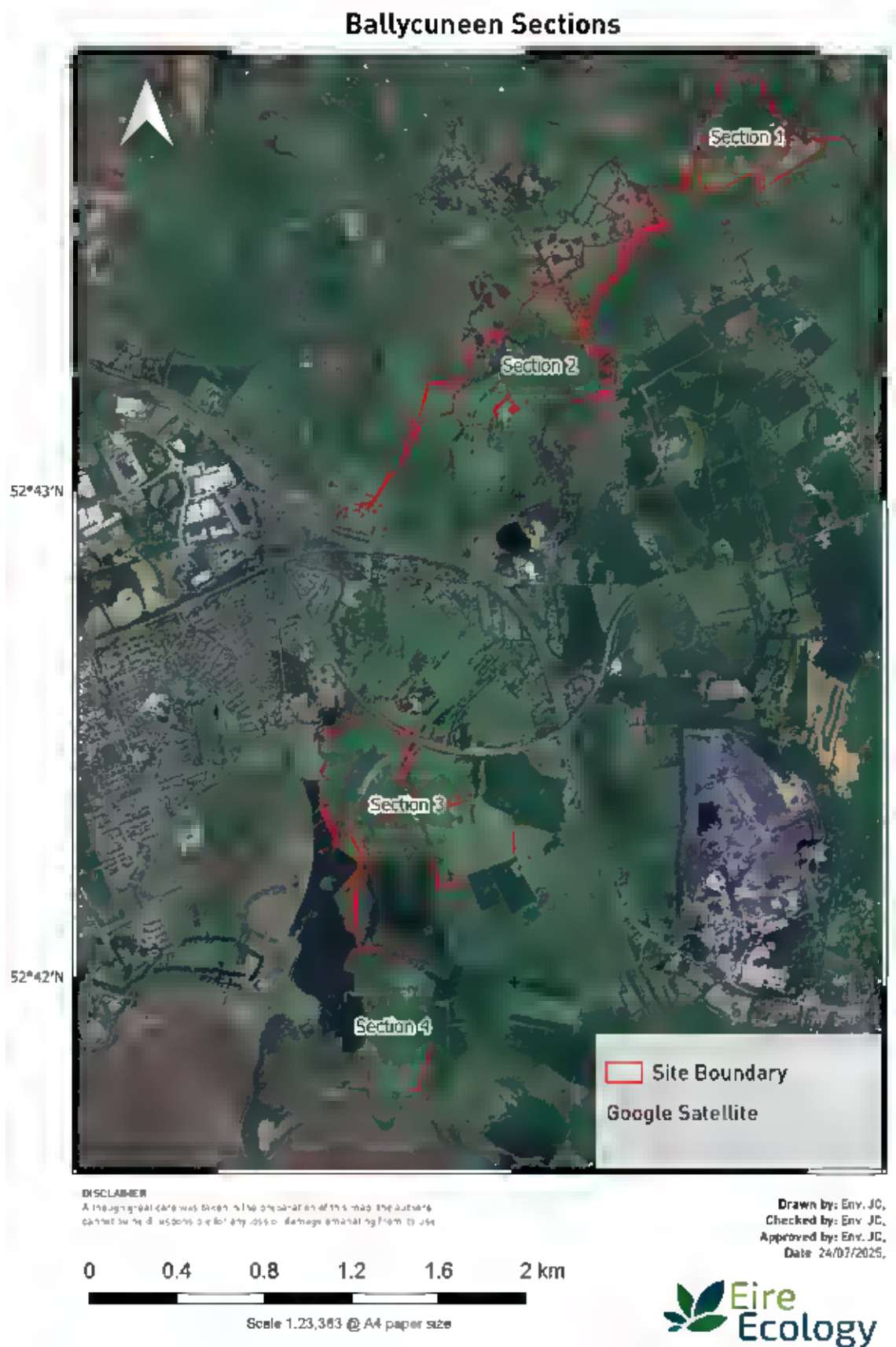


Figure 3-1: Aerial view displaying site sections.

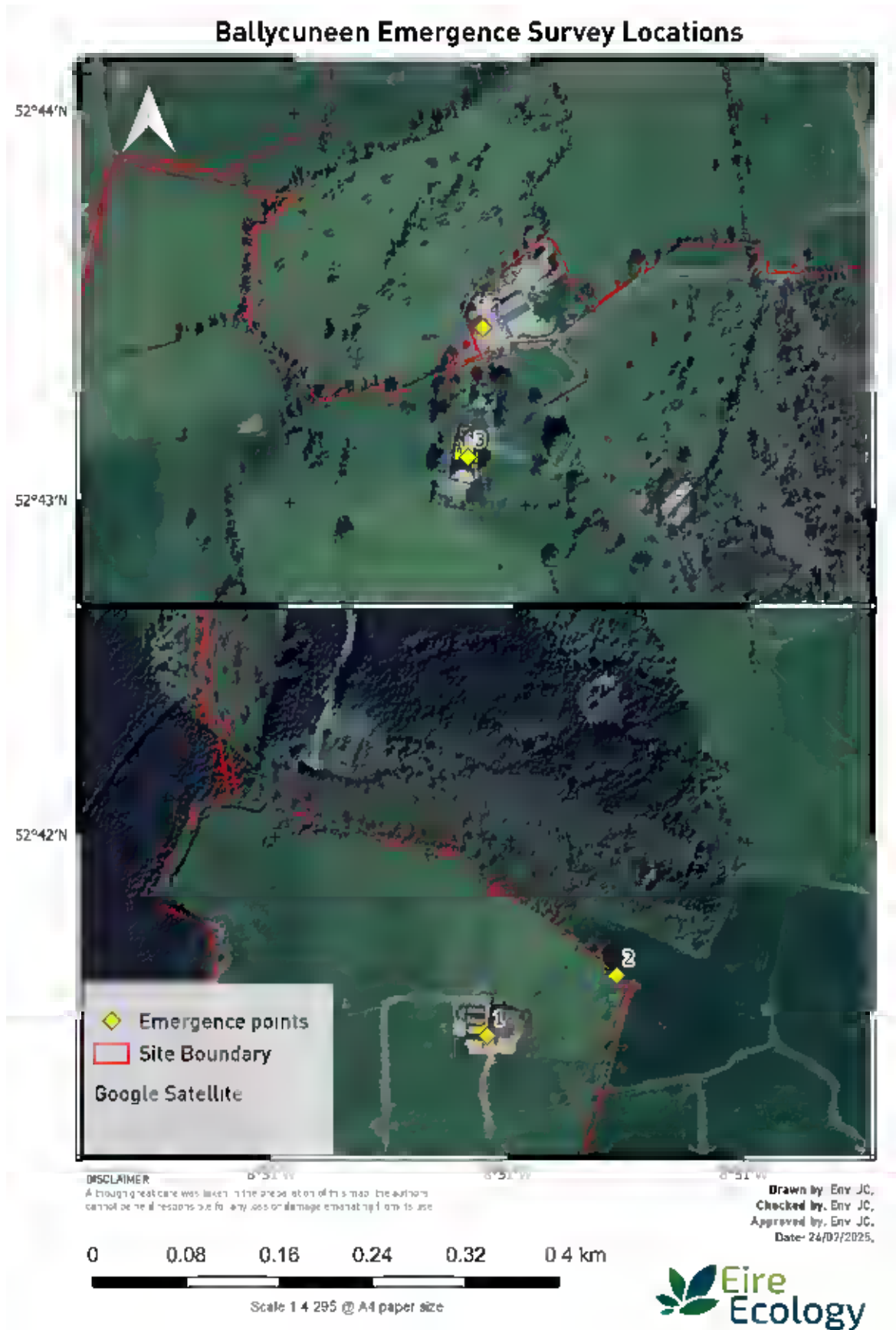


Figure 3-2: Building and trees where emergence surveys were deemed necessary

3.1.4 Static bat detector surveys

Song Meter Mini (version 1 and 2) and SM4BAT Full spectrum bat recorders were deployed within the study area from the 16th of April for 20 nights and were redeployed during the Summer period from the 11th of July for a further ten nights. Detector locations were spread to encompass different habitat types as well as geographical areas (details are provided in Table 3-2 and Figure 3-3 below). In total, detectors were deployed at seven locations: 4 locations within open habitats (the habitat type most impacted by the solar panels) and 3 adjacent to tree lines, hedges or woodland edges (higher potential features).

Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species such as the Pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass is more likely to be indicative of individual bats.

Table 3-2: Static Survey Locations

Detector	Habitat	Sections	Details	Long	Lat	Nights recorded
1	Open	1	In the Open in agricultural Grassland	52.7346799	-8.8232929	30
2	Edge		Edge of field, in gap in hedgerow	52.7350165	-8.8283522	30
3	Open	2	Open; on a fenceline on a farm track	52.7251767	-8.8368634	30
4	Edge		Attached on post along hedgerow/treeline	52.7228847	-8.8425145	32
5	Open	3	On a post in the middle of an open field	52.7094045	-8.8509630	30
6	Edge		Edge of Field, alongside Conifer plantation	52.7051248	-8.8488479	30
7	Open	4	Attached to post along dividing fenceline.	52.6988476	-8.8478544	30

Detectors were programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded.

The data was analysed with Wildlife Acoustic's Kaleidoscope Pro; version 5.6.8). This software identifies many of the calls made by Irish bats. **All calls were manually verified.** Static detector results presented below in Section 4.2, show some Myotis calls that the surveyor is confident are Natterer's bat. Distinguishing between Myotis species recordings is difficult (unless distinctive social calls are recorded thus several calls are recorded to genus level only). These could be either Whiskered, Daubenton's or Natterer's bat. Similarly, several Pipistrelle calls were recorded with a peak frequency of around 40kHz. These calls are lower than expected for Common Pipistrelle but higher than typical for Nathusius' Pipistrelle. Following the precautionary approach these calls have been included in the ECOBAT Section 4.4 below as Nathusius Pipistrelle although it is likely many, if not all were Common Pipistrelle.

3.1.5 Static Survey and Analysis Limitations

- It is not always possible to identify a bat call to species level due to the recorded call not being clear. Recorded files from automated detectors may contain only fragments of a call, or the bat may be calling from a distance (from the detector) in which case it may not be clear enough to assign the call to a specific species. In these cases the call has been assigned to genus level;
- Some caution must be taken when comparing activity levels between species, as bias can be shown towards those species with 'louder' or 'lower frequency' echolocation calls. For example, *Nyctalus* species have louder and low frequency echolocation calls which carry further than the quieter and more broad-band brown long-eared bat echolocation calls;
- A bat contact (for static surveys) is defined as a single detector file which contains at least one bat call. Multiple contacts at any given detector location do not necessarily indicate the presence of more than one bat and should therefore be interpreted as a level of activity rather than the number of bats recorded;
- Typically, ECOBAT analysis (provides tools for the standardised, rigorous interpretation of bat activity data) is used to assign activity levels based on bat passes per night compared with environmental data such as location, weather etc. It works by contrasting the users data with previously uploaded data from other users. This tool had been offline (since November 2022) and while recently available, the author is not confident it currently works correctly thus the author has had to evaluate this dataset by using ECOBAT percentiles from previously used analysis on different sites that share similar attributes (open and edge habitat).
- Following the conservative approach 40kHz activity was included with *Nathusius* *Pipistrelle*.

Ballycuneen - Static Locations

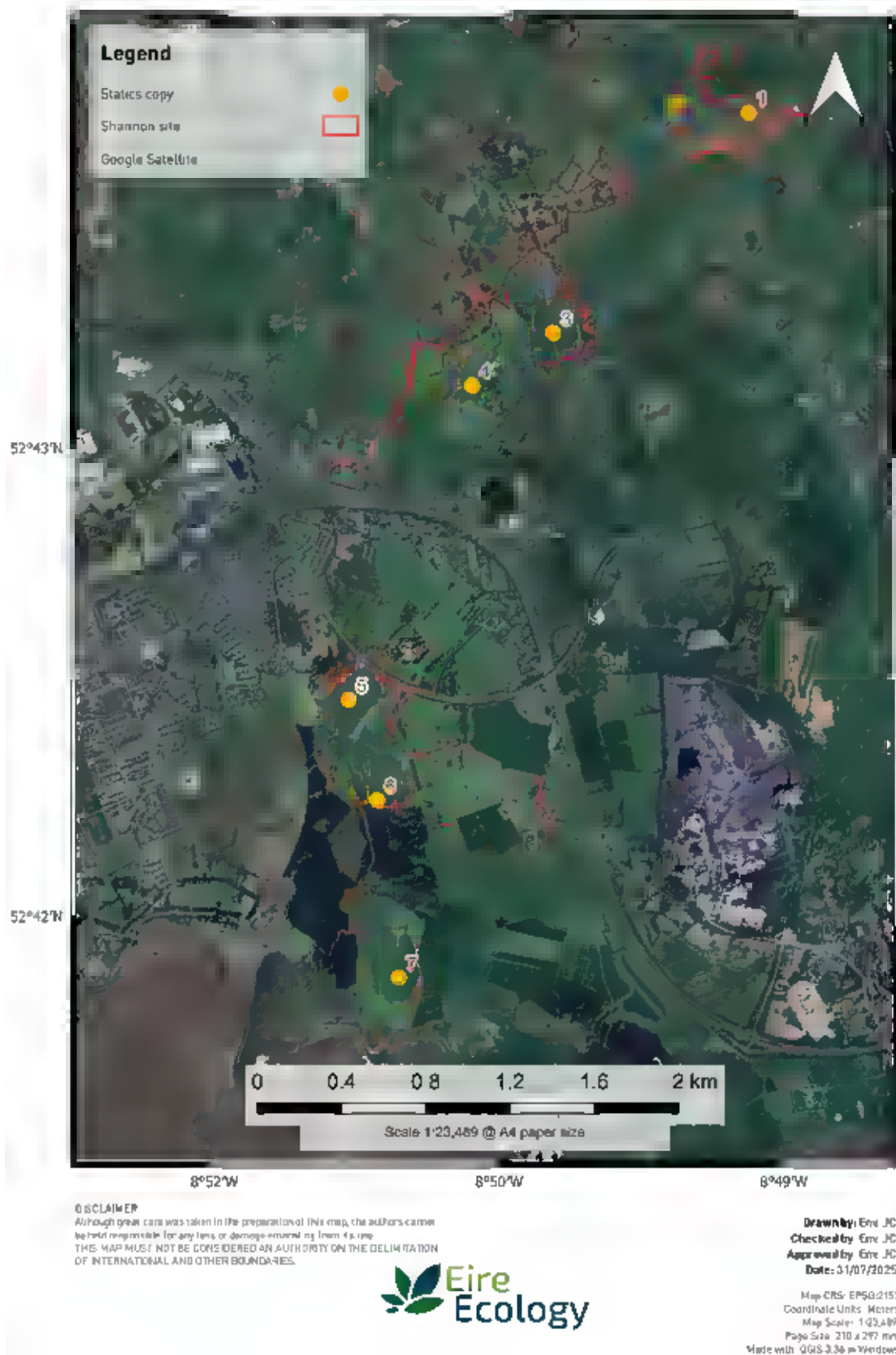


Figure 3-3: Static detector locations.

4 SURVEY FINDINGS

4.1 PEA RESULTS

4.1.1 Structures

Searches were conducted of sheds and dwellings of highest potential for bat roosts that were within or close to the proposed project site. Where access was not possible, the surveyor conducted nighttime surveys from the road examining bats and attempting to locate commuting routes and roosts. Table 4-1 provide details from a preliminary search for bat roosts within buildings.

Table 4-1 Potential roost structures examined during daylight preliminary searches.

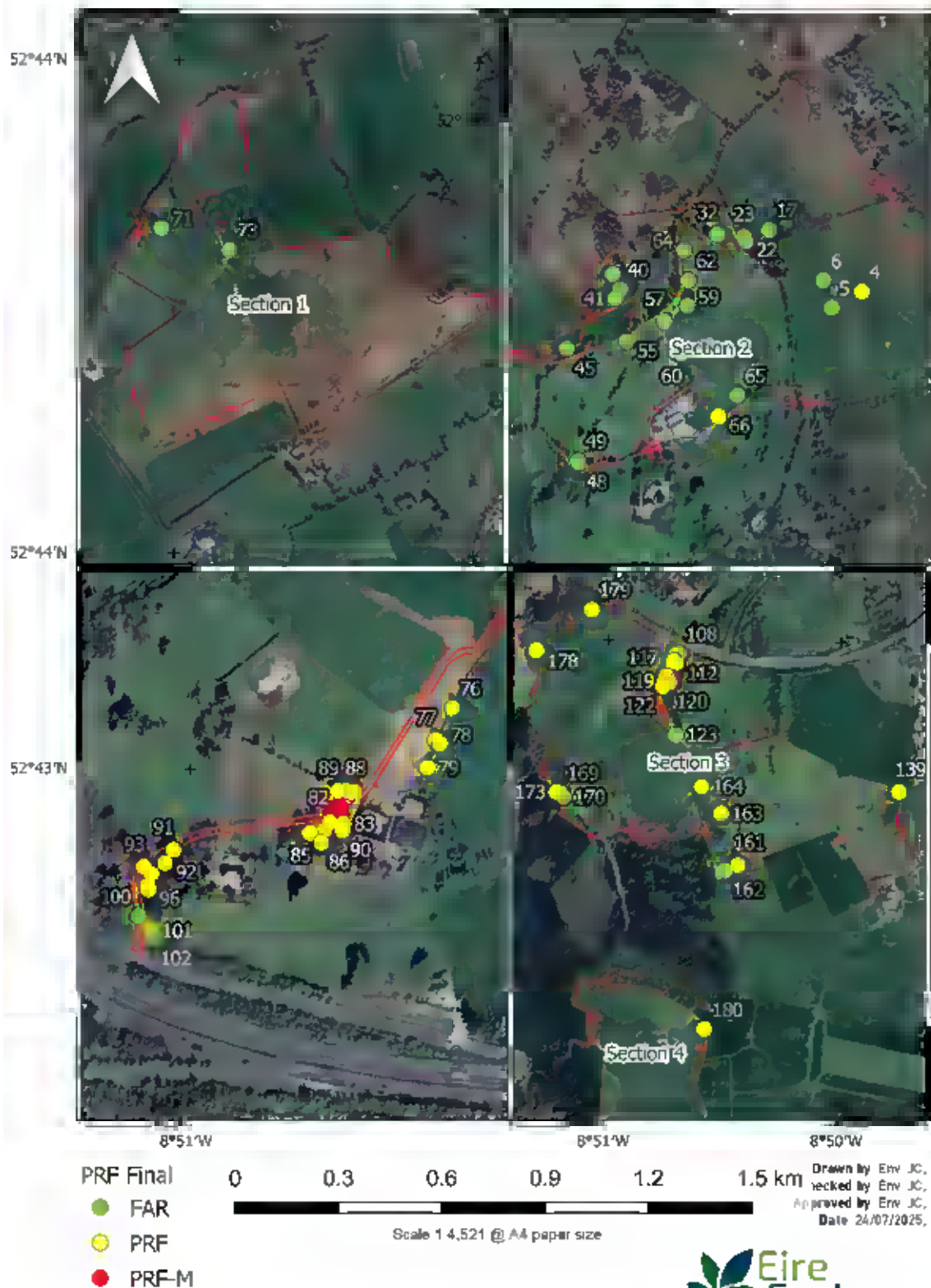
Location No.	Potential	Description	Latitude	Longitude
1	Moderate	Farm sheds in use, with a handful of potential features. Elevated Leisler's Activity at Detector 7. Shed 1a and 1b were subject to emergence surveys	52.69946	-8.84721
2	Moderate-Low	Mature Horse chestnut tree with multiple PRF's. Elevated Leisler's activity at Detector 7. Tree was subject to emergence surveys	52.7000	-8.84561
3	Moderate-High	The dwelling, 3a, is a three-storey building with plastered walls and a slate roof. Shed 3b is right beside the house.	52.72238	-8.84168
4	High	Shed 3c is 100 meters away from Location 3. It has stone walls with a slate roof, good potential	52.72335	-8.84157

During the daylight search no evidence of bats was noted from any of the structures listed in Table 3-4. Nighttime surveys did reveal the presence of bat roosts from Locations 2, 3 and 4.

4.1.2 Trees

In total, 181 trees were identified on site and were surveyed for bat Potential. Of these, 43 trees were concluded to contain PRF. One sycamore tree in Section 2 was flagged to have good potential for a larger roost. Emergence Surveys conducted at Location 2 discovered the presence of a Leisler's Bat roost in a mature horse chestnut tree.

Ballycuneen GLTA Results



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Figure 4-1: PRF tree locations

4.2 STATIC BAT DETECTOR SURVEYS

Seven Song Meter Mini full spectrum bat recorders were deployed within the proposed project site. Detectors were deployed in both the Spring and Summer bat seasons. Overall, seven bat species were recorded (Common Pipistrelle, Soprano Pipistrelle, Nathusius' pipistrelle, Leisler's bat, Brown Long-eared bat, Natterer's bat and Lesser Horseshoe). In addition, several Myotis calls were identified only to the genus level where more precise classification was not possible.

Table 4-2 provides a breakdown of recording per species from all detectors and seasons. In total 33,701 registrations were recorded. Table 4-3 provides a breakdown per detector. A bat passes per hour (BpHr) has also been provided. Figures 4-2 & 4-3 provide a visual representation of activity at each static location by graduating the size of the circle based on BpHr.

Table 4-2: Static Results

Common Name	Latin Name	No. of Recordings	%
Leisler's Bat	<i>Nyctalus leisleri</i>	14,817	43.9
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	10,547	31.2
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	6,912	20.5
Nathusius Pipistrelle	<i>Pipistrellus nathusii</i>	3	0.0
Pipistrelle 40 kHz	<i>Pipistrellus nathusii</i> or <i>P. pipistrellus</i>	62	0.0
Brown Long-eared	<i>Plecotus auritus</i>	302	0.1
Lesser Horseshoe bat	<i>Rhinolophus hipposideros</i>	20	0.0
Natterer's Bat	<i>Myotis nattereri</i>	313	0.01
Unidentified Myotis species		725	0.02
Total		33,701	

Leisler's bat and Common Pipistrelle were the most frequently recorded species within the proposed project site followed by Soprano Pipistrelle. All other species were recorded in lower numbers.

Detector 4, placed adjacent to Location 3, had highest overall activity. This location has connectivity through mature hedgerows and treelines. The detector here had highest activity within the proposed project site. Activity at this detector was dominated by Leisler's bats (38% of calls for this species), Soprano Pipistrelles (25%), and Common Pipistrelles (32%), with Lesser Horseshoe bats accounting for less than 0.1% of detections.

Other areas with high comparative activity include Detector 6 to the south of Section 3. Detector 6 had highest activity after Detector 4 with higher levels of Common Pipistrelle than were seen at Detector 4. Leisler's Bat are much sparser here than at Detector 7.

Baring Detector 7, activity across the proposed project site was substantially higher on edge habitat compared to open sections (Table 4-4 below summarises these results). Open habitats had less than a third of the activity compared to edge.

It should be noted that a single bat continuously circling a small stand of trees will produce numerous recordings. Therefore the number of registrations reflect bat activity rather than abundance.

4.2.1.1 Lesser Horseshoe Activity

During the surveys, 20 Lesser Horseshoe registrations were recorded at three of the seven detectors deployed. Only one static set in open habitats recorded this species, Detector 1, recorded this species, with a single registration. Figure 4-5 shows the locations of Lesser Horseshoe recordings with static points graduated by number of calls.

Table 4-3: Summary of all results from static detector surveys

Detector	Habitat	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total	Bp/Hr
1	Open	570	382	344	1	8	21	1	32	299	1,658	5.8
2	Edge	1,080	2,358	1,304	1	34	34	0	105	134	5,050	17.8
3	Open	1,261	188	208	1	0	17	0	20	30	1,725	6.1
4	Edge	4,815	3,105	3,969	0	12	221	16	142	109	12,389	44.7
5	Open	383	162	123	0	1	1	0	1	4	675	2.4
6	Edge	2,205	3,645	672	0	3	5	3	6	119	6,658	23.5
7	Open	4,503	707	292	0	4	3	0	7	30	5,546	19.6
Total		14,817	10,547	6,912	3	62	302	20	313	725	33,701	
Bat passes per hour		6.6	4.7	3.1	0.0	0.0	0.1	0.0	0.1	0.3	14.9	

Table 4-4: Differences in activity between open and edge habitats

Detector	Activity	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total
Open	Registrations	6717	1439	967	2	13	42	1	60	363	9604
	BpHr	5.9	1.3	0.9	0.0	0.0	0.0	0.0	0.1	0.3	8.5
Edge	Registrations	8100	9108	5945	1	49	260	19	253	362	24097
	BpHr	9.6	10.8	7.0	0.0	0.1	0.3	0.0	0.3	0.4	28.5

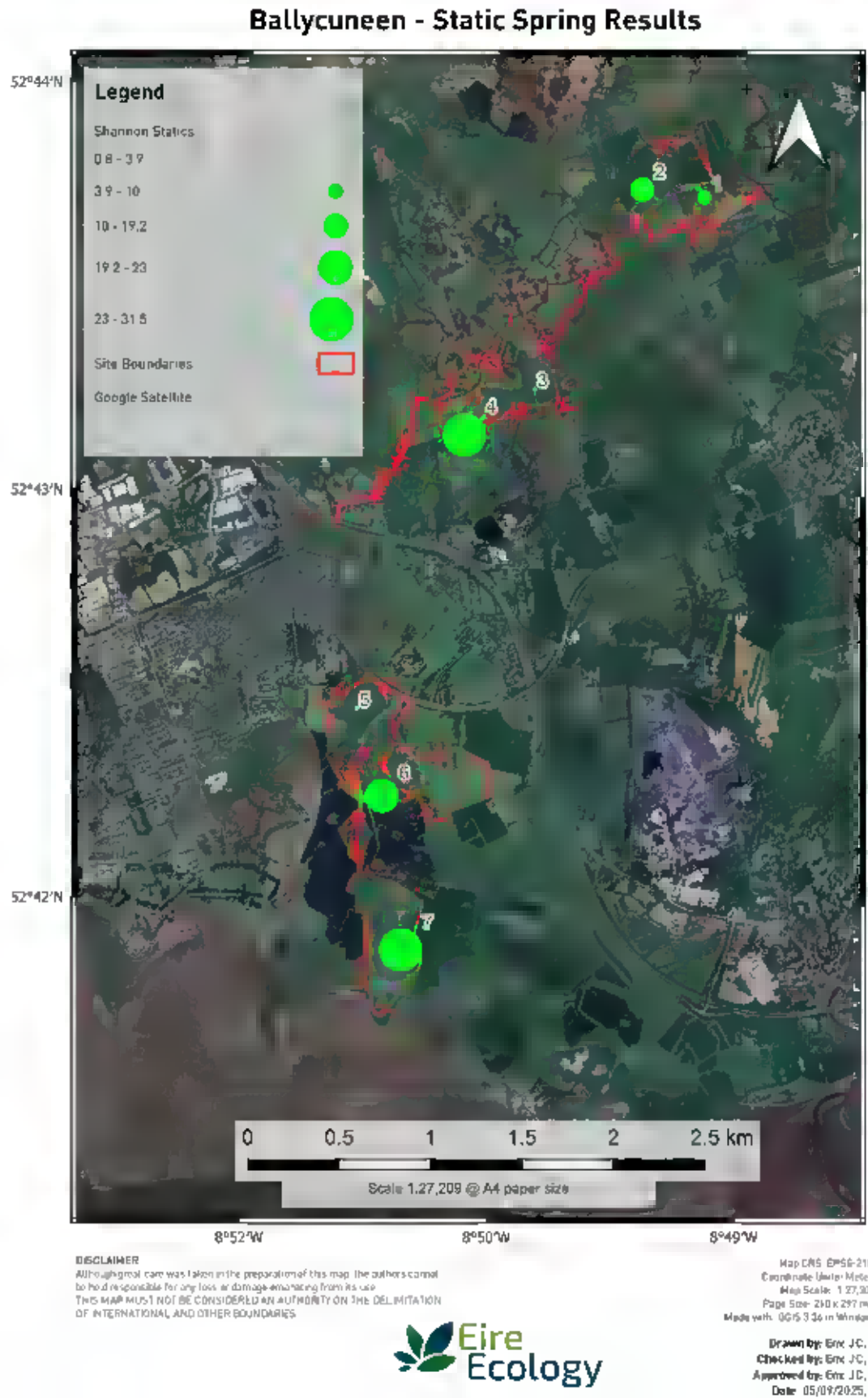
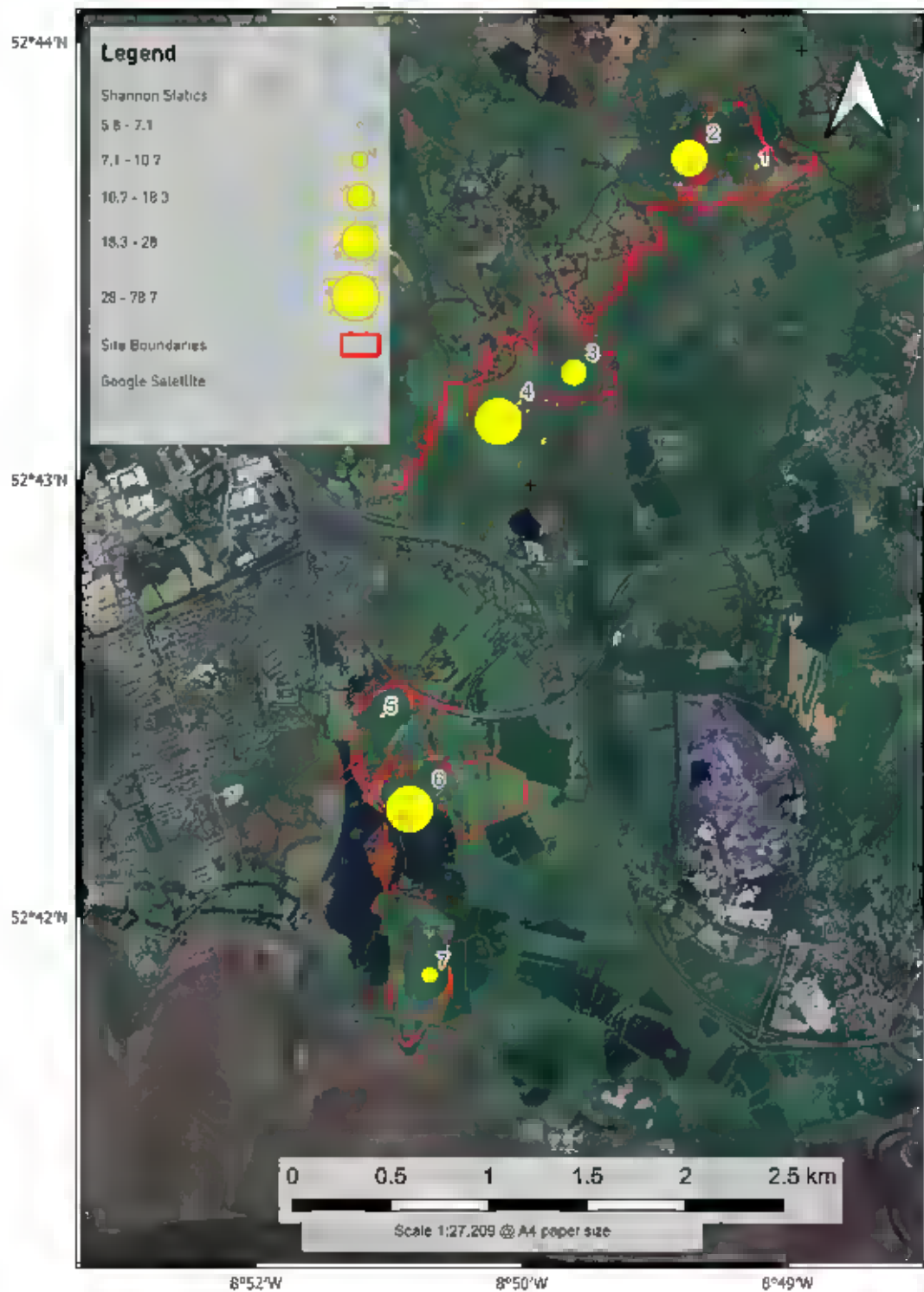


Figure 4-2: Static Detector Results – Spring BpHr

Ballycuneen - Static Summer Results



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Map CRS: EPSG:2157
Coordinate Units: Meters
Map Scale: 1:27,209
Page Size: 210 x 297 mm
Made with: QGIS 3.6 on Windows

Figure 4-3: Static Detector Results – Summer

Ballycuneen - Lesser Horseshoe Bat Spring Registrations



Figure 4-4: Spring statics with Lesser Horseshoe colored blue.

Ballycuneen - Lesser Horseshoe Bat Summer Registrations



Figure 4-5: Summer statics with Lesser Horseshoe colored purple

4.2.1.2 Proximity to Roost Analysis

An assessment was conducted of the Spring and Summer static activity to attempt identify close by bat roosts by examining the times of bat calls and comparing them to species typical emergence.

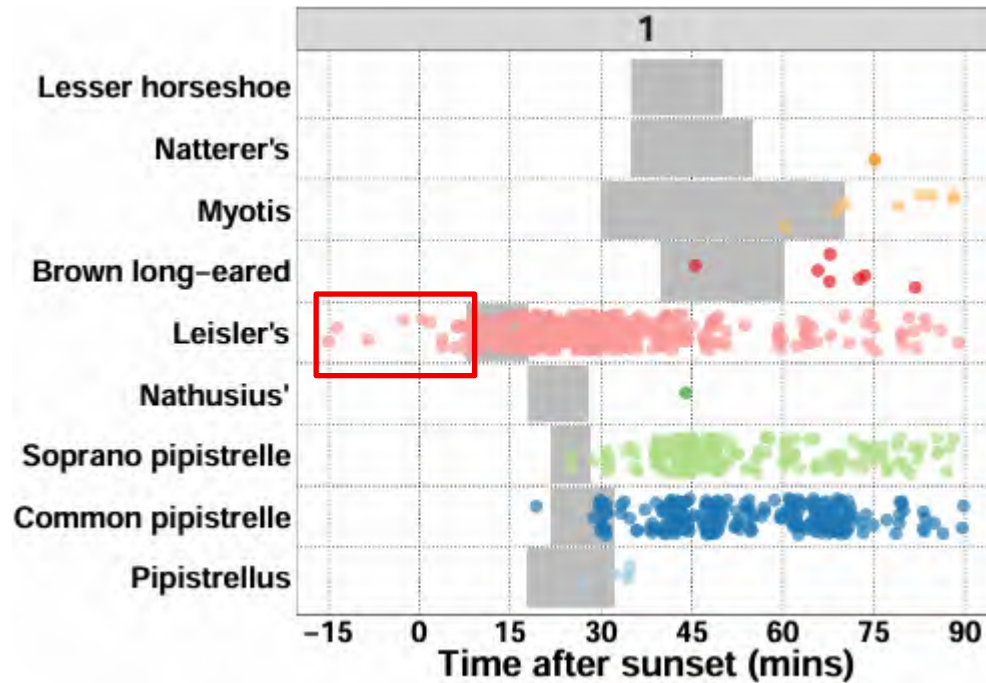


Figure 4-6: At Detector 1, Leisler's were regularly recorded prior to typical emergence in Spring and Summer (highlighted in red)

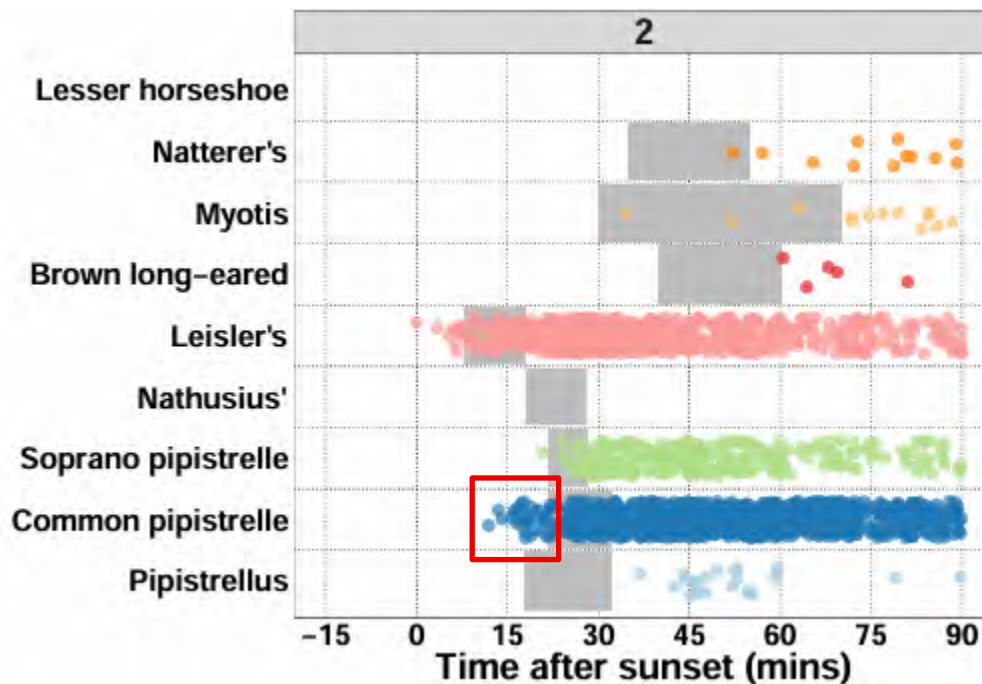


Figure 4-7: At Detector 2, Leisler's and Common Pipistrelle were regularly recorded prior to typical emergence during Spring and Summer

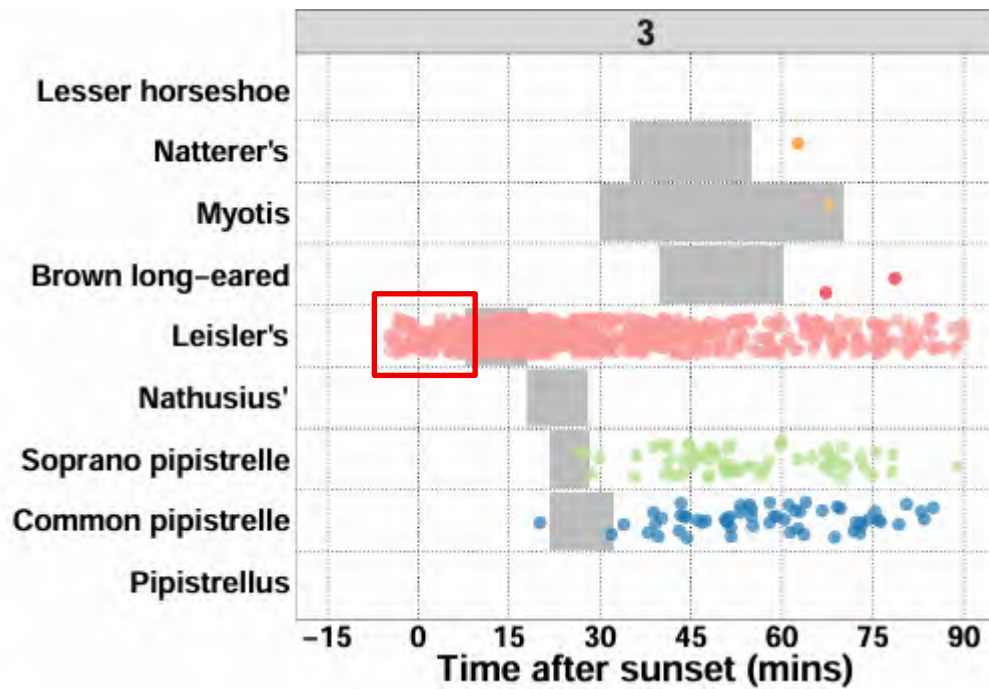


Figure 4-8: At Detector 3, Leisler's were regularly recorded prior to typical emergence during Spring and Summer

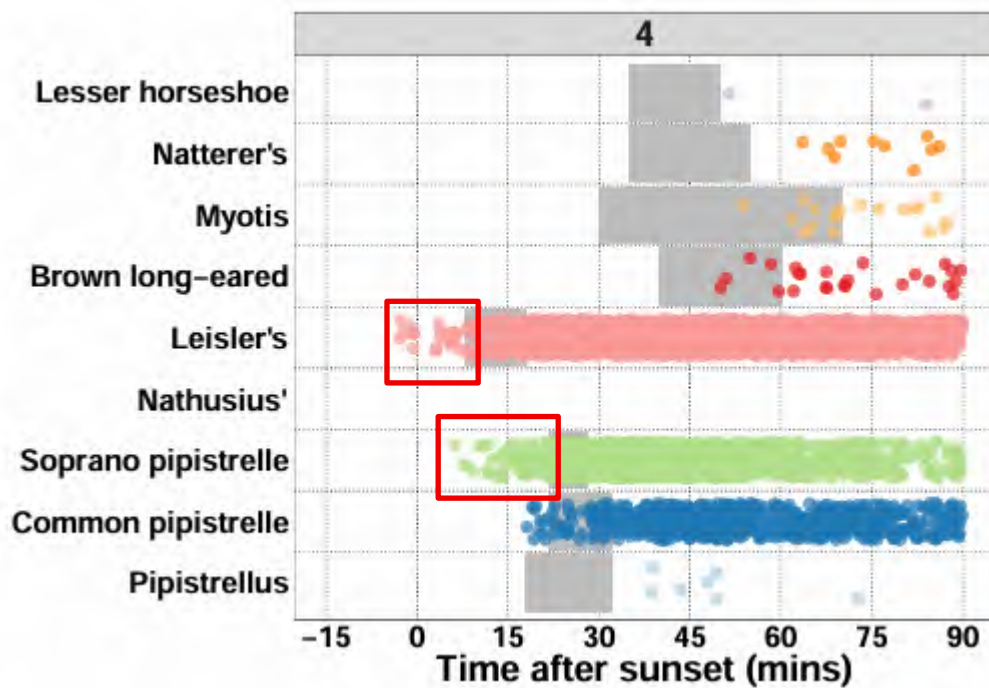


Figure 4-9: At Detector 4 Leisler's, Common and Soprano Pipistrelle were regularly recorded prior to typical emergence during Spring and Summer

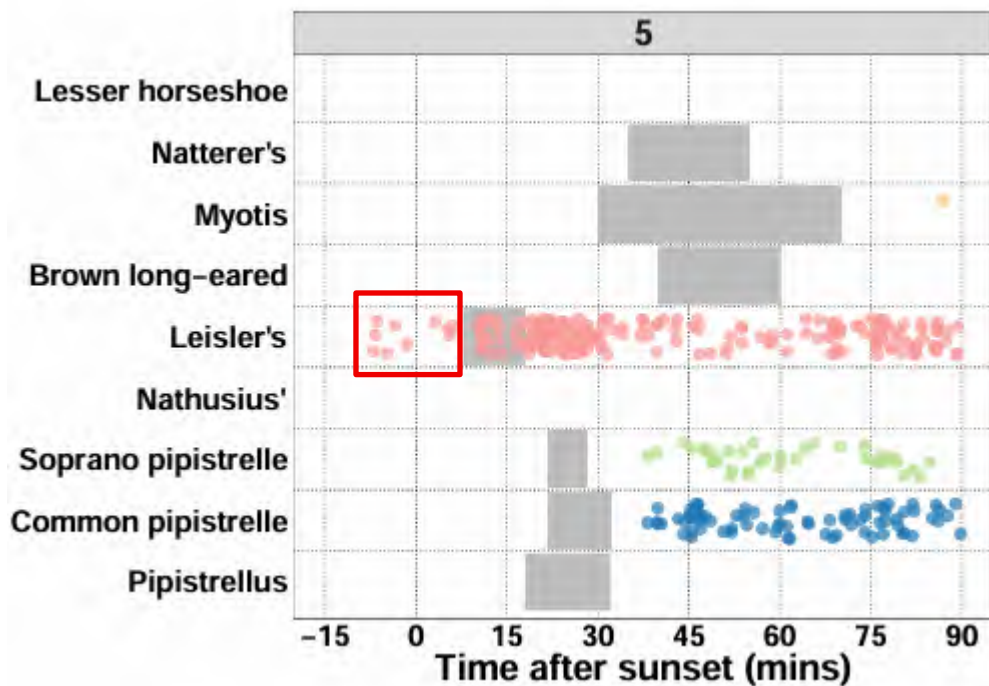


Figure 4-10: At Detector 5, Leisler's were recorded prior to typical emergence during Spring and Summer

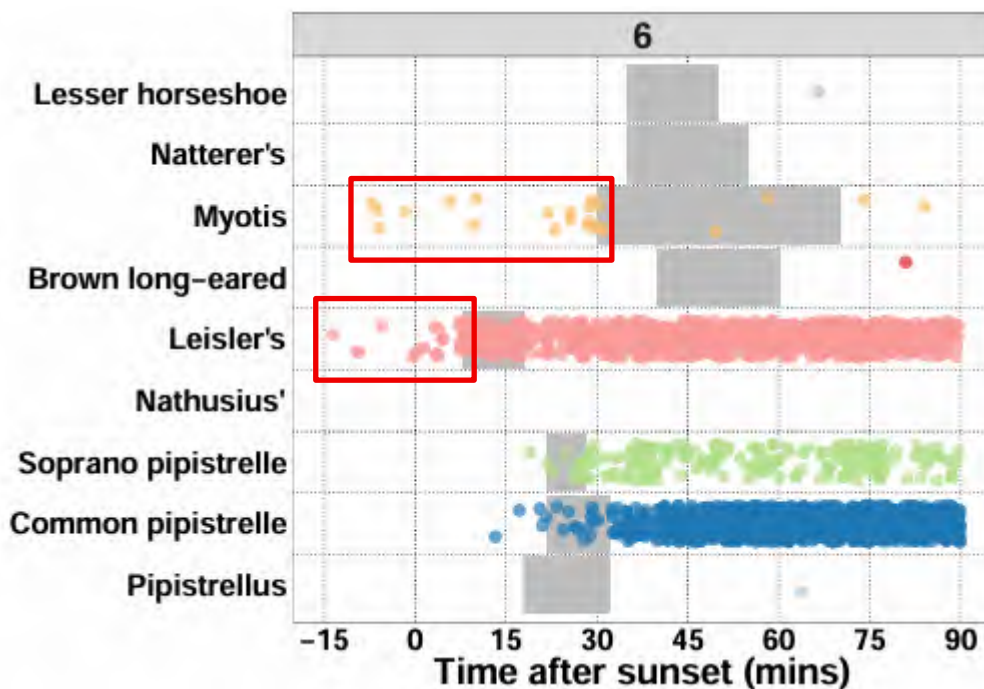


Figure 4-11: At Detector 6 unidentified Myotis recorded prior to typical emergence during Spring, alongside Leisler's and occasional Pipistrelles recorded prior to typical emergence, during Spring and Summer

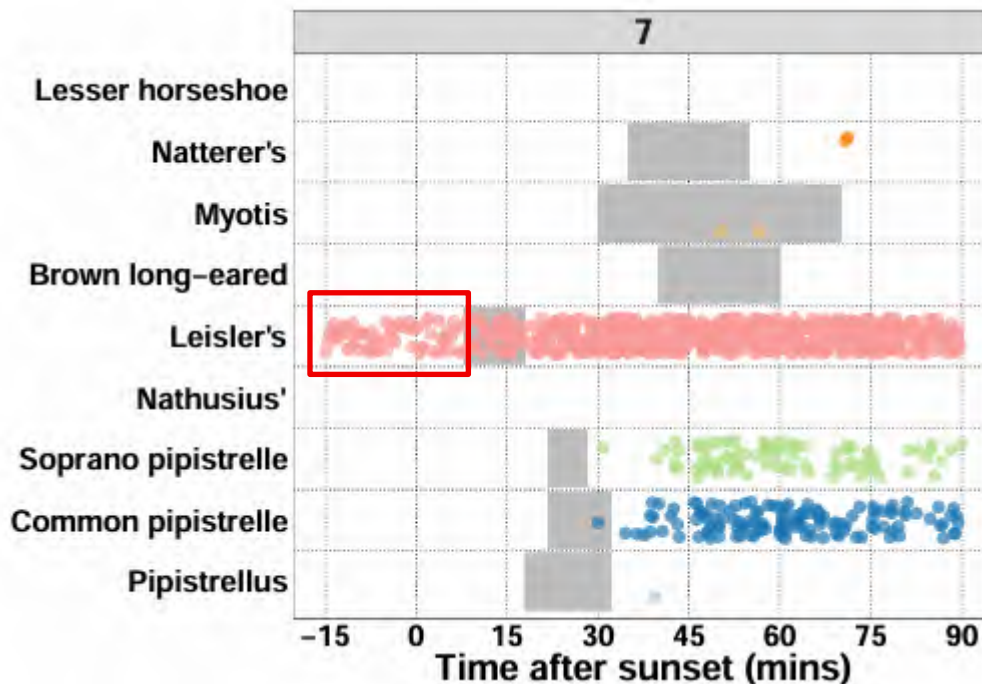


Figure 4-12: At Detector 7, Leisler's high levels of Leisler's bat was recorded prior to typical emergence during Spring and Summer

Leisler's Bat is the earliest emerger on the proposed project site, with emergence times before typical emergence seen at every detector. There are likely multiple Leisler's roosts across the site, particularly at Detector 7, where activity is high for this species.

Detector 6 shows an early emergence time for many Myotis Bats. Given the vicinity of the Detector to woodland, it is suspected that they may be roosting in a tree nearby. The static survey in Summer did not have any Myotis emerging as early as the Spring Survey.

Pipistrelle species display early emergence at Detector 1, 2, 3, 4 and 6. Detector 4 also shows Lesser Horseshoe bat emerging near the typical emergence times, though slightly later than usual. One or more Lesser Horseshoe roosts may be likely in the locality.

4.3 ROOST SURVEYS.

Nighttime surveys were conducted on the 3rd and 21st of July 2025. These surveys consisted of multiple surveyors recording activity levels at various points throughout the proposed project site at various structures identified during desktop surveys. The purpose of surveys was to examine for roosting bats that could be impacted by the development, observe bat interactions such as commuting routes, feeding areas, and examine if there are current impediments to bats within and surrounding the proposed project site.

- Sheds in Section 4, adjacent to Detector 7
- Horse chestnut tree in Section 4
- Farm Shed in Section 2

- Occupied Dwelling South of Section 3 of the proposed project site adjacent to Detector 4, stable included in survey.

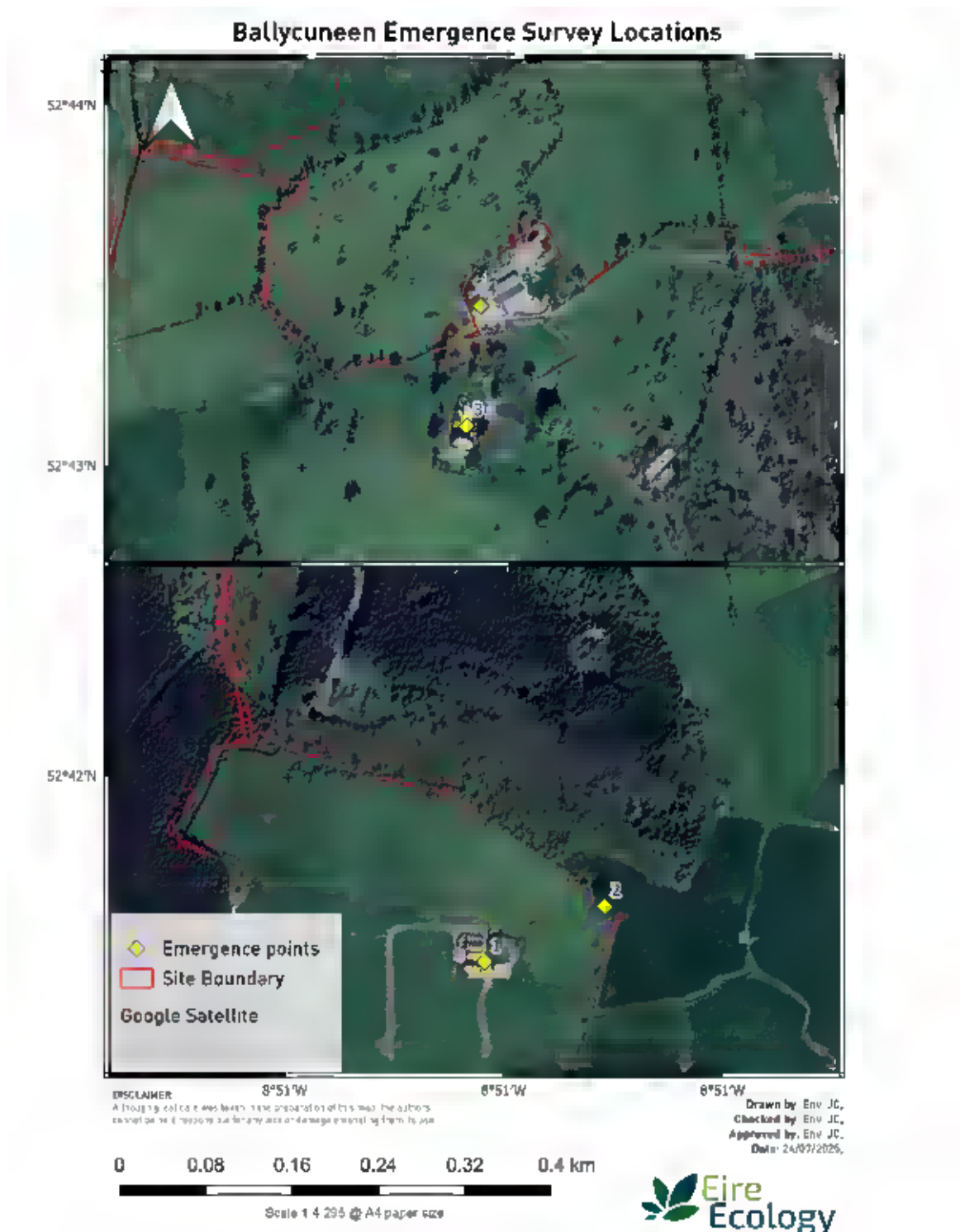


Figure 4-13: Emergence survey locations

4.3.1.1 Key findings from nighttime surveys

4.3.1.1.1 Emergence surveys on 03/07/2025

Emergence surveys were conducted on two sheds and a PRF Tree which showed good potential for roosting bats. Static Detector 7 showed elevated Leisler's activity for this site in the Spring, and emergence time analysis shows that these bats have an early emergence time for this species at Detector 7, indicating a likely nearby roost. Shed 1a has a tractor stored within and doors that are not closed. Shed 1b was a smaller storage shed with good eaves and roosting potential. The horse chestnut tree (Location 2) was also recorded with a Thermal NVA to investigate the potential for a tree roost.

Emmergence Survey 03/07/2025



Figure 4-14: Emergence Surveys Conducted 3rd of July 2025

Table 4-5: Results from Shed 1a; 03/07/2025

Contact number	Time	Species	Details	NVA
1	22:27	Common Pipistrelle	Three individuals Circling yard in front of tractor shed	Canon IR
2	22:29	Leisler's Bat	Passes over	
3	22:47	Leisler's Bat	Circle yard; entering and exiting sheds	
4	22:52	Leisler's Bat	Continues circling for 8 minutes	
5	23:01	Leisler's Bat	Single bat circling yard	
6	23:09	Leisler's Bat	Swooping past	
7	23:24	Leisler's Bat	Bat swoops up to shed then turns and leaves	
8	23:30	Leisler's Bat	Single bat emerges	
9	23:55	Leisler's Bat	Bat entering tractor shed	
1 Leisler's bat seen emerging from Shed 1a				



Plate 4-1: Canon IR - Tractor Shed 1a

Table 4-6: Results from Shed 1b; 03/07/2025

Contact number	Time	Species	Details	NVA
-	22:16	Unknown	Bird carrying something into a nest	Thermal 19mm
-	22:40	Unknown	Second bird perches on rafters	
No bats seen emerging from Shed 1b				

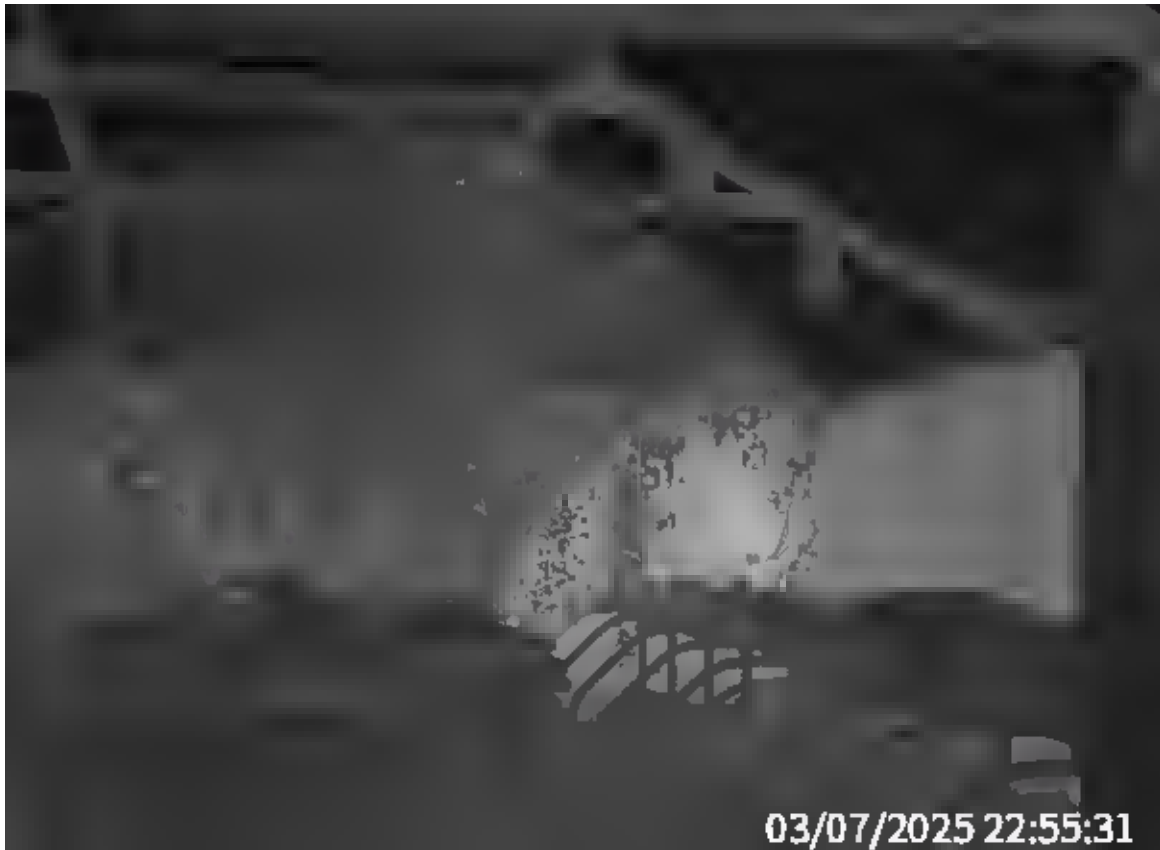


Plate 4-2: Interior of Shed Smaller Storage Shed

Table 4-7: Results from Tree; 03/07/2025

Contact number	Time	Species	Details	NVA
1	22:24	Unknown	Bat passes in front of scope	Thermal TK
2	22:35	Leisler's Bat	Two bats emerge from tree	
3	22:36	Leisler's Bat	Bat emerges from tree	
4	22:38	Leisler's Bat	8 Bats fly past tree	
5	22:43	Leisler's Bat	Bat emerges from tree	
6	22:49	Leisler's Bat	Bat emerges from tree	
5 Leisler's Bats emerging				

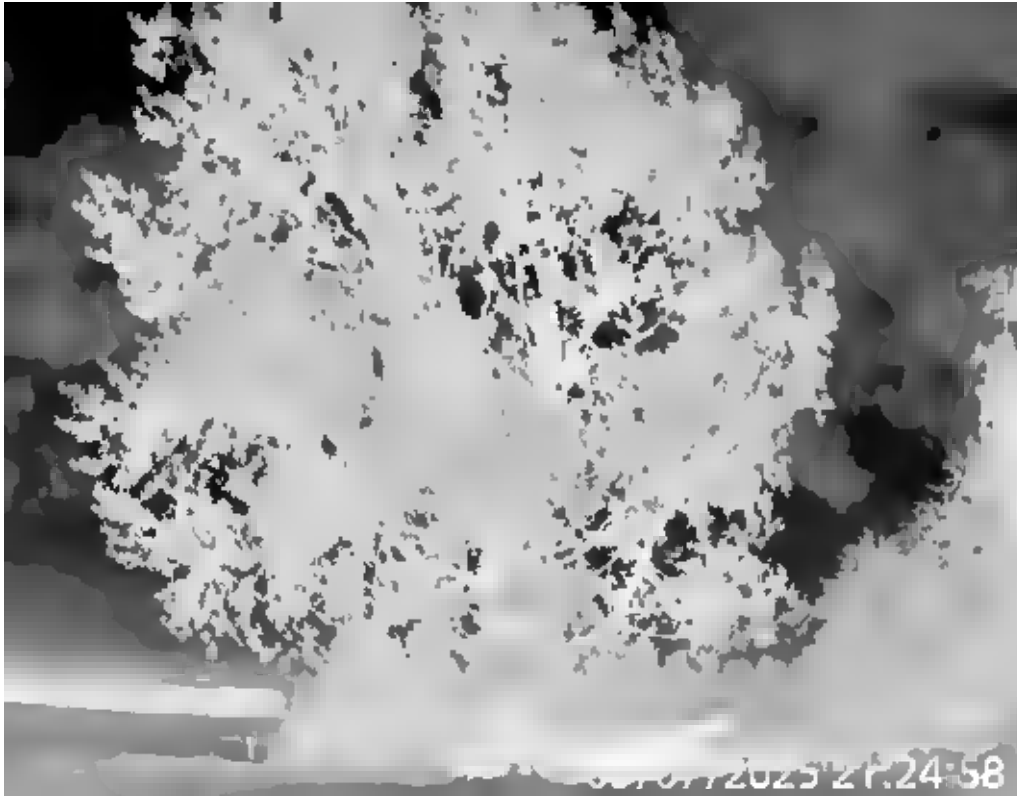


Plate 4-3: Thermal Footage of Horse Chestnut Tree Emergence Survey

4.3.1.1.2 Emergence surveys on 21/07/2025

Two emergence surveys were conducted on the 21 July 2025 of structures 3a; an occupied Manor house, 3b; an old stable, with excellent crevice features in the stonework and 3c; another, smaller shed, with similarly good potential, by multiple surveyors working with NVAs and ultrasonic detectors. Six Pipistrelle bats were observed emerging from Structure 3b (5 Common Pipistrelles which emerged earlier and 1 Leisler's Bat later in the night). Lastly, two bats were seen emerging from Building 3c, where activity was high in the farmyard through the night.

Table 4-8: Results from House 3a; 21/07/2025

Contact number	Time	Species	Details	NVA
1	22:00	Leisler's Bat	Heard not seen	Pixfra Monocular
2	22:03	Soprano Pipistrelle	Heard not seen	
3	22:09	Soprano Pipistrelle	Heard not seen	
4	22:10	Leisler's Bat	Heard not seen	
5	22:13	Common Pipistrelle	Heard not seen	
6	22:14	Leisler's Bat	Emerges from roof of house	
7	22:26	Barn Owl	Two barn owls seen and heard calling	
8	22:40	Leisler's Bat	Swoop in front of Thermal Scope	
9	22:52	Common Pipistrelle	Emerging from chimney base	
10	22:52	Leisler's	Poss emerging / overflying from chimney	
1 Leisler's Bat and 1 Common Pipistrelle bat recorded emerging from building				



Plate 4-4: Manor House Thermal Scope view

Emmergence Survey 21/07/2025

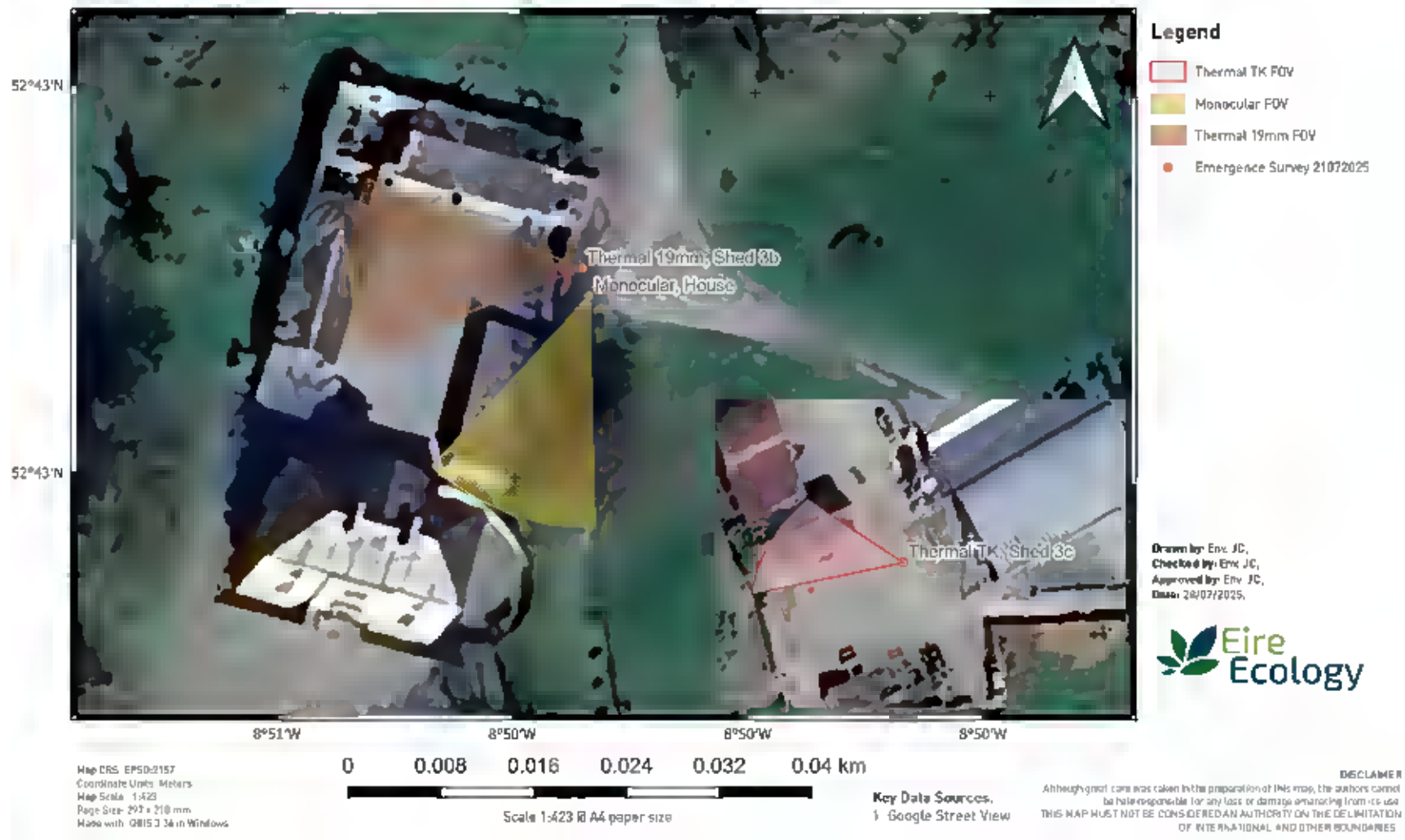


Figure 4-15: Emmergence Surveys conducted on 21st July

Table 4-9: Results from Shed 3b; 21/07/2025

Contact number	Time	Species	Details	NVA
1	21:39	Unknown	Bat seen inside	Thermal TK
2	21:48	Common Pipistrelle	Five from large barn door	
3	22:34	Leisler's Bat	One from Crevice, flew into barn	
5 Common Pipistrelles and 1 Leisler's bat Emerge				



Figure 4-16: Shed 3b, Thermal TK view on stable doors

Table 4-10: Results from Shed 3c; 21/07/2025

Contact number	Time	Species	Details	NVA
1	21:48	Common Pipistrelle	Circling Yard, North of House	Thermal 19mm
2	22:16	Leisler's Bat	Circling Yard	
3	22:35	Leisler's Bat	Passes in front of Shed 2	
4	22:41	Leisler's Bat	Passes in front of Shed 2	
5	22:44	Leisler's/ Soprano Pipistrelle	Two bats enter shed and one emerges immediately after	
6	22:49	Common Pipistrelle	Emerges from Shed 2 Door	
7	22:54	Soprano Pipistrelle	Emerges from Shed 2 Door	

Contact number	Time	Species	Details	NVA
8	22:57	Leisler's Bat	Enters Shed	
Common Pipistrelle and Soprano Pipistrelle emerging from Shed 3c				

In total 5 roosts were found during nighttime surveys, Shed 1a at Location 1, which had Leisler's Bats, The PRF Tree at Location 2, where a Leisler's roost was found, House 3a, which had a Leisler's bat emerging, Shed 3b, where Common Pipistrelle and Leisler's Bat were present and lastly Shed 3c, which showed common and Soprano Pipistrelle Emerging.

The tree roost contained the largest accumulation of Leisler's, with 5 observed emerging and many observed using the hedgerow here as connectivity. These numbers equate to that of a satellite roost. The three further satellite roosts for this species that were found in buildings in or adjacent to the proposed project site showed only a single Leisler's bat emerging, again suggesting satellite roosts.

4.4 ACTIVITY ANALYSIS

Static results were interpreted through ECOBAT analysis. Ecobat is an online tool which makes assessments of bat activity levels by comparing data entered by the user with bat survey information from similar areas. Specifically, a median bat activity level is calculated which corresponds to a bat activity category (Table 4-8).

Table 4-11: Median percentile range and corresponding bat activity

Percentile	Bat Activity
81-100	High
61-80	Moderate to High
41-60	Moderate
21-40	Low to Moderate
0-20	Low

To prepare a risk assessment for the proposed project site, previous ECOBAT data the author has analysed was used to derive both an activity level and a median percentile. Data from numerous sites with similar habitat types were examined and compared with data from the proposed project site. Activity levels from these donor sites were examined, activity percentiles were averaged to create a model from which activity can be derived. Detectors were condensed into two groups; open grassland without a landscape feature within 25m of the detector and locations close to edge habitat (be that hedgerow or treeline). The percentile rating for each night's total passes per species from the comparison sites were ranked and averaged to derive a percentile score for the Ballycuneen detectors. Following (P. Lintott., 2017) a minimum range of 200 nights with at least one night of bat passes was compiled.

An assessment was conducted only for those species identified for Leisler's bat, Common, Soprano and Nathusius' Pipistrelle (following the precautionary approach all 40kHz Pipistrelle recordings were added to Nathusius' Pipistrelle data). Table 4-13 provides an assessment of the entire site while table 4-14 compares the

difference between open and edge habitats. For open habitats the proposed project site had Moderate Common and Soprano Pipistrelle activity and Low Leisler's activity while edge had High activity for Common and Soprano and Low for Leisler's activity. Nathusius' activity was low everywhere.

Table 4-12: Ballycuneen detectors grouped by habitat

Group	1	2
Habitats	Open grassland without a landscape feature within 25m	Close to edge habitat (treeline, hedgerow or woodland)
Detectors	1, 3, 5, 7	2, 4, 6

Table 4-13: Assigned activity levels – entire site

Latin Name	Common Name	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity	Median Percentile	Bat Activity Category
<i>Nyctalus leisleri</i>	Leisler's bat	130	58	22	8	10	78	Moderate to High
<i>Pipistrellus nathusii</i>	Nathusius Pipistrelle	0	0	0	0	3	0	Low
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	114	62	42	5	3	74	Moderate to High
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	65	98	39	8	18	68	Moderate to High

Table 4-14: Assigned activity levels – open compared to edge habitat

Latin Name	Common Name	Edge Habitat		Open Habitat	
		Median Percentile	Activity Category	Median Percentile	Activity Category
<i>Nyctalus leisleri</i>	Leisler's bat	81	Moderate	85	Low
<i>Pipistrellus nathusii</i>	Nathusius' Pipistrelle	0	Low	0	Low
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	70	High	89	Moderate
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	66	High	67	Moderate

5 DISCUSSION

Seven of the nine resident Irish bat species were found within the proposed project site; Leisler's Bat, Common Pipistrelle, Soprano Pipistrelle, Nathusius' Pipistrelle, Brown Long-eared, Natterer's Bat and Lesser Horseshoe Bat.

A total of 33,701 registrations were recorded over the course of 30 nights from 7 static bat detectors placed in key locations throughout the proposed project site. Detectors 2, 4, 6 are set in Edge Habitat which shows much higher activity on this site and these detectors make up 41% of all bat calls. The location with highest density of bat commuting traffic was Detector 4.

Lowest Levels of activity was consistently seen in open habitats onsite, with Detector 1, 3, and 5 showing drastically lower levels of activity. Detector 7, while also in the open, showed elevated levels of activity in Spring, where 4,503 registrations were attributed to Leisler's Bat. Activity at this detector for other species is consistent with Open habitat activity levels seen elsewhere on site. It also showed the highest levels of Myotis Species on site though few Myotis bats were recorded.

The detector surveys show in open habitats, the average bat pass equates to 8.5 Bp/Hr. This is a low level of activity, and this habitat represents the majority of the proposed project site, particularly where the solar panels are proposed. In open habitats Common and Soprano Pipistrelle make up 25% of activity with Leisler's bats representing 70%. All these species typically fly at heights above 5m and regularly at heights of 20m+. The presence of solar panels should have little impact on these species' current rate of activity in open areas. Other species were found in very low numbers here.

The average Bp/hr by edge habitat reached 28.5 Bp/Hr with high numbers of Leisler's Bat, Common and Soprano Pipistrelle. Some hedgerow and treeline loss will take place as part of the development, and as such this will have to be mitigated in order to protect important connective features for bat species.

A Leisler's Bat tree roost was identified during nighttime surveys. Additionally bat roosts were noted from buildings in Section 4 and Section 2 also (4 roost structures total). None of these buildings will be altered by the proposed development.

6 IMPACT ASSESSMENT PRIOR TO MITIGATION

Determination of impacts is derived with guidance from EPA 2022 Guidelines on the information to be contained in Environmental Impact Assessment Reports. Table 6-1 provides definitions of effect while table 6-2 provides an assessment of impacts prior to mitigation for bats recorded within the proposed project site.

6.1 LOSS OF ROOSTING HABITAT

Assessment of Potential Impacts on Roosting Bats	All structures, trees and hedge species which could be impacted by the development were assessed from ground level examining the potential to host a bat roost. No buildings identified in the PEA are going to be subject to renovation, despite being onsite, and as such no derogation license is required. Trees were examined for their potential to host a bat roost and one roost was identified in Section 4. The majority of trees including the confirmed roost will remain unaffected by the proposed development baring in section 2 where scrub and some areas of hedgerow are proposed to be removed. Important tree lines will require re-surveying prior to felling to ensure no bats are present.
Characterization of unmitigated effect	Due to the retaining of the building roosts on site the development will not have an impact on roosting bats. Bats moving into potential roosts at trees being impacted could be harmed. Lighting is typically the greatest post-construction risk to roost habitats, as inappropriate lighting practices can deter bats from returning to their roosts; however, for the project no operational lighting is proposed.
Assessment of Importance prior to mitigation	Bats moving into potential roosts in trees being impacted could be harmed.
Mitigation	Tree-felling should ideally be undertaken in the period September to late October/early November, however, can also be conducted from late January until the end of February. Outside of these times an EcOW will need to first verify if impacts will occur. All trees recorded as PRF / FAR will require an additional at-height survey prior to felling. No trees identified as bat roosts will be disturbed during construction phase and care must be taken in implementing lighting in the area of the roost. A 50m buffer surrounding the tree roost will be put in place where no panels will be erected. 4 x Schwegler 1ff, 2 x Schwegler 2fn and 2 cavity rocket bat boxes suitable for void dwelling
Residual Effect following Mitigation	With the implementation of the prescribed mitigation measures, no significant residual effects are predicted as a result of the construction works.

6.2 LOSS OF FORAGING AND COMMUTING HABITAT

Describing the Significance of Effects	Surveys demonstrate low bat activity in open areas of the proposed project site thus the placement of solar panels throughout the site should have low levels of impact on feeding bats. It is projected that approximately 174m² of hedgerow and 70.6m² of treeline will be lost to facilitate the construction of the proposed project. The loss of these linear features will result in the loss of feeding and commuting habitats for the local bat population.
Characterization of unmitigated effect	Without mitigation, there would be a loss of some feeding habitat for bats close to the location of a Manor House roosts South of Section 2.
Assessment of Importance prior to mitigation	This is a moderate effect on receptors.
Mitigation	Planting of Compensatory Woodland 0.7Ha of land has been set aside and compensatory woodland will be planted in land in Section 2 along the Northern Border of this section. With the retaining of mature trees, this will provide feeding and commuting habitat for local bats. This will act as feeding habitat for bats in this section of the proposed project site. To mitigate all treeline and hedgerow loss across the proposed project site, 4,304m² of new treeline and hedgerows will be planted in accordance with Figures 6-1 to 6-4 below. These hedgerows should be of Irish provenance and must be at least 3m wide to ensure they will serve as commuting routes for bats. In addition, it is proposed to plant a new woodland area of approximately 0.83ha (see Biodiversity Enhancement Management Plan for details). Fence A section of boundary gorse is proposed to be removed. While compensation hedgerow is proposed, this will take time to establish. As this scrub provides N-S connectivity, a temporary fence with solid timber hoarding will be installed along the new hedgerow providing alternative connective features.
Residual Effect following Mitigation	With the implementation of the prescribed mitigation measures, no significant residual effects are predicted as a result of the construction works. Short term slight effects on foraging and commuting are anticipated due to the temporary loss of vegetation during the construction phases though these effects will reduce as the Compensatory woodland matures.

Ballycuneen Mitigation - Section 1

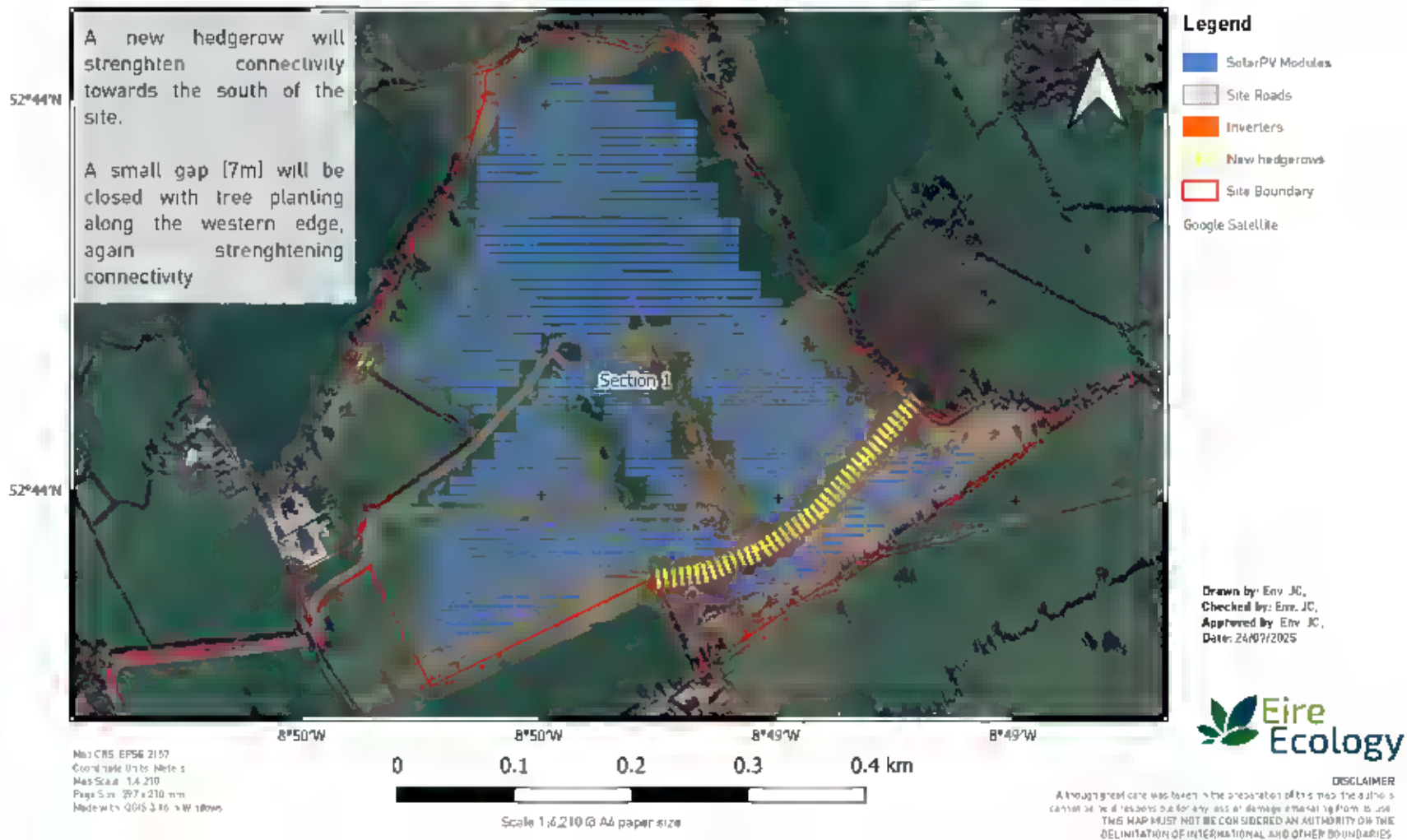


Figure 6-1: Section 1 – Planting of Hedgerows

Ballycuneen Mitigation - Section 2 Buffer - Leislars and Barn Owl

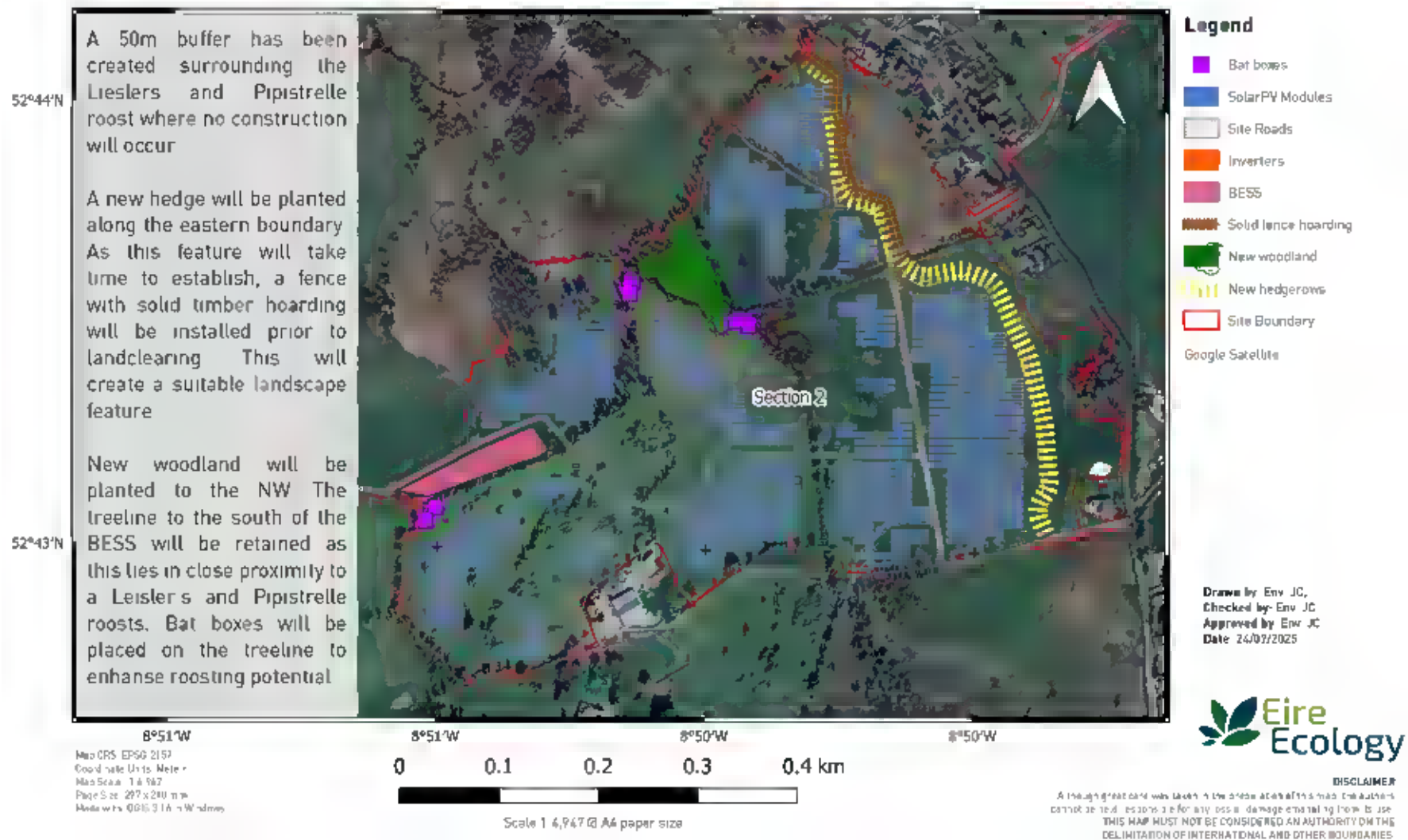


Figure 6-2: Section 2 - Planting of Hedgerows and Enhancement Woodland.

Ballycuneen Mitigation - Section 3



Figure 6-3: Section 3 - Planting of Hedgerows and Pond Feature

Ballycuneen Mitigation - Section 4

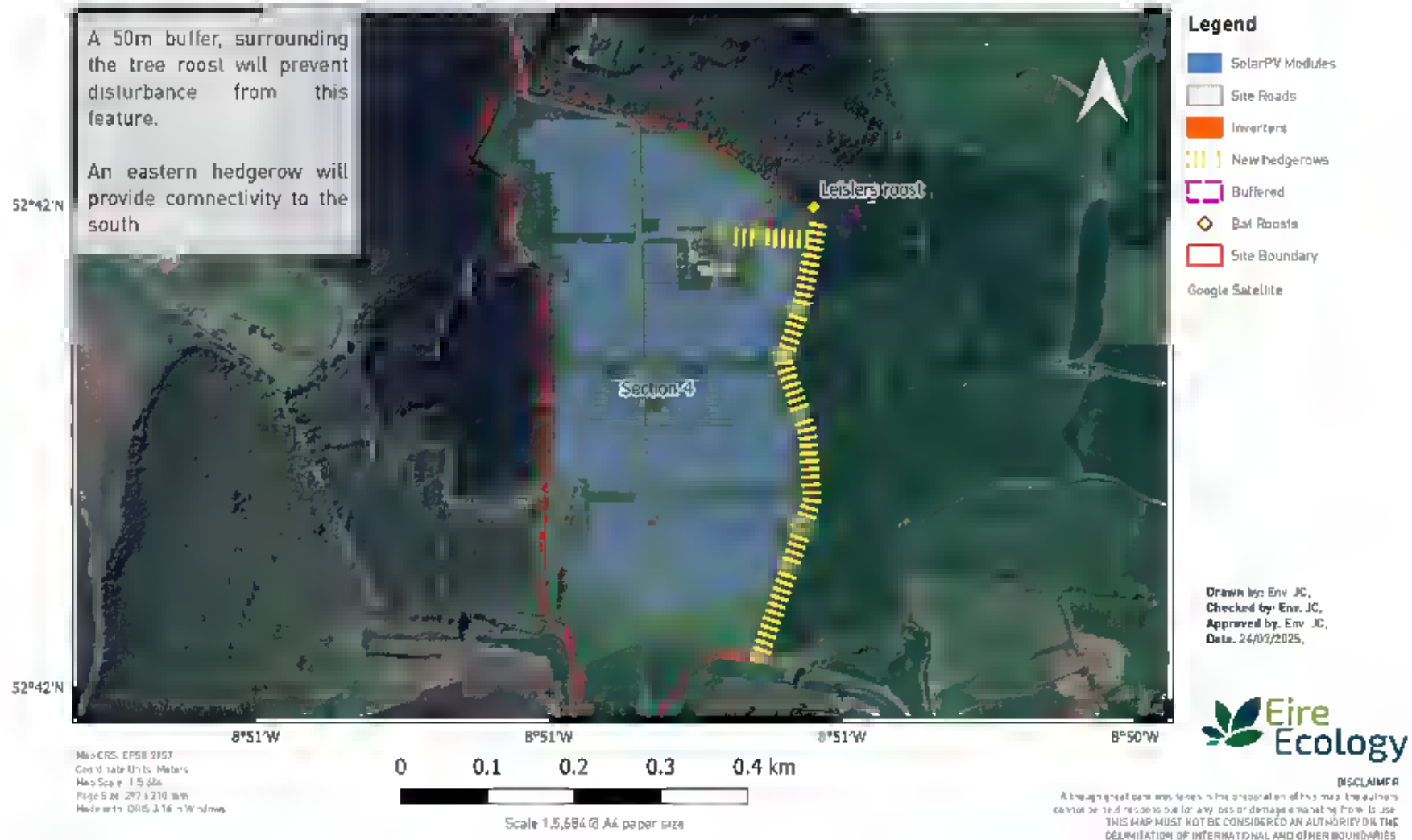


Figure 6-4: Section 4 - Planting of Hedgerows and buffer surrounding tree roost

6.3 DISTURBANCE.

Describing the Significance of Effects	Disturbance - Works associated with development or building work are likely to lead to an increase in human presence at the proposed project site, extra noise and changes in the site layout and local environment. Lighting effects on feeding and commuting bats Guidance on lighting has been based on Bats and artificial lighting in the UK, Guidance Note 08/18 (BCT, 2018), EUROBATS; <i>Guidelines for consideration of bats in lighting projects</i>. (Voigt, 2018) and BCI; Bats & Lighting document; (BCI, 2010). Lighting can alter the behaviour of bats and the insects they prey on. Night flying insects can be attracted to lights particularly sources that emit an ultraviolet component or have a high blue spectral content. Whilst some species of bat such as Leisler's and Pipistrelle species can take advantage of this occurrence, other species such as Daubenton's bat and brown long-eared avoid such areas. Lighting can create barriers for bat species both entering roosts and using commuting routes such as rivers, treelined roads and woodland edges. During construction artificial lighting may be used but will follow best-practice guidelines to avoid disturbance to bats. A mitigation guideline produced by (BCT, 2018) recommends that for effective mitigation to be implemented, there needs to be a collaborative effort by an ecologist in conjunction with engineers, planners and when deemed necessary by the ecologist, there should also be input from a lighting specialist and landscape designer. The guideline was designed for the UK where more bat species are concerned however there are aspects of the guideline that apply to Irish bat species. The guidelines recommend a baseline bat survey is conducted and the following areas should have no ALAN • Roosting and swarming sites for all species • Foraging or commuting habitat for highly light-averse species (lesser horseshoe, brown long-eared and some Myotis) • Foraging or commuting habitat used by large numbers of bats • Foraging or commuting habitat for rare species (Lesser horseshoe) (Bat Conservation Trust, 2018) Lighting during the construction phase, if used, will be designed and positioned to meet these requirements, ensuring minimal disruption to bat activity while maintaining safety. No operational lighting is proposed for the proposed project.
Characterisation of unmitigated effect	Without sufficient care, lighting during the construction phase could have a significant impact on the roosts found within the proposed project site.
Assessment of Importance prior to mitigation	This is assessed as a significant effect on a receptor of Local Importance (Higher Value).
Mitigation	Construction During construction, artificial lighting may be required but will follow best-practice guidelines to avoid disturbance to bats. Where lighting is unavoidable during construction, low-intensity lighting and motion sensors will be used to limit illumination. Exterior lighting, during construction, will be designed to minimize light spillage, thus reducing the effect on areas outside the proposed development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the proposed project site boundary and woodland areas to minimize disturbance to bats. Directional accessories will be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.

	Operational phase Lighting No outdoor lighting is proposed during operational phase. Ballycasey Cricket Club In Section 3, a hedgerow will be planted on the western boundary of the proposed project site, where a Cricket Club is located. In addition to bolstering connectivity from the southern portions of the proposed project site, this hedgerow will also prevent light spillage
Residual Effect following Mitigation	No significant residual effects on bats are expected .

6.4 IN COMBINATION EFFECTS CONSIDERING GP JOULE & TERRA SOLAR PROPOSED SOLAR FARMS

6.4.1 GP Joule.

The EclA submitted with this application by Scot Cawley has proposed mitigation / enhancement measures consisting of hedgerow planting and limiting outdoor lighting. No bat roosts were found and their impact assessment states there will be no impact on the local bat population. They value the local bat population as local higher value for all species baring Lesser Horseshoe which was ranked as of County Importance.

Should both projects proceed, the in combination effects will be negligible given both projects having not significant effects. Mitigation and enhancement effects of the Ballycuneen project are strong and the long term effects should be positive due to the creation of hedgerows, woodland and the instillation of bat boxes.

As long as the mitigation measures requested above are implemented, impacts on the local bat populations will be negligible.

6.4.2 Terra Solar.

The Terra solar application was granted a 10 year permission in 2017 thus only has under two years to commence and complete the works. The site outline of this proposal lies partially within the Ballycuneen development area. A review of the bat surveys conducted for this development shows minimal survey effort and assessment in regards to bats. Notwithstanding this, given the Ballycuneen proposal should see a net benefit to bats, the in combination effects are anticipated to be negligible.

7 CONCLUSION

Seven of the nine resident Irish bat species were found within the proposed project site. Two bat roosts were found; the proposed project site is utilised for feeding and commuting purposes. The site is located in Co. Clare. Leisler's Bat was the primary species utilising the proposed project site, with Common and Soprano Pipistrelles also present in moderate numbers. Four Roosts were found in structures, two onsite and three just south of Section 2's site boundary. Leisler's Bat, Common pipistrelle and Soprano Pipistrelles were confirmed roosting onsite.

Leisler's Bats at D-7 showed high elevation in activity, during the Spring season. In the Summer, Leisler's bats here showed a drop-in activity. It's these groups of bats that are of the highest risk onsite. Lesser Horseshoe bat was recorded multiple times on site, primarily in the vicinity of Detector 4.

Mitigation has been implemented by way of Compensatory woodland and additional hedgerow features to enhance the stability of the area. Detector 4, the detector with the highest activity, is located in section 2 of the proposed project site where this compensatory woodland will be planted.

After mitigation, no significant long term residual impacts will occur to roosting and commuting bats. It is possible that there will be a slight long-term impact on feeding bats specifically relating to bats utilising the area in and around the BESS and lands adjacent to construction areas in Section 2, though compensatory measures will ensure that ample opportunities are available for bats after the construction phase is completed.

Additionally, bats should be able to better utilise the southern sections of the proposed project site, where connectivity has been created by way of the planting of hedgerows. Activity was low in the Southern section of site but improving connectivity will encourage transit of bats to the larger landscape outside the proposed project site.

APPENDIX A – TABLES, FIGURES & PHOTOS

Table 0-1: Irish bat roosts records in the BCI database within 6km

Roost type	Distance	Date of last visit	Species	Details	Within CSZ?
Building	1.01km W	1997	<i>Plecotus auritus</i>	Droppings noted in attic. Old record over 27 years old.	Small old roost record unlikely to be impacted by the proposed development.
			<i>Myotis nattereri</i>		
			<i>Pipistrellus species</i>		
Building	2.7km W	2001	<i>Pipistrellus pygmaeus</i>	April record; 5 Sopranos and 4 Common pipistrelle. Old record, 24 years old	Small old roost records unlikely to be impacted by the proposed development.
			<i>Pipistrellus pipistrellus</i>		
Building	2.49km NE	1999	<i>Rhinolophus hipposideros</i>	Max of 10 recorded (1998). Last record had 2.	Some connectivity via hedgerows however this roost record is very old.
Building	2.7km NE	1998	<i>Rhinolophus hipposideros</i>	1 recorded in old record	Small old roost record.
Building	3.14km E	1999	<i>Rhinolophus hipposideros</i>	Old record with max of 4 bats recorded.	Small old roost record.
Building	3.9km NW	2006	<i>Rhinolophus hipposideros</i>	Droppings found in 2000. The 2006 record does not have details of observations.	Old record with not enough details on numbers using roost.
Building	3.95km NE	1998	<i>Rhinolophus hipposideros</i>	Old records; 1983 (1 bat), and 1998 (1 bat)	Small old roost record.
Building	4.13km NW	1999	<i>Rhinolophus hipposideros</i>	Old record of droppings	Small old roost record.
Building	4.14km NW	2005	<i>Rhinolophus hipposideros</i>	Large roost record with 135 bats recorded in Aug 2005 and 87 the previous year. Is designated as an SAC (Ratty River)	Roost is considered in Table 2-1 above.
Building	4.3km S	1997	<i>Pipistrellus species</i>	Old records of droppings	Old record. Shannon is likely to provide a barrier for connectivity
			<i>Plecotus auritus</i>		
Building	4.62km NW	2001	<i>Pipistrellus species</i>	Droppings recorded on floor of upper floor	Survey suggests this site is a maternity roost. The proposed project site lies outside the CSZ for bat species recorded here.
			<i>Plecotus auritus</i>		
Building	4.4km NW	2000	<i>Rhinolophus hipposideros</i>	Old record of a single bat	Small old roost record.
Building	5.16km S	1997	<i>Pipistrelle species</i>	Juvenile female found thus must be a maternity roost. Very old record.	Old record. Shannon is likely to provide a barrier for connectivity
Building	5.2km NW	2006	<i>Rhinolophus hipposideros</i>	Two visits in 2006, both of a single bat. Satellite roost	Small old roost records unlikely to be impacted by the proposed development.
Building	5.6km NW	No details			
Building	5.41km E	1998	<i>Rhinolophus hipposideros</i>	Droppings recorded, old record	Old record with proposed project site lying outside the CSZ for this species.
Building	5.76km NE	1999	<i>Rhinolophus hipposideros</i>	Droppings recorded, old record	
Building	5.53km NE	1999	<i>Rhinolophus hipposideros</i>	Highest numbers recorded in 1999 with 24 bats. Small maternity roost. Old record	
Building	5.95km S	2009	<i>Rhinolophus hipposideros</i>	Droppings recorded in 1997, 2009 visit does not have any details	Old record. Shannon is likely to provide a barrier for connectivity

GROUND LEVEL TREE ASSESSMENT (GLTA) RESULTS

Table 0-2: GLTA Results

No.	Species	Rating	Description	Lat	Lon
1	Ash	None	No potential	-8.8341	52.72516
2	Unknown	None	No visible cracks or holes. Some ivy but not mat forming	-8.83465	52.72537
3	Unknown	None	No potential	-8.83427	52.72579
4	Ash	PRF	A few cracks and knot holes. Possible for single bats	-8.8366	52.72549
5	Ash	FAR	No visible cracks but may have some. Too tall to see. Lots of ivy on tree but not mat forming	-8.83735	52.72524
6	Ash	FAR	No cracks visible but too tall to see	-8.83756	52.72565
7	Unknown	None	No potential	-8.83783	52.72633
8	Ash	None	No potential	-8.83804	52.72631
9	Ash	None	No potential	-8.83817	52.72628
10	Ash	None	No potential	-8.83846	52.72619
11	Alder	None	No potential	-8.83844	52.72558
12	Alder	None	No potential	-8.83828	52.72502
13	Ash and alder	None	No potential	-8.83816	52.72488
14	Alder	None	No potential	-8.83809	52.72464
15	Ash	None	No potential	-8.83795	52.72407
16	Oak	None	No potential	-8.83799	52.72381
17	Unknown	FAR	No visible cracks but too tall to tell	-8.83891	52.7264
18	Ash	None	No potential	-8.83876	52.72656
19	Ash	None	No potential	-8.83865	52.72688
20	Alder	None	No potential	-8.83928	52.72674
21	Ash	None	No potential	-8.83931	52.72657
22	Ash	FAR	No visible cracks but too tall to tell	-8.83949	52.72623
23	Ash	FAR	No visible cracks but too tall to tell	-8.83953	52.72629
24	Alder	None	No potential	-8.83964	52.72643
25	Ash	None	No potential	-8.83983	52.72671
26	Ash	None	No potential	-8.83995	52.72686
27	Unknown	None	No potential	-8.84005	52.72699
28	Unknown	None	No potential	-8.83938	52.72802
29	Unknown	None	No potential	-8.83971	52.72609
30	Ash	None	No potential	-8.83978	52.7261
31	Ash	None	No potential	-8.83997	52.72618
32	Unknown	FAR	No visible cracks but too tall to tell. Lots of ivy	-8.8402	52.72632
33	Ash	None	No potential	-8.84078	52.72651
34	Ash	None	No potential	-8.84165	52.72629
35	Ash	None	No potential	-8.84186	52.72633
36	Ash	None	No potential	-8.84198	52.72636
37	Beech	None	No potential	-8.8423	52.72609
38	Ash	None	No potential	-8.84247	52.72595
39	Ash	FAR	No visible cracks but too tall to tell	-8.84277	52.72571

No.	Species	Rating	Description	Lat	Lon
40	Ash	FAR	No visible cracks but too tall to tell	-8.84258	52.72548
41	Oak	FAR	No visible cracks but too tall to tell	-8.84269	52.72535
42	Ash	None	No potential	-8.84333	52.72522
43	Ash	None	No potential	-8.84337	52.72496
44	Ash	None	No potential	-8.84339	52.72473
45	Unknown	FAR	No visible cracks but too tall to tell	-8.84388	52.72458
46	Ash	None	No potential	-8.84615	52.72433
47	Ash	None	No potential	-8.8462	52.72422
48	Unknown	FAR	No visible cracks but too tall to tell	-8.84355	52.72287
49	Alder	FAR	No visible cracks but too tall to tell	-8.84357	52.7229
50	Ash	None	No potential	-8.84353	52.7231
51	Ash	None	No potential	-8.84442	52.72341
52	Ash	None	No potential	-8.84436	52.72358
53	Ash	None	No potential	-8.84429	52.72396
54	Ash	None	No potential	-8.84327	52.72453
55	Ash	FAR	No visible cracks but too tall to tell	-8.84241	52.7247
56	Ash	None	No potential	-8.84211	52.72475
57	Ash	FAR	No visible cracks but too tall to tell. Lots of ivy	-8.84148	52.72501
58	Ash	None	No potential	-8.84101	52.72532
59	Oak	FAR	No visible cracks but too tall to tell	-8.84091	52.72524
60	Ash	FAR	No visible cracks but too tall to tell	-8.84106	52.72453
61	Ash	None	No potential	-8.841	52.72414
62	Ash	FAR	No visible cracks but too tall to tell	-8.84089	52.72563
63	Ash	None	No potential	-8.8409	52.72581
64	Ash	FAR	No visible cracks but too tall to tell	-8.84101	52.72608
65	Oak	FAR	No visible cracks but too tall to tell	-8.83965	52.72391
66	Ash	PRF	Some nice cracks and knot holes suitable for single bats	-8.84011	52.72359
67	Ash	None	No potential	-8.82818	52.73503
68	Oak	None	No potential	-8.82793	52.73533
69	Ash	None	No potential	-8.82781	52.73539
70	Ash	None	No potential	-8.82761	52.73557
71	Ash	FAR	No visible cracks but too tall to tell	-8.82738	52.73561
72	Ash	None	No potential	-8.82716	52.73591
73	Oak	FAR	No visible cracks but too tall to tell	-8.82578	52.73531
74	Ash	None	No potential	-8.82581	52.73519
75	Ash	None	No potential	-8.82526	52.73461
76	Sycamore	PRF	Partially hollow tree	-8.84877	52.72048
77	Sycamore	PRF	Dead branches, knot holes	-8.84897	52.72024
78	Dead tree	PRF	Dead tree with crevices and cracks along length	-8.84892	52.72021
79	Ash	PRF	Small knot holes	-8.84907	52.72003
80	Ash	PRF	Middling ash, minor ivy cover, knot holes	-8.84997	52.71984
81	Sycamore	PRF	Small knot holes	-8.85001	52.71984
82	Sycamore	PRF-M	Mature Sycamore with multiple large knot holes, signs of hollow interior	-8.85015	52.71973
83	Sycamore	PRF	Mature sycamore with peeling bark, small knot hole	-8.8501	52.7196
84	Unknown	PRF	Small knot holes	-8.85033	52.71955
85	Sycamore	PRF	Large two trunk sycamore, knotholes	-8.85051	52.71953
86	Unknown	PRF	Same as adjacent tree, crevices and knotholes	-8.85037	52.71946
87	Blackthorn	PRF	Medium Blackthorn, some crevices	-8.85027	52.71961
88	Sycamore	PRF	Large sycamore with broken branches, knotholes and ivy >50mm	-8.85007	52.71985
89	Ash	PRF	Ivy cover, no visible knotholes, broken branches	-8.85017	52.71985
90	Evergreen Oak	PRF	Peeling bark and rotten branch high up	-8.85011	52.71955

No.	Species	Rating	Description	Lat	Lon
91	Leyland	PRF	Mature tree with multiple crevices, broken branches, split branches and peeling bark	-8.8522	52.71939
92	Leyland	PRF	Large tree with peeling bark	-8.8523	52.71929
93	Beech	PRF	Large beech, multiple large knotholes, smaller ones high up	-8.85256	52.71926
94	Beech	PRF	Many knotholes higher up on tree	-8.85247	52.71921
95	Sycamore	PRF	Medium tree, peeling bark knotholes higher up	-8.85251	52.71912
96	Sycamore	PRF	Mostly dead and small but with rotted areas that may make hollows suitable	-8.8525	52.71909
97	Holly	None		-8.85262	52.71909
98	Holly	None		-8.85252	52.71908
99	Leyland	None	Middling tree with no peeling bark	-8.85251	52.71893
100	Sycamore	FAR	Large sycamore with some small knotholes high up	-8.85262	52.71889
101	Sycamore	PRF	Split and rotten branches, knotholes	-8.85246	52.71878
102	Ash	FAR	Medium tree with some dead branches and ivy cover	-8.85244	52.71872
103	Beech	None	Multiple young beech	-8.8524	52.71866
104	Beech	None	Multiple small beech	-8.85271	52.71872
105	Ash	None	Small ash	-8.84765	52.71001
106	Ash	None	Small	-8.84756	52.70992
107	Whitethorn	None	Small Whitethorn	-8.84757	52.70987
108	Beech	PRF	Large beech, multiple knotholes	-8.84701	52.70967
109	Beech	PRF	Large with rotted and broken branches some knotholes higher up	-8.8471	52.70964
110	Beech	FAR	Dead branches, small knot holes	-8.84718	52.70951
111	Beech	PRF	Several knotholes and crevices	-8.84722	52.7094
112	Beech	PRF	Large tree with some crevices, no knot holes	-8.8471	52.70943
113	Beech	PRF	Large tree with crevices and knotholes	-8.8472	52.70947
114	Blackthorn	None		-8.84666	52.70947
115	Blackthorn	None		-8.84677	52.70938
116	Blackthorn	None		-8.84686	52.70934
117	Beech	PRF	Large with crevices, no knot holes	-8.84752	52.70907
118	Beech	PRF	Large tree with broke branch	-8.84756	52.70901
119	Beech	PRF	Partially hollow from the bottom, knotholes	-8.84758	52.70895
120	Sycamore	PRF	Large tree with suitable ivy and knot holes higher up	-8.8474	52.70891
121	Sycamore	None		-8.84734	52.70892
122	Beech	PRF	Large with multiple good knotholes and some crevices	-8.84766	52.70881
123	Whitethorn	FAR	Considerable ivy cover on large whitethorn	-8.84708	52.70754
124	Whitethorn	None	Ivy cover on moderately sized tree. Not mat forming	-8.84713	52.70758
125	Whitethorn	None	Two trees with considerable ivy cover but not mat forming	-8.84677	52.70734
126	Whitethorn	None		-8.84702	52.70717
127	Spruce	None	Ivy but does not form mats	-8.84527	52.70705
128	Spruce	None	Two Sitka spruce trees	-8.84518	52.70707
129	Unknown	None	Massive ivy cover	-8.84481	52.70711
130	Whitethorn	None	Small	-8.84467	52.707
131	Whitethorn	None		-8.84469	52.70675
132	Blackthorn	None		-8.84468	52.70657
133	Spruce	None	Small spruce with significant ivy cover but not mat forming	-8.84172	52.70715
134	Spruce	None	Medium spruce	-8.84183	52.70719
135	Spruce	None	Ivy but does not form mats	-8.84167	52.70714
136	Spruce	None	Ivy but does not form mats	-8.84155	52.7071
137	Spruce	None		-8.84148	52.70708
138	Spruce	None	4 smaller trees	-8.84106	52.70696
139	Unknown	PRF	Large tree with knotholes	-8.83746	52.70612
140	Hazel	None	Single tree in black and whitethorn woods	-8.83776	52.70558
141	Blackthorn	None		-8.83814	52.70444

No.	Species	Rating	Description	Lat	Lon
142	Sycamore	None	Small with ivy	-8.83667	52.70446
143	Ash	None	Ivy cover, no knotholes	-8.8365	52.70433
144	Unknown	None	Small ash, no knot holes	-8.83647	52.70429
145	Whitethorn	None		-8.83642	52.70425
146	Whitethorn	None		-8.83706	52.70431
147	Whitethorn	None		-8.83713	52.70448
148	Whitethorn	None		-8.83702	52.70456
149	Birch	None	Ivy but does not form mats	-8.83801	52.70386
150	Birch	None		-8.83808	52.70386
151	Birch	None		-8.83813	52.70384
152	Birch	None		-8.83818	52.70383
153	Birch	None		-8.83823	52.70383
154	Birch	None		-8.83826	52.70382
155	Birch	None		-8.83829	52.70381
156	Leyland	None		-8.8384	52.7038
157	Elder	None	Middling Elder tree	-8.8397	52.70475
158	Elder	None	Small trees	-8.84358	52.70399
159	Elder	None	Small tree	-8.8438	52.70396
160	Blackthorn	None	Large Blackthorn with ivy cover - not mat forming	-8.84431	52.70412
161	Elder	PRF	Broken branches and knot holes	-8.84435	52.70416
162	Blackthorn	FAR	Large with broken branches and ivy cover	-8.8449	52.70402
163	Blackthorn	PRF	Ivy and crevices in blackthorn	-8.8451	52.70551
164	Whitethorn	PRF	Some crevices, small tree	-8.84595	52.7062
165	Whitethorn	None	Large but sheltered by dense hedge	-8.84602	52.705
166	Blackthorn	None	Large with ivy and broken branches	-8.84712	52.70496
167	Unknown	None	Ivy but does not form mats	-8.84782	52.70479
168	Whitethorn	None		-8.8487	52.70507
169	Blackthorn	PRF	Heavily ivy covered	-8.85203	52.706
170	Blackthorn	FAR	Heavy live ivy cover	-8.85188	52.70589
171	Whitethorn	None	Large with dead ivy	-8.85196	52.70578
172	Whitethorn	None	Fallen	-8.85216	52.70596
173	Whitethorn	PRF	Medium, with crevices and small knothole	-8.85218	52.70602
174	Blackthorn	None	Large without ivy	-8.85223	52.70634
175	Blackthorn	None	Fallen after storm	-8.85213	52.70641
176	Ash	None	Small tree with Ivy but does not form mats	-8.85185	52.70793
177	Ash	None	Young ash, no prfs	-8.85307	52.70912
178	Horse Chestnut	PRF	Large tree with split branches, broken branches, some ivy cover and small knotholes	-8.85312	52.70971
179	Ash	PRF	Large tree among young planted, knotholes	-8.85075	52.71079
180	Horse Chestnut	PRF	Large with suitable ivy and knotholes on branches	-8.84571	52.69987
181	Whitethorn	None		-8.85062	52.70004

STATIC DETECTOR RESULTS

Spring												
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	LSH	Natterer's Bat	Unidentified Myotis	Total	Minutes recorded	Bat passes per hour
1	479	173	178	1	8	19	1	30	296	1185	12351	5.8
2	503	1585	1004	1	34	17	0	98	109	3351	12351	16.3
3	435	109	117	1	0	2	0	20	27	711	12351	3.5
4	3133	1360	1385	0	12	174	14	135	63	6276	11960	31.5
5	27	62	68	0	1	0	0	1	1	160	12351	0.8
6	1832	2074	338	0	3	3	0	2	107	4359	12351	21.2
7	3982	602	218	0	4	2	0	6	18	4832	12351	23.5
Total	10391	5965	3308	3	62	217	15	292	621	20874	86066	14.6
Bat passes per hour	7.2	4.2	2.3	0.0	0.0	0.2	0.0	0.2	0.4	20874		
Summer												
Detector	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	LSH	Natterer's Bat	Unidentified Myotis	Total	Minutes recorded	Bat passes per hour
1	90	201	154	0	0	2	0	2	3	452	4662	5.8
2	577	773	300	0	0	17	0	7	25	1699	4662	21.9
3	826	79	91	0	0	15	0	0	3	1014	4662	13.1
4	1682	1745	2584	0	0	47	2	7	46	6113	4662	78.7
5	356	100	55	0	0	1	0	0	3	515	4662	6.6
6	373	1571	334	0	0	2	3	4	12	2299	4662	29.6
7	521	105	74	0	0	1	0	1	12	714	4662	9.2
Total	4425	4574	3592	0	0	85	5	21	104	12806	32634	23.5
Bat passes per hour	8.1	8.4	6.6	0.0	0.0	0.2	0.0	0.0	0.2	23.5		

Static	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 kHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total
1	16th April	1	2	4	0	0	0	0	0	1	8
1	17th April	19	5	27	0	1	0	0	0	0	52
1	18th April	83	12	9	0	0	0	0	2	6	112
1	19th April	23	7	11	0	0	0	0	3	25	69
1	20th April	2	0	0	0	0	0	0	0	1	3
1	21st April	2	3	7	0	2	0	0	2	10	26
1	22nd April	6	15	3	0	0	0	0	2	6	32
1	23rd April	57	10	25	0	0	1	0	1	25	119
1	24th April	3	5	2	0	0	2	0	0	19	31
1	25th April	11	16	5	0	1	0	0	0	13	46
1	26th April	69	24	17	0	0	0	0	3	21	134
1	27th April	65	22	14	0	0	5	0	4	28	138
1	28th April	35	7	9	0	1	4	0	3	18	77
1	29th April	23	15	19	0	1	1	1	1	23	84
1	30th April	23	14	10	0	1	3	0	1	10	62
1	1st May	16	3	4	0	0	0	0	1	21	45
1	2nd May	16	3	0	0	0	1	0	3	19	42
1	3rd May	16	3	5	0	0	0	0	2	23	49
1	4th May	3	4	4	1	1	1	0	1	15	30
1	5th May	6	3	3	0	0	1	0	1	12	26
1	11th July	32	9	12	0	0	1	0	0	0	54
1	12th July	8	15	28	0	0	0	0	0	0	51
1	13th July	6	9	16	0	0	0	0	0	0	31
1	14th July	0	0	0	0	0	0	0	0	0	0
1	15th July	15	90	10	0	0	0	0	1	0	116
1	16th July	5	54	27	0	0	0	0	0	0	86
1	17th July	21	4	4	0	0	0	0	1	0	30
1	18th July	1	15	36	0	0	0	0	0	0	52
1	19th July	2	5	21	0	0	1	0	0	3	32
1	20th July	1	8	12	0	0	0	0	0	0	21
2	16th April	6	6	10	0	0	2	0	1	1	26
2	17th April	58	207	33	0	15	1	0	11	3	328
2	18th April	11	13	1	0	0	0	0	0	0	25
2	19th April	39	90	39	0	1	0	0	8	9	186
2	20th April	12	35	15	0	0	0	0	6	5	73
2	21st April	32	14	15	0	1	3	0	11	2	78
2	22nd April	1	255	100	0	0	1	0	8	6	371
2	23rd April	31	119	126	1	2	0	0	4	13	296

Static	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total
2	24th April	0	2	0	0	0	0	0	0	0	2
2	25th April	30	41	19	0	0	0	0	8	7	105
2	26th April	34	21	17	0	0	0	0	5	9	86
2	27th April	51	25	21	0	1	0	0	3	3	104
2	28th April	39	133	69	0	1	4	0	3	9	258
2	29th April	40	126	173	0	3	4	0	7	6	359
2	30th April	21	69	74	0	0	0	0	8	6	178
2	1st May	35	229	119	0	1	1	0	8	7	400
2	2nd May	13	71	0	0	0	0	0	2	7	93
2	3rd May	9	74	130	0	9	0	0	1	3	226
2	4th May	32	30	25	0	0	1	0	2	9	99
2	5th May	9	25	18	0	0	0	0	2	4	58
2	11th July	67	48	52	0	0	1	0	0	1	169
2	12th July	124	75	57	0	0	2	0	0	1	259
2	13th July	90	39	22	0	0	1	0	0	2	154
2	14th July	9	4	3	0	0	0	0	0	3	19
2	15th July	55	132	27	0	0	0	0	2	4	220
2	16th July	75	50	16	0	0	1	0	2	3	147
2	17th July	54	74	29	0	0	3	0	1	5	166
2	18th July	56	81	34	0	0	6	0	0	2	179
2	19th July	15	8	3	0	0	0	0	0	0	26
2	20th July	32	262	57	0	0	3	0	2	4	360
3	16th April	1	4	4	0	0	0	0	1	0	10
3	17th April	17	11	6	0	0	0	0	1	0	35
3	18th April	10	0	4	0	0	0	0	0	0	14
3	19th April	49	10	9	0	0	0	0	1	3	72
3	20th April	11	2	7	0	0	0	0	0	3	23
3	21st April	13	10	6	0	0	0	0	6	1	36
3	22nd April	2	3	2	0	0	0	0	0	0	7
3	23rd April	23	10	17	0	0	0	0	1	1	52
3	24th April	7	6	2	0	0	0	0	0	3	18
3	25th April	9	0	0	0	0	0	0	0	0	9
3	26th April	38	6	5	0	0	1	0	0	1	51
3	27th April	32	3	5	0	0	0	0	0	1	41
3	28th April	17	8	10	0	0	0	0	0	3	38
3	29th April	35	10	15	0	0	0	0	0	3	63
3	30th April	55	6	8	0	0	1	0	0	1	71

Static	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total
3	1st May	27	6	5	1	0	0	0	1	0	40
3	2nd May	23	6	0	0	0	0	0	3	0	32
3	3rd May	25	3	8	0	0	0	0	1	2	39
3	4th May	20	3	4	0	0	0	0	1	1	29
3	5th May	21	2	0	0	0	0	0	4	4	31
3	11th July	151	16	17	0	0	3	0	0	0	187
3	12th July	98	22	19	0	0	1	0	0	0	140
3	13th July	16	0	0	0	0	0	0	0	0	16
3	14th July	9	0	0	0	0	0	0	0	0	9
3	15th July	80	9	3	0	0	2	0	0	0	94
3	16th July	92	5	6	0	0	1	0	0	0	104
3	17th July	110	10	9	0	0	1	0	0	0	130
3	18th July	77	10	12	0	0	5	0	0	1	105
3	19th July	73	2	14	0	0	0	0	0	1	90
3	20th July	120	5	11	0	0	2	0	0	1	139
4	6th May	59	38	148	0	2	9	6	1	5	268
4	7th May	64	61	100	0	0	11	0	2	5	243
4	8th May	84	62	51	0	0	16	0	3	2	218
4	9th May	121	204	138	0	0	11	1	2	8	485
4	10th May	65	22	27	0	0	14	0	0	1	129
4	11th May	71	68	56	0	0	2	3	3	5	208
4	12th May	114	20	54	0	0	6	0	7	2	203
4	13th May	94	24	39	0	0	2	1	1	2	163
4	14th May	124	104	42	0	3	10	1	3	4	291
4	15th May	109	54	38	0	0	8	0	16	4	229
4	16th May	182	61	37	0	2	11	0	22	5	320
4	17th May	210	48	49	0	1	6	2	15	0	331
4	18th May	219	33	44	0	0	3	0	10	3	312
4	19th May	529	46	90	0	1	3	0	0	2	671
4	20th May	131	7	43	0	0	4	0	0	0	185
4	21st May	126	33	59	0	0	11	0	20	2	251
4	22nd May	114	24	0	0	0	11	0	20	3	172
4	23rd May	481	211	100	0	0	6	0	2	6	806
4	24th May	59	96	97	0	0	4	0	4	1	261
4	25th May	43	62	84	0	0	16	0	3	2	210
4	26th May	67	82	89	0	3	10	0	1	1	253
4	27th May	67	0	0	0	0	0	0	0	0	67
4	11th July	270	375	333	0	0	5	0	1	7	991
4	12th July	282	387	269	0	0	8	0	1	12	959
4	13th July	160	136	296	0	0	2	0	2	7	603
4	14th July	4	0	0	0	0	0	0	0	0	4
4	15th July	164	111	117	0	0	16	0	1	6	415
4	16th July	219	225	187	0	0	5	0	0	4	640
4	17th July	183	274	655	0	0	5	2	0	4	1123
4	18th July	139	70	133	0	0	2	0	1	0	345
4	19th July	107	100	397	0	0	3	0	1	3	611
4	20th July	154	67	197	0	0	1	0	0	3	422

Static	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total
5	16th April	1	0	1	0	0	0	0	0	0	2
5	17th April	4	3	7	0	0	0	0	0	0	14
5	18th April	0	0	0	0	0	0	0	0	0	0
5	19th April	0	5	5	0	0	0	0	0	0	10
5	20th April	0	3	0	0	0	0	0	0	0	3
5	21st April	0	0	0	0	0	0	0	0	0	0
5	22nd April	0	0	2	0	0	0	0	0	0	2
5	23rd April	0	3	3	0	0	0	0	0	0	6
5	24th April	0	0	0	0	0	0	0	0	0	0
5	25th April	0	0	0	0	0	0	0	0	0	0
5	26th April	5	9	8	0	1	0	0	0	0	23
5	27th April	5	5	9	0	0	0	0	0	0	19
5	28th April	3	5	7	0	0	0	0	0	0	15
5	29th April	1	6	9	0	0	0	0	0	0	16
5	30th April	3	7	5	0	0	0	0	0	0	15
5	1st May	2	2	5	0	0	0	0	0	0	9
5	2nd May	0	3	0	0	0	0	0	1	0	4
5	3rd May	0	4	0	0	0	0	0	0	1	5
5	4th May	1	4	6	0	0	0	0	0	0	11
5	5th May	2	3	1	0	0	0	0	0	0	6
5	11th July	43	14	14	0	0	0	0	0	0	71
5	12th July	70	20	12	0	0	0	0	0	1	103
5	13th July	11	0	2	0	0	0	0	0	0	13
5	14th July	0	0	0	0	0	0	0	0	0	0
5	15th July	39	2	2	0	0	0	0	0	0	43
5	16th July	61	21	5	0	0	0	0	0	0	87
5	17th July	37	24	5	0	0	1	0	0	0	67
5	18th July	57	11	4	0	0	0	0	0	1	73
5	19th July	2	1	1	0	0	0	0	0	0	4
5	20th July	36	7	10	0	0	0	0	0	1	54
6	16th April	5	87	7	0	0	0	0	0	3	102
6	17th April	173	75	23	0	1	0	0	1	0	273
6	18th April	45	10	6	0	0	0	0	0	7	68
6	19th April	230	159	49	0	0	0	0	0	2	440
6	20th April	36	74	7	0	1	0	0	0	4	122
6	21st April	8	160	14	0	0	0	0	0	14	196
6	22nd April	14	95	43	0	0	0	0	0	1	153
6	23rd April	338	716	54	0	0	0	0	0	10	1118
6	24th April	12	35	8	0	0	0	0	0	8	63
6	25th April	33	65	29	0	0	0	0	0	4	131
6	26th April	93	118	11	0	1	0	0	0	12	235
6	27th April	102	50	12	0	0	0	0	1	2	167
6	28th April	111	107	14	0	0	0	0	0	8	240
6	29th April	266	68	22	0	0	0	0	0	6	362
6	30th April	144	59	10	0	0	1	0	0	5	219
6	1st May	83	71	10	0	0	1	0	0	6	171
6	2nd May	22	57	0	0	0	0	0	0	4	83
6	3rd May	24	21	9	0	0	0	0	0	3	57
6	4th May	57	27	5	0	0	1	0	0	5	95
6	5th May	36	20	5	0	0	0	0	0	3	64

Static	Date	Leisler's Bat	Common Pipistrelle	Soprano Pipistrelle	Nathusius Pipistrelle	Pipistrelle 40 KHz	Brown Long-eared	Lesser Horseshoe	Natterer's Bat	Unidentified Myotis	Total
6	11th July	39	66	15	0	0	0	0	1	1	122
6	12th July	39	39	11	0	0	0	0	2	4	95
6	13th July	27	34	6	0	0	0	0	1	0	68
6	14th July	6	21	1	0	0	0	0	0	0	28
6	15th July	24	101	10	0	0	0	0	0	1	136
6	16th July	66	129	12	0	0	0	1	0	2	210
6	17th July	45	226	28	0	0	2	1	0	2	304
6	18th July	34	121	22	0	0	0	0	0	0	177
6	19th July	32	94	20	0	0	0	0	0	0	146
6	20th July	61	740	209	0	0	0	1	0	2	1013
7	16th April	4	0	0	0	0	0	0	3	0	7
7	17th April	1296	36	18	0	0	0	0	0	1	1351
7	18th April	389	9	5	0	0	0	0	0	0	403
7	19th April	46	35	16	0	1	0	0	0	1	99
7	20th April	26	26	14	0	0	0	0	1	2	69
7	21st April	17	7	3	0	1	0	0	0	1	29
7	22nd April	10	21	11	0	1	0	0	0	0	43
7	23rd April	109	46	31	0	1	0	0	0	1	188
7	24th April	1639	20	1	0	0	0	0	0	0	1660
7	25th April	19	13	6	0	0	0	0	0	1	39
7	26th April	96	124	26	0	0	0	0	0	2	248
7	27th April	132	118	17	0	0	0	0	0	3	270
7	28th April	44	29	11	0	0	0	0	0	0	84
7	29th April	49	25	16	0	0	1	0	0	0	91
7	30th April	26	29	22	0	0	0	0	0	1	78
7	1st May	18	14	10	0	0	1	0	0	3	46
7	2nd May	6	8	0	0	0	0	0	0	0	14
7	3rd May	15	3	1	0	0	0	0	1	0	20
7	4th May	21	31	7	0	0	0	0	1	1	61
7	5th May	20	8	3	0	0	0	0	0	1	32
7	11th July	58	14	11	0	0	0	0	0	2	85
7	12th July	75	11	13	0	0	0	0	0	1	100
7	13th July	20	8	7	0	0	0	0	0	0	35
7	14th July	0	0	0	0	0	0	0	0	0	0
7	15th July	44	8	3	0	0	0	0	0	2	57
7	16th July	92	32	11	0	0	0	0	0	1	136
7	17th July	29	5	5	0	0	0	0	1	2	42
7	18th July	74	8	7	0	0	0	0	0	3	92
7	19th July	91	11	12	0	0	1	0	0	1	116
7	20th July	38	8	5	0	0	0	0	0	0	51

APPENDIX D. GOLDCREST BIRD SURVEY REPORTS

BNRG – Ballycunneen Solar and Battery Energy Storage System Project

Ornithology Survey Report - February 2025 to January 2026

From: Michael O’Clery
Ref: 12099
Re: South Galway Solar Farm Ornithological Surveys

Introduction

Goldcrest Environmental were appointed by TOBIN to carry out transect walkover bird surveys at the proposed BNRG Ballycunneen Solar and Battery Energy Storage System (BESS) Project (hereafter referred to as the proposed project site), located at south and west of Shannon, County Clare.

The surveys were undertaken monthly from February 2025 to January 2026 to capture breeding and wintering bird survey period.

This report provides a February to January 2026 survey results.

Given the wide spatial spread and complexity of the site, and its likely ecological sensitivity due to it being adjacent to the *River Shannon and River Fergus Estuaries Special Protection Area* [Site Code: 004077], the primary objectives of the monthly transect walkover were to:

1. Establish suitable transect routes for monthly ecological monitoring
2. Assess and report on the likely usage of lands by bird species.
3. Identify key areas of ecological interest.

Methodology

Guidance

Bird transect surveys were undertaken using the following guidance:

- Scottish Natural Heritage (SNH) (2017) ‘*Recommended Bird Survey Methods to Inform Impact Assessments of Onshore Wind Farms*’.
- Hardy, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. (2013). *Raptors: A Field Guide for Surveys and Monitoring*.
- Gilbert, G Stanbury A., Lewis, L. (2021). *Birds of Conservation Concern in Ireland 2020-2026*. Irish Birds 9: 523-544.

Survey Area

The study area comprises the proposed project site and key habitats in neighbouring areas of the proposed project boundary as per the Scottish Natural Heritage guidelines (SNH, 2017).



Survey Methodology

Transect Surveys

Transect surveys were also undertaken within the proposed project site. A transect survey follows a defined linear route through a specific area. To achieve maximum coverage of suitable habitat, 4 transect routes were needed for the proposed project site. These transects covered a large and representative portion of the 4 survey areas.

The transect surveys were walked at a standard walking speed. Notes on aural and visual registrations of bird species were recorded during field surveys. Visual registrations were recorded with the aid of binoculars (e.g., 8 x 42) and, where necessary, with the aid of a telescope (e.g., 20-45 x 60 scope). The 4 survey areas are shown below.



Figure 0.1: Site Location



The transect routes (in white) for each of the 4 survey areas bordered in red) are shown in Figure 1.2 below.

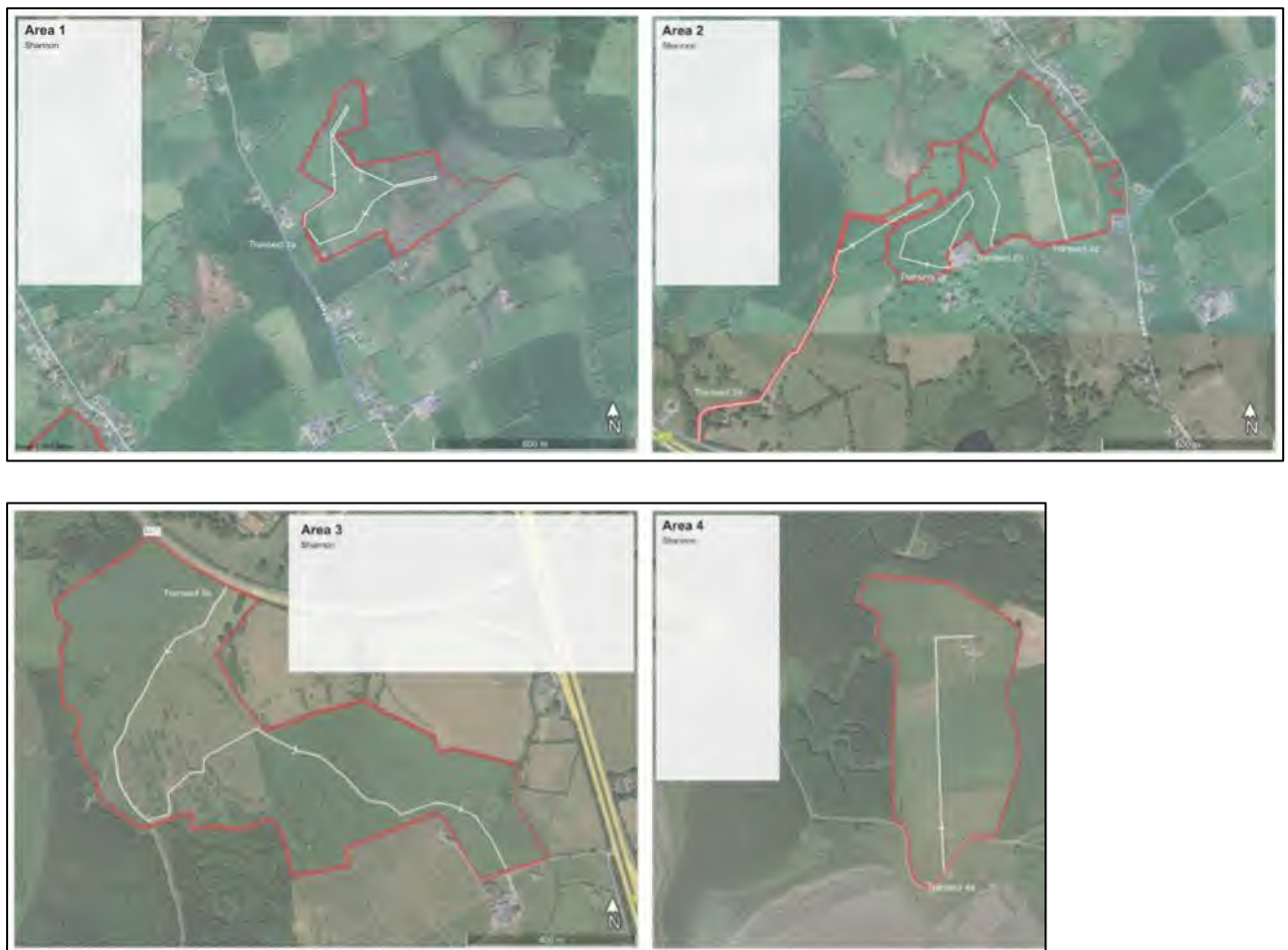


Figure 0.2: Transect Routes

Transect Survey Results

5th February 2025

Area 1: Kestrel x1.

Area 2: No target species recorded.

Area 3 Little Egret x1; Lesser Black-backed Gull x1; Herring Gull x1; Buzzard x1.

Area 4: Curlew x51.

12th March 2025

Area 1: Buzzard x1; Snipe x1.

Area 2: Buzzard x2.

Area 3: Buzzard x1.

Area 4: No target species recorded.



5th April 2025

Area 1: No target species recorded.
Area 2: Buzzard x2; Grey Heron x1; Buzzard x1.
Area 3: Kestrel x1.
Area 4: No target species recorded.

5th May 2025

Area 1: No target species recorded.
Area 2: Buzzard x1.
Area 3: No target species recorded.
Area 4: Kestrel x1.

4th June 2025

Area 1: Lesser Black-backed Gull x2.
Area 2: Buzzard x2, Sparrowhawk x1
Area 3: Lesser Black-backed Gull x1
Area 4: No target species recorded.

18th July 2025

Area 1: No target species recorded.
Area 2: Buzzard x2.
Area 3 Lesser Black-backed Gull x1.
Area 4: Buzzard x1.

1st August 2025

Area 1: Buzzard x1.
Area 2: Buzzard x2. Lesser Black-backed Gull x1.
Area 3: No target species recorded.
Area 4: No target species recorded.

8th September 2025

Area 1: Lesser Black-backed Gull x2.
Area 2: No target species recorded.
Area 3: Buzzard x1, and Lesser Black-backed Gull x5.
Area 4: No target species recorded.

21st October 2025

Area 1: Mallard x2.
Area 2: Buzzard x2. Herring Gull x3.
Area 3: Buzzard x1. Lesser Black-backed Gull x1. Grey Heron x1.
Area 4: No target species recorded.

5th November 2025

Area 1: Lesser Black-backed Gull x2, Snipe x1.
Area 2: No Target Species recorded.
Area 3: Herring Gull x1, Grey Heron x1.
Area 4: Herring Gull x16, Curlew x10, Common Gull x22, Black-headed Gull x110, Lesser Black-backed Gull x4.



30th December 2025

Area 1: No Target Species recorded.

Area 2: No Target Species recorded.

Area 3: Black-headed Gull x1.

Area 4: Black-headed Gull x3

31st January 2026

Area 1: No Target Species recorded.

Area 2: Buzzard x2, Sparrowhawk x1.

Area 3: Buzzard x1, Snipe x1.

Area 4: Small mixed flock feeding on field comprising Black-headed Gull x7, Lesser Black-backed Gull x2, and Oystercatcher x5.

Conclusion

The transect surveys undertaken in February 2025 identified 6 sightings of 56 wintering target species within the proposed project site. The most significant sighting was of a flock of 51 Curlew feeding on short grassland at the SE side of Area 4. This flock moved after approximately ten minutes to land east of Area 4.

The transect surveys undertaken in March 2025 identified 5 sightings of 2 wintering target species within the proposed project site.

The transect surveys undertaken in April 2025 identified 5 sightings of 4 target species within the proposed project site.

The transect surveys undertaken in May 2025 identified 2 sightings of 2 target species within the proposed project site.

The transect surveys undertaken in June 2025 identified 4 sightings of 6 target species within the proposed project site. All 6 sightings were of birds in flight, with none recorded on the ground in any of the survey areas.

The transect surveys undertaken in July 2025 identified 4 sightings of 4 target species within the proposed project site. All 4 sightings were of birds in flight, with none recorded on the ground in any of the survey areas.

The transect surveys undertaken in August 2025 identified 4 sightings of 4 target species within the proposed project site. All 4 sightings were of birds in flight, with none recorded on the ground in any of the survey areas.

The transect surveys undertaken in September 2025 identified 4 sightings of 8 target species within the proposed project site. Two sightings were of birds in flight, with one sighting of x2 Lesser Black-backed Gulls feeding on the ground, in Area 1 and x1 Buzzard perched by a gate.

The transect surveys undertaken in October 2025 identified 7 sightings of 10 target species within the proposed project site. All 10 sightings were of birds in flight, with x3 Herring Gulls recorded as feeding on field, in Area 2.



The transect surveys undertaken in November 2025 identified 9 sightings of 166 target species within the proposed project site. A large mixed flock feeding on a field in Area 4 accounted for the bulk of the sightings of 16 Herring Gulls, 10 Curlew, 22 Common Gulls, 110 Black-headed Gulls and 4 Lesser Black-headed Gull. The remaining sightings were of 4 individuals (a single Lesser Black-backed Gulls, Herring Gull, Grey Heron and Snipe), 3 of which were in flight, and 1 (a single Snipe flushed during the transect) on the ground.

The transect surveys undertaken in December 2025 identified 2 sightings of 1 target species Black-headed Gulls x3 feeding in a field in Area 4 and a single and a single Black-headed Gull flying above Area 3.

The transect surveys undertaken in January 2026 identified 7 sightings of 19 target species within the proposed project site. 3 of 7 sightings were of birds in flight (Buzzard x3 and Sparrowhawk) with the remaining four (Black-headed Gulls x7, Lesser Black-backed Gull x2, Snipe x1 flushed, and Oystercatcher x5) feeding on fields.

References

Directorate-General for Environment (European Commission), 2019, The birds directive: 40 years of conserving our shared natural heritage, Luxembourg: Publications Office of the European Union.

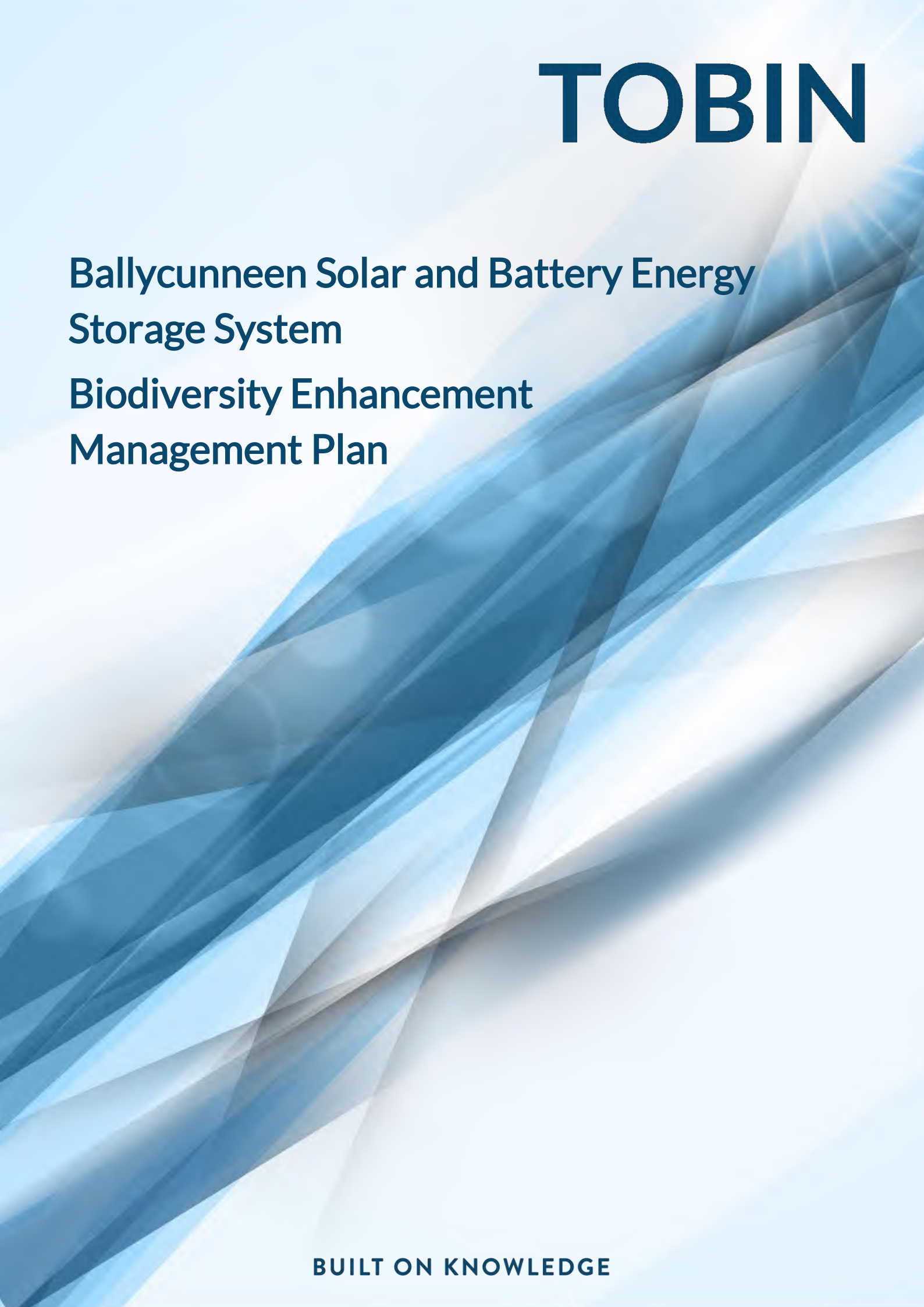
Hardy, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. (2013). Raptors: A Field Guide for Surveys and Monitoring.

SNH (2017) Recommended bird survey methods to inform impact assessment of onshore wind farms.

Gilbert, G Stanbury A., Lewis, L. (2021). Birds of Conservation Concern in Ireland 2020-2026. Irish Birds 9: 523-544.



APPENDIX E. BIODIVERSITY ENHANCEMENT MANAGEMENT PLAN



TOBIN

**Ballycunneen Solar and Battery Energy
Storage System**

**Biodiversity Enhancement
Management Plan**

BUILT ON KNOWLEDGE

Document Control Sheet

Document Reference	Ballycunneen Solar and Battery Energy – Biodiversity Enhancement Management Plan
Client:	BNRG Renewables Ltd.
Project Reference	12099

Rev	Description	Author	Date	Reviewer	Date	Approval	Date
A	First Issue	CB	22/07/2025	JCF	02/09/2025		
B	Final Issue	CB	03/09/2025	JCF	09/09/2025	DH	11/09/2025

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1. INTRODUCTION

1.1 PROJECT OVERVIEW

This Biodiversity Enhancement Management Plan (BEMP) has been prepared by TOBIN for the proposed BNRG Ballycunneen Solar Farm and Battery Energy Storage System (BESS) (herein referred to as the 'proposed project'). The proposed project includes a solar farm, internal access tracks, MV stations, storage containers, hard standings, material storage, internal electrical and communication cabling, CCTV, temporary construction compound, drainage infrastructure associated BESS, grid connection, and a 38kV substation across the townlands of Ballycunneen, Drumline, Ballycasey More, Clonmoney West, Firgrove, and Ard Kyle, Co. Clare.

The proposed project includes the installation of PV panels at four distinct land parcels, labelled 1 to 4, are shown in Figure 1.1. The land parcels have a combined area of 98ha. The northernmost land parcel, labelled 1, is located in the townland of Ard Kyle, with an additional land parcel 2 further south in the townlands of Ballycunneen and Firgrove, and the southernmost land parcels 3 and 4 situated in Clonmoney West. These parcels are strategically located on both sides of the N18 National Road and R458 Regional Road and are interconnected via underground cabling.

Electricity generated by the PV panels will be converted from DC to AC by MV stations distributed within the parcels, ensuring efficient energy conversion close to the point of generation. The location of MV stations are shown in Figure 1.1. The AC electricity will then be transmitted through the internal underground network to the onsite 38 kV substation located at Firgrove, before being exported to the 110kV substation at Drumline. The proposed internal network of underground cabling, the location of the onsite 38 kV substation at Firgrove, and the interconnecting cable to the 110kV substation at Drumline are shown in Figure 1.1. Along the cable route, horizontal directional drilling (HDD) will be used to cable under the Urlan Beg_010 WFD RWB (IE_SH_27U010950) to north of land parcel 4 and also under the N18 road. The locations of the HDD points are shown in Figure 1.1.

The National Biodiversity Action Plan (NBAP) (NPWS, 2023) states that Ireland's Vision for Biodiversity is:

"That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally."

Globally, biodiversity is in decline and despite increased awareness and efforts to halt its loss, biodiversity remains threatened by human activities worldwide. Major causes of global biodiversity loss include overexploitation of wild species and conversion of land for anthropogenic uses. Loss of biodiversity worldwide led to the wide acceptance of the need to coordinate management for biodiversity on a global scale.

1.2 AIMS OF THE BEMP

The main objective of this BEMP is to provide specific proposals for managing and enhancing biodiversity within the proposed project site based on current species records within the local

area and includes measures to encourage new species to the site and the creation of new habitats.

Figure 1.1 Proposed Project



2. METHODOLOGY

2.1 GUIDELINES AND LEGISLATION

Legislation and Policy

Legislation and policy relevant to biodiversity enhancement and referenced herein are as follows:

- Convention on Biological Diversity, established in 1992 and ratified at the convention in Ireland in 2016;
- Flora (Protection) Order, 2022;
- Ireland's 4th National Biodiversity Action Plan, 2023-2030, produced by the Department of Culture, Heritage;
- All Ireland pollinator Plan 2021-2025, produced by the National Biodiversity Data Centre;
- Regulation on Nature Restoration (Nature Restoration Law) (2024);
- Clare County Development Plan 2023-2029;
- Clare Biodiversity Action Plan 2024-2030.

Guidelines

Guidelines relevant to biodiversity enhancement and referenced herein are as follows:

- All Ireland Pollinator Plan Guideline Documents and How-to-guides¹.
- Biodiversity Net Gain. Good Practice Principles for Development, a Practical Guide (CIEEM-CIRIA-IEMA, 2019).
- Briefing Paper: Biodiversity Net Gain in Ireland (CIEEM, 2024).
- Ireland's Butterfly Series no 4- Gardening for Butterflies (Phelan et al., 2023).

2.2 DATA COLLECTION

This BEMP has been informed by a combination of desktop studies and directed field surveys. These measures herein are tailored to the specific potential effects on biodiversity identified for the proposed project, ensuring that sensitive habitats, and species are adequately protected and enhanced throughout the lifecycle of the proposed project.

The desktop study included:

- A review of NPWS reports relating to threatened and protected species of European sites.
- Review of National Biodiversity Data Centre (NBDC) Database records relevant to the proposed project site.
- A review of published data from Bat Conservation Ireland, Birdwatch Ireland, Botanical Society of Britain and Ireland and Inland Fisheries Ireland.

The field surveys included multidisciplinary ecological walkover surveys, as well as targeted bat and bird surveys.

The multidisciplinary ecological walkover surveys were carried out across the land parcels and adjacent land by TOBIN Ecologists on the May 1st and 2nd, 2025 and July 8th, 2025. During

¹ [All-Ireland Pollinator Plan » All-Ireland Pollinator Plan](#) (Accessed June 2025)



surveys, habitats were classified as per the Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000) and in accordance with the Heritage Council's 'Best Practice Guidance for Habitat Survey and Mapping' (Smith et al., 2011). Particular attention was paid to habitats that may be used by the Qualifying Interest (QI) species of the adjacent Lower River Shannon Special Area of Conservation (SAC) (Site code: 002165) is designated.

Bat surveys were carried out at the project site by Eire Ecology from February 2025 - August 2025 in order to assess the suitability of the site for bats. The survey considered all bat species including the lesser horseshoe bat which is a QI of the nearby Ratty River Cave SAC (Site code: 002316) is designated.

Michael O'Clery (B.A. Hons), Ornithologist with Goldcrest Environmental, undertook bird monitoring for the proposed project. Surveys were undertaken between January and August 2025 along established transects designed to provide comprehensive coverage of the project site. Monthly monitoring established patterns of species diversity and seasonal habitat use. The surveys recorded bird species presence, abundance, and behaviour, providing baseline of site utilisation by avifauna, with particular attention to species potentially associated with the adjacent River Shannon and River Fergus Estuaries SPA (Site code: 004077).

Full details of the ecological surveys undertaken are provided in Chapter 4: Biodiversity Chapter of the Planning Environmental Considerations Report (PECR), together with the Appropriate Assessment (AA) Screening and Natura Impact Statement (NIS) prepared to support the BNRG planning application for the proposed project to Clare County Council.

3. SUMMARY OF THE PROPOSED PROJECT

The proposed project comprises a Solar Farm, BESS, 38kV Substation and associated Grid Connection to the existing Drumline 110kV Substation. The proposed project site is shown in Figure 1.1.

The solar farm will provide up to 60 MW of energy which will supply approximately 11,700 homes locally. BNRG is applying for the proposed solar farm to have planning permission that is effective for 10 years (and an operational period of 40 years).

The project will be the subject of a Planning Application to Clare County Council.

The proposed project will include solar panels, internal access tracks, MV stations, BESS, storage containers, hard standings, material storage, internal electrical and communications cabling, CCTV, temporary construction compound, drainage infrastructure and all associated works related to the construction of the solar farm as well as measures designed to protect and enhance existing habitats.

The proposed project will consist of the construction of the following:

- Linear arrays of solar PV panels on ground mounted steel supported structures with associated cabling and ducting (including underground cable grid connection to the Drumline 110kV substation);
- 2 no. Horizontal Directional Drilling (HDD) locations associated with interconnecting cable routes
- 11 no. proposed single storey MV stations;
- A BESS installation (including 20 No. containers with cells and 5no. containers with PCS MV stations);
- Perimeter fencing;
- Palisade double security gates at all temporary (3No.) and permanent (3 no). site entrances;
- 2 no. temporary construction compound/carpark/material storage areas with associated temporary site offices, parking areas and security fencing;
- 8 no. steel storage containers;
- 5 no. turning bays;
- On-site pole mounted CCTV cameras;
- 3 no. temporary construction stage wheel wash systems;
- Temporary soil storage areas; and

A temporary sealed below ground wastewater storage tank will be constructed on site to hold wastewater generated by toilets in the temporary staff building during the construction phase. It will have a high-level alarm to alert when it should be emptied, and its content transported offsite for treatment at a licenced facility.

All solar MV stations and the energy storage containers will sit on a reinforced concrete slab.

The proposed solar panels (modules) will be fixed in position with galvanised steel framing pile driven into the ground, so there will be no moving parts. The solar PV panels are to be arranged in south facing rows, approximately 4m apart, within the existing field boundaries, whose perimeter will be fenced. A 5 m buffer between the field boundaries/hedgerows and fencing is proposed.

The proposed solar panels are typically set 0.6 m above ground level at the lowest point increasing to a maximum height above ground level of 3 m. The panels will be mounted typically at 5-25 degrees to the horizontal, but this may be adjusted to suit local conditions.

Each land parcel will be accessed via existing site entrances off both local and regional road networks. In the case of the southernmost parcel (4) this will be accessed through parcel No. 3 using an existing track running through woodland.

Internal access tracks (approx. 3.5m wide) will be required for construction and maintenance. A road crossing (via Horizontal Directional Drilling - HDD) will be required across the N18 road that divides the site in order to access the northern and southern land parcels and at Arkdyle to connect parcels No.1 and No.2.

Access gates, for security purposes, will be provided as part of the project. Gates will be located at a setback distance of 4.5 m from the road to allow vehicles to pull in from the main carriageway to access the gates. The security gates will be located at the main entrances to the site and will be screened by planting. Other gates required internally that separate land parcels will be provided and will be similar to the existing agricultural gates on the lands.

The proposed solar panels are typically set 0.6–0.8 m above ground level at the lowest point increasing to a height above ground level of 3 m. The panels will be mounted typically at 25 degrees to the horizontal, but this may be adjusted to suit local conditions. The final arrangement would be subject to detailed design and will be submitted to the Planning Authority prior to the commencement of project

All 11no. MV stations will sit on a 200 mm reinforced concrete slab. The typical MV stations, measuring approximately 6m (length) x 2.5m (width) x 3m (height), will be lifted into place. It should be noted the final appearance of inverters may alter due to detailed design requirements; flexibility of the design is required for tendering purposes. It should also be noted that this layout represents a worst-case scenario, and any post planning design changes (during detailed design) will only reduce any impacts/effects.

It is proposed to connect the Ballycunneen Solar Farm 38kV Substation to the existing 110 kV ESB/EirGrid substation located at Drumline via an underground cable. This will be undertaken using a 38 kV cable to connect back to the substation and 33 kV cable to connect between the parcels.

The construction phase will be short term in nature. It is anticipated that the construction phase will be limited to between 10 -12 months in total. Works will be restricted to standard day-time operational hours i.e. 07:00 to 19:00, Monday to Friday and 08:00 to 14:00 on Saturdays. No work will be undertaken on Sundays or Bank Holidays.

4. SUMMARY OF THE RECEIVING ENVIRONMENT

4.1 DESK STUDY RESULTS

A search of the NBDC database² showed a number of protected fauna species previously recorded within the 2km grid squares (R46F, R46G, and R46H).

Protected birds recorded in the 2km grid squares include Annex I species little egret (*Egretta garzetta*), four Red-listed species of BoCCI lapwing (*Vanellus vanellus*), barn owl (*Tyto alba*), kestrel (*Falco tinnunculus*), curlew (*Numenius arquata*) and four Amber-listed species of BoCCI.

Protected mammals recorded within the 2km grid squares included Eurasian badger (*Meles meles*), pine marten (*Martes martes*), hedgehog (*Erinaceus europaeus*), red squirrel (*Sciurus vulgaris*) and three bat species, Leisler's Bat (*Nyctalus leisler*), soprano pipistrelle (*Pipistrellus pygmaeus*), and brown long-eared bat (*Plecotus auritus*).

NPWS Article 12 of the Birds Directive (Directive 2009/147/EC) breeding birds' distribution data showed previous records of little grebe (*Tachybaptus ruficollis*), great crested grebe (*Podiceps cristatus*), grey heron (*Ardea cinerea*), mute swan (*Cygnus olor*), greylag goose (*Anser anser*), teal (*Anas crecca*), mallard (*Anas platyrhynchos*), tufted duck (*Aythya fuligula*), peregrine (*Falco peregrinus*), pheasant (*Phasianus colchius*), and water rail (*Rallus aquaticus*) within the 10km grid square that encompasses the proposed project site.

No plant species from the Flora Protection Order have previously been recorded within the proposed project site or the 2km grid squares.

4.2 FIELD SURVEY RESULTS

4.2.1 Habitats

During the multidisciplinary walkover survey, the dominant habitat within the proposed project site was GA1 Improved Agricultural Grassland (GA1). Other occasionally occurring habitats included

- BL3 - Buildings and artificial surfaces
- ED1 - Exposed sand, gravel or till
- FS1 - Reed and large sedge swamps
- FW1 - Eroding/ upland rivers
- FW4 - Drainage ditches
- GM1 - Marsh
- GS2 - Dry meadows and grassy verges
- GS4 - Wet grassland
- WD1 - (Mixed) broadleaved woodland
- WD2 - Mixed broadleaved/ conifer woodland
- WD4 - Conifer plantation
- WL1 - Hedgerows
- WL2 - Treelines
- WS1 - Scrub

² [Maps - Biodiversity Maps](#)



The most abundant habitat (GA1) exhibited little species diversity which is reflective of active management (agricultural practices). However, multiple habitats within the proposed project site had higher ecological value. For the proposed project, infrastructure has been purposely set back from sensitive habitat to minimise potential ecological impacts. Enhancement measures are proposed below for hedgerows (WL1), treelines (WL2), mixed broadleaved woodland (WD1), scrub (WS1), treelines (WL2), mixed broadleaved woodland (WD1), wet grassland (GS4). These measures will enhance local conditions for fauna.

4.2.2 Mammals

No evidence of badger was recorded during the walkover survey, however the landowner of the southern parcel of land (land parcel 3) informed the surveyors of an active sett located under a hawthorn tree in a field. As a result, this location was excluded from the proposed project site.

Table 4.1 Bird Species Recorded Within the Proposed Project

Species	Number of Birds Recorded on the Proposed Project Site	Designation
Little Egret	1	Annex I (2009/147/EC) Birds Directive Green listed on the BoCCI
Curlew	51	Red listed species on the BoCCI
Snipe	1	
Kestrel	5	
Herring Gull	3	Amber listed on the BoCCI
Lesser Black-backed Gull	7	
Grey Heron	1	Green listed on the BoCCI
Buzzard	12	
Sparrowhawk	1	

Specialised Bat surveys were conducted by Eire Ecology from February 2025 to August 2025. Nighttime roost surveys and emergence surveys were conducted on July 3rd and 21st, 2025. Static detector surveys were carried out from the 16th April for 20 nights and were redeployed from 11th July for ten nights in order to establish a baseline of species assemblages, along with spatial and temporal distribution of species activity within the proposed project site.

Leisler's Bat is the earliest emerger on the site. Other species recorded in smaller numbers include Pipistrelle species and lesser horseshoe bat. Leisler's bat, soprano pipistrelle and common pipistrelle were recorded during the nighttime emergency surveys. A total of 5 roosts were found during nighttime surveys. 33,701 registrations were recorded over the course of 30 nights from static bat detectors. The results of the static surveys are illustrated in Table 4.2.

Table 4.2 Static bat detector results

Common name	Latin Name	No. of recordings
Leisler's Bat	<i>Nycatalus leisleri</i>	14,817
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	10,547
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	6,912
Nathusius Pipistrelle	<i>Pipistrellus nathusii</i>	3
Pipistrelle 40 KHz	<i>Pipistrellus nathusii</i> or <i>P. pipistrellus</i>	62
Brown Long-eared	<i>Plecotus auritus</i>	302
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	20
Natter's Bat	<i>Myotis Nattereri</i>	313
Unidentified Myotis Species		725
Total Registrations		33,701

4.2.3 Birds

Monthly bird transect surveys undertaken by Goldcrest identified a total of nine bird species at the proposed project site. Of these, only one species, Curlew (*Numenius arquata*), is a species of conservation interest (SCI) for the River Shannon and River Fergus Estuaries SPA. A flock of 51 curlew was observed foraging on grasslands in the southern section of the site (land parcel 4), with a further four individuals recorded outside the project area, flying at heights of 0–60 m. Additional species recorded within the proposed project during the transect surveys included Little Egret (*Egretta garzetta*), Snipe (*Gallinago gallinago*), Kestrel (*Falco tinnunculus*), Herring Gull (*Larus argentatus*), Lesser Black-backed Gull (*Larus fuscus*), Grey Heron (*Ardea cinerea*), Buzzard (*Buteo buteo*) and Sparrowhawk (*Accipiter nisus*).

During the multidisciplinary walkover surveys undertaken by TOBIN in May 2025 two Red-listed species of BoCCI were recorded. Four meadow pipits (*Anthus pratensis*) were also recorded calling and performing parachuting flights within the northeast of the proposed project site at land parcel 1. Kestrel activity was also recorded on site, with nesting confirmed in a lone ash tree along the proposed underground cable route south of land parcel 1. This was evidenced by an adult kestrel carrying prey to a juvenile, which was calling from the nest.

5. BIODIVERSITY ENHANCEMENT MEASURES

The recommendations for habitat and specific species enhancements for the proposed project are outlined hereunder. All recommendations comply and adhere to the management and objectives of the National Biodiversity Action Plan, the All-Ireland Pollinator Plan 2021-2025 and the Clare County Development Plan 2023-2029. The aforementioned plans seek to safeguard and enhance biodiversity and landscape values at national and local scales.

5.1 HABITATS AND FLORA

Habitats selected for biodiversity enhancement within the proposed project site are described below.

5.1.1 Hedgerows (WL1) and Treelines (WL2)

Treelines are among the most extensive habitats across the proposed project site, followed by hedgerows, and present key opportunities for biodiversity enhancement. Thick, well-structured, and species-rich hedgerows and treelines are essential for wildlife, providing foraging resources, habitat, and shelter, while also functioning as commuting corridors into the wider landscape.

5.1.1.1 Buffers

Given the high biodiversity value of these hedgerow and treeline habitats, the project has been designed to minimise impacts, with a 5-metre (m) buffer established between the habitats and the proposed infrastructure. The implementation of buffers has minimised loss to approximately 174m² of hedgerow and 70.6m² of treeline will be lost to facilitate the construction of the proposed project (see Figure 5.1 through Figure 5-3). The removal of these treelines and hedgerows will be outside the bird nesting season (March 1st to August 31st). All lost hedgerows will be reinstated.

During construction works, temporary palisade fencing will be installed at night in any gaps within hedgerows to maintain the integrity of commuting corridors for bats and other nocturnal mammals. Fencing will only be removed during daytime hours if construction access is required, minimising disturbance to nocturnal wildlife.

5.1.1.2 Hedgerow / Treeline Planting

A total of 4,304m² of new hedgerow will be planted within the proposed project site as illustrated on Figure 5.4 and Figure 5.5. It is crucial that the tree, hedgerow and shrubs species used in the replanting are of Irish provenance to avoid the introduction of diseases and/or invasive species. Woodlands of Ireland³ provide a list of tree suppliers that guarantee trees are of Irish provenance. In the event that ash is used, the ash will be confirmed to be free of Ash dieback (*Hymenoscyphus fraxineus*).

Hedgerow / Treeline Bolstering

Bolstering of existing hedgerows and treelines is an excellent means of maintaining the structural integrity of the hedge as well as maximising their biodiversity value. The location of existing hedgerows and treelines that will be bolstered is shown in Figure 5.4 and Figure 5.5.

³ [Tree Nurseries – Native Provenance Planting Material – Woodlands of Ireland](#)



It is recommended to bolster existing hedgerows and treelines within the proposed project to increase thickness and cover, along with species diversity. Shrubs and small trees that can be planted to increase hedgerow thickness include blackthorn (*Prunus spinosa*), hawthorn (*Crataegus monogyna*), holly (*Ilex aquifolium*), wild privet (*Ligustrum vulgare*), guelder rose (*Viburnum opulus*), elder (*Sambucus nigra*), rowan (*Sorbus aucuparia*), honeysuckle (*Lonicera periclymenum*), hazel (*Corylus avellana*), and spindle (*Euonymus europaeus*). All these species are native to Ireland and support a multitude of different invertebrate species. These trees also produce flowers, or catkins in the case of hazel, which are excellent resources for pollinators. Later in the season berries and nuts are produced which are an important food source for birds and mammals⁴. Flowering climbers can also be considered for planting in this bolstering effort. They increase the hedge or treeline density and hold their own unique invertebrate assemblages. Suitable native climber species include common dogrose (*Rose canina*) and honeysuckle (*Lonicera periclymenum*).

If there are gaps within the hedgerow or treeline, they can be filled by planting the above recommended species or by laying hedge. Laying involves partially cutting the hedgerow stems near ground level and bending the stem to the required position to fill a gap. This results in new growth from the cut, which thickens the hedge base and rejuvenates it. (Hedgerows Ireland, 2024). It should be noted that laying will reduce birds breeding opportunities in the few years immediately after management and should therefore be carried out over many years rather than managing large sections in one year. Where gaps are too large to use the laying technique, native whips can be planted.

Hedgerow Maintenance

Hedgerows within the proposed project site should be cut on a minimum of a three-year cycle, in rotation. This ensures that thick nesting cover, autumn berry crops and micro habitats for overwintering insects are available somewhere on the site every year. Hedgerows marked 'A' will be cut in the first year, hedgerows marked 'B' will be cut in the second year and hedgerows marked 'C' will be cut in the third year. In the fourth year, this cycle will start over again. It is recommended to allow hedgerows and treelines to grow for two years before starting this regime as many have been over-managed in the past (see Figure 5.6 to Figure 5.7)

See also the Heritage Council's 'Hedgerow Appraisal System' (Foulkes, *et al.*, 2013) guidance on 'favourable' and 'highly favourable' hedgerows conditions in Table 5.1 below. Hedgerows within the proposed project site should be managed to strive for these conditions in terms of dimensions, height, width, profile and basal density.

Hedgerows managed for pollination should be cut between November and January (AIPP, 2021). The cutting equipment used should be sharp so as not to shatter or fray the hedge as this allows disease to enter the plants, using a finger bar cutter is recommended for this task.

⁴ [Winter berries for birds | Suffolk Wildlife Trust](#)



Table 5.1 The Heritage Council's Condition Assessment of Hedgerows (Source: Foulkes *et al.*, 2013)

Structural Variables	0	1	2	3
Dimensions	Unfavourable	Adequate	Favourable	Highly favourable
Height	<1.5m	1.5 – 2.5m	2.5 – 4m	>4m
Width	>1m	1 – 2m	2 – 3m	>3m
Profile	Remnant; Derelict	Wind shaped; Losing Structure; Base	Boxed / A-shaped; Straight shaped	Overgrown; Top Heavy / undercut; Outgrowths at base
Basal density / porosity to light of woody shrubs	Open	Semi-translucent	Semi-opaque	Opaque / Dense

5.1.2 Woodland (WD1, WD2) and Scrub (WS1)

Pockets of woodland and scrub were recorded throughout the site, including mixed broadleaved woodland (WD1), mixed broadleaved/conifer woodland (WD2) and Scrub (WS1). Recognising the high ecological value of these habitats, areas of woodland and scrub within parcel 2 and parcel 3 have been excluded from the project.

As a biodiversity enhancement measure, the scrub areas will be allowed to undergo natural succession, gradually transitioning into woodland and expanding up to the 5 m buffer from the solar panels, thereby increasing habitat diversity and ecological value on the site. Once the woodland reaches the buffer of the solar panels and associated infrastructure, the boundary will be managed through occasional cutting or trimming using sharp equipment to avoid shattering or fraying, which can introduce disease. A finger bar cutter (or similar) will be employed for this task. In addition, it should be noted that no cutting or trimming will occur during the breeding bird season which runs from March 1st to August 31st.

In addition to allowing the expansion of woodland, it is proposed to plant a new woodland area of approximately 0.83ha. This woodland will comprise species already present on the project site, including elder, willow, hawthorn, alder, hazel, birch, and holly. The proposed location of this woodland is shown in Figure 5.4 to Figure 5.5.

5.1.3 Wet grassland (WS4)

As a biodiversity enhancement measure, a section of grassland will be managed as wet grassland, with existing wet grassland areas left undisturbed. The location of this wet grassland is illustrated in Figure 5.4.

Wet grassland will important suitable nesting habitat for several bird species including the following SCIs species for the adjacent River Shannon and River Fergus Estuaries SPA is designated; lapwing, curlew, redshank (*Tringa totanus*), snipe (*Gallinago gallinago*), and black-tailed godwit (*Limosa limosa*).

The wet grassland will also serve as a hunting habitat for species including barn owl, short-eared owl (*Asio flammeus*), merlin (*Falco columbarius*), and peregrine falcon (*Falco peregrinus*).

Grazing by sheep will be used to control encroachment of scrub species such as willow and gorse and to create a range of sward heights. Grazing will be avoided or reduced during the bird nesting season to prevent loss of nests. Sheep trampling can create small patches of bare or compacted ground that may benefit certain invertebrates.

5.1.4 Dry Meadows and Grassland (GS1)

As a biodiversity enhancement measure, it is proposed to retain a section of low ecological value GA1 grassland to be managed as a hay meadow, covering an area of approximately 4.84ha. The location of the proposed hay meadow is shown in Figure 5.4 to Figure 5.5. Hay meadow is a species-rich habitat that will provide high biodiversity value on site. The grassland will be allowed to grow throughout the growing season without grazing or cutting, and at the end of the season in early September, the meadow will be cut and the vegetation immediately removed.

To protect ground-nesting birds, the meadow will remain uncut during the bird breeding season, from March 1st to August 31st. In winter, the land may be lightly grazed. Over time, this management regime will increase herb and forb cover, benefiting pollinators and a wide range of other invertebrates. Following the autumn cut, yellow rattle (*Rhinanthus minor*) may be sown across the meadow to reduce grass vigour and promote a more diverse habitat. All seed used, including yellow rattle seed, will be of local provenance.

Areas of grassland that are unearthed or disturbed during the construction phase will be reinstated and replanted with diverse mix of grass species. Grasses such as; sweet vernal-grass (*Anthoxanthum odoratum*), red fescue (*Festuca rubra*), rough meadow-grass (*Poa trivialis*), smooth meadow-grass (*Poa pratensis*), Yorkshire fog (*Holcus lanatus*), crested dogs-tail (*Cynosurus cristatus*) and cocksfoot (*Dactylis glomerata*) will be used to provide the bulk of the cover and structure to the meadow. No wildflower seed mixes will be sown on site, instead, wildflowers will be allowed to naturally colonise the area in time.

5.1.5 Grass Verges

Grassy verge habitats provide an important transition in vegetation height between grasslands, hedgerows, and treelines. Many grasses act as larval foodplants for a wide range of butterflies in Ireland, including almost all species within the 'brown' category (family cluster within the Nymphalidae (subfamily Satyrinae)). In addition, taller vegetation offers shelter and hibernation sites for invertebrates, ground-nesting birds, and small mammals.

To maintain their biodiversity value, margins should be cut once annually, with vegetation removed immediately afterwards. This management should be carried out on a rotational basis so that the entire margin is not mown in any single year, thereby avoiding complete loss of habitat for local invertebrate populations.

5.2 FAUNA

5.2.1 Birds

Well-managed hedgerows and treelines will provide excellent foraging areas and/or shelter for the bird species recorded using the proposed project site. In the breeding season, these habitats will also act as nesting sites for many species. Due to this, and as mentioned, all hedge and tree trimming will be carried out outside the breeding season which runs from the March 1st to August 31st. Prior to any hedge and tree trimming works the areas will be inspected by a

qualified ecologist for the presence of nests prior to commencement. Where an active nest is found, the nest will be clearly marked and avoided until the chicks have fledged or where nesting has failed.

To enhance passerine bird breeding opportunities bird nest boxes will be installed across the proposed project site. These boxes will be positioned on trees, 3-5m off the ground with a clear flight path in and out. The boxes can be tilted forward slightly to prevent rain entering the nest hole. Boxes with different entrance hole sizes will be installed, for example, some 28mm hole boxes and some 32mm. Open-fronted nestboxes will also be included. This provides nesting opportunities for a variety of different bird species. A steel plate around the entrance hole will be used as this protects against predation. In all cases, the installation of bird boxes will follow British Trust for Ornithology (BTO) guidelines on the placement and installation of nest boxes⁵.

5.2.2 Bats

The biodiversity enhancement proposals related to bats included in this report were prepared by John Curtin of Eire Ecology. These proposals are detailed in Appendix A.

Well-managed hedgerows and treelines will provide foraging opportunities for bats and also act as important commuting corridors. Several of the larger trees within the treelines on project site were categorised as holding a least one potential roost feature (PRF).

As discussed in Section 5.1.1, new hedgerows and treelines will be planted, while existing hedgerows will be bolstered and improved, providing commuting and foraging routes for bats.

In order to increase roosting opportunities for bats, bat boxes will be installed within the proposed project site (see Appendix A). The proposed bat box type is wood-crete, which are a combination of clay, concrete and timber. This type is recommended as they last longer and are more resistant to weathering. The flat (self-cleaning) boxes are ideal as all faeces falls directly out of the box and no cleaning is required. Boxes will be installed at least 4m high in a sheltered location. If positioned on a tree, the surface should be free from ivy. Boxes should be positioned near a commuting corridor such as a hedgerow or treeline. They will not be near any artificial light source. At boxes will be installed at different aspects. For example, one north-facing, one south-facing and one east-facing. This allows bats to regulate their temperature by moving between the boxes depending on weather conditions. (Bat Conservation Ireland, 2015).

Lesser horseshoe bat (*Rhinolophus hipposideros*) was recorded to be using the site as a commuting and foraging area. The Ratty River SAC (0002316) is located 4.1km from the proposed project, there will be no impacts on the SAC population of Lesser Horseshoe bat. The bolstering of existing hedgerows and treelines and the planting of new hedgerow will enhance the sites effectiveness as a commuting corridor for this bat species. The current land use for the proposed project is pasture grazing. Lesser Horseshoe Bat prefers a mosaic of different habitats such as pastureland, woodland and hedgerows for commuting. Dung flies make up a portion of their diet so the presence of grazing livestock can be vital for this species. It is important to note that although solar photovoltaic panels will be installed, cattle or sheep will graze around these panels and there will therefore be little change in the invertebrate assemblages found on site.

It is predicted that the hay meadow, when established will provide new foraging opportunities for bat species by boosting invertebrate numbers on the project site.

⁵ [Putting up a nest box | BTO](#)



5.2.3 Non-volant Mammals

While no evidence of badger activity was recorded from walkover survey, there is potential the species is utilising the project area. Surveyors were notified of an area occupied by badgers and this area has been excluded from the proposed project.

Bolstering and proper management of hedgerows and treelines will benefit badger due to an increase in berry and nut yields and by boosting general biodiversity in the area. As part of the measure elder will be in the hedgerows and treelines as the berries are an important part of the species diet in Autumn.

Log piles will be created on-site within the proposed project area, positioned near hedgerows to provide shelter. These decaying materials offer suitable habitat for a variety of invertebrates, including bees, and provide both shelter and food resources for insectivorous birds. Additionally, smaller mammals, such as shrews and mice, are likely to use these log piles for shelter.

5.2.4 Invertebrates

The proposed habitat enhancement measures are expected to benefit invertebrate species across the project site. The increased diversity of habitats will encourage both the abundance and variety of invertebrates.

Pesticides and herbicides will not be used within the proposed project site. These chemicals reduce invertebrate numbers which has a negative impact on all biodiversity on site.

Log piles will be created on-site within the proposed project area, positioned near hedgerows to provide shelter. These decaying materials offer suitable habitat for a variety of invertebrates, including bees, and provide both shelter and food resources for insectivorous birds. Additionally, smaller mammals, such as shrews and mice, are likely to use these log piles for shelter.

Bee scrapes are another measure recommended that is easily implemented. Most of our solitary bees (62 species or 80% of Irish species) make their nest by excavating a small burrow into bare soil⁶. Habitat for ground nesting bee species can be created by removing or scraping vegetation from the surface of soil (removing a surface area of 1m x 1m), on a slope of south or southeast facing soil at the northwestern boundary of the proposed project site. Bee scrapes should be created in February- March to be ready for colonisation by solitary bees from April.

The following guidance was shared by the Irish Bee Conservation Project (IBCP)⁷ during consultation, regarding the construction of 'bee posts.' Lengths of wood, 2m high, are drilled with holes of varying sizes and depths. Table 5.2 outlines general guidelines for the corresponding depths for hole diameters. It is advised to use a Computer Numerical Control (CNC) machine when drilling the holes, as using a standard drill will result in rough edges, bees will not use the post if the edges are too rough. The posts must be south to south-east facing and the drilled holes must be at least 1.5m off the ground. It is advised not to treat the wood to allow the post to naturally decay over time, which will provide additional dead wood for other insect populations within the proposed project site.

⁶ [The secret life of solitary bees - National Biodiversity Data Centre](#)

⁷ [Irish Bee Conservation Project](#)



Table 5.2: Bee Post Drill Holes

Drilled Hole Width	Corresponding Hole Depth
4mm	50mm
8mm	100mm
10mm	125mm

Alternatively, to bee posts, insect hotels can be installed in hedgerows and treelines around the site. These should be 1-1.5m off the ground and south to south-east facing. These insect hotels will particularly benefit solitary bee species.

Figure 5.1 Hedgerow and Treeline Loss in Parcel 1 and Parcel 2

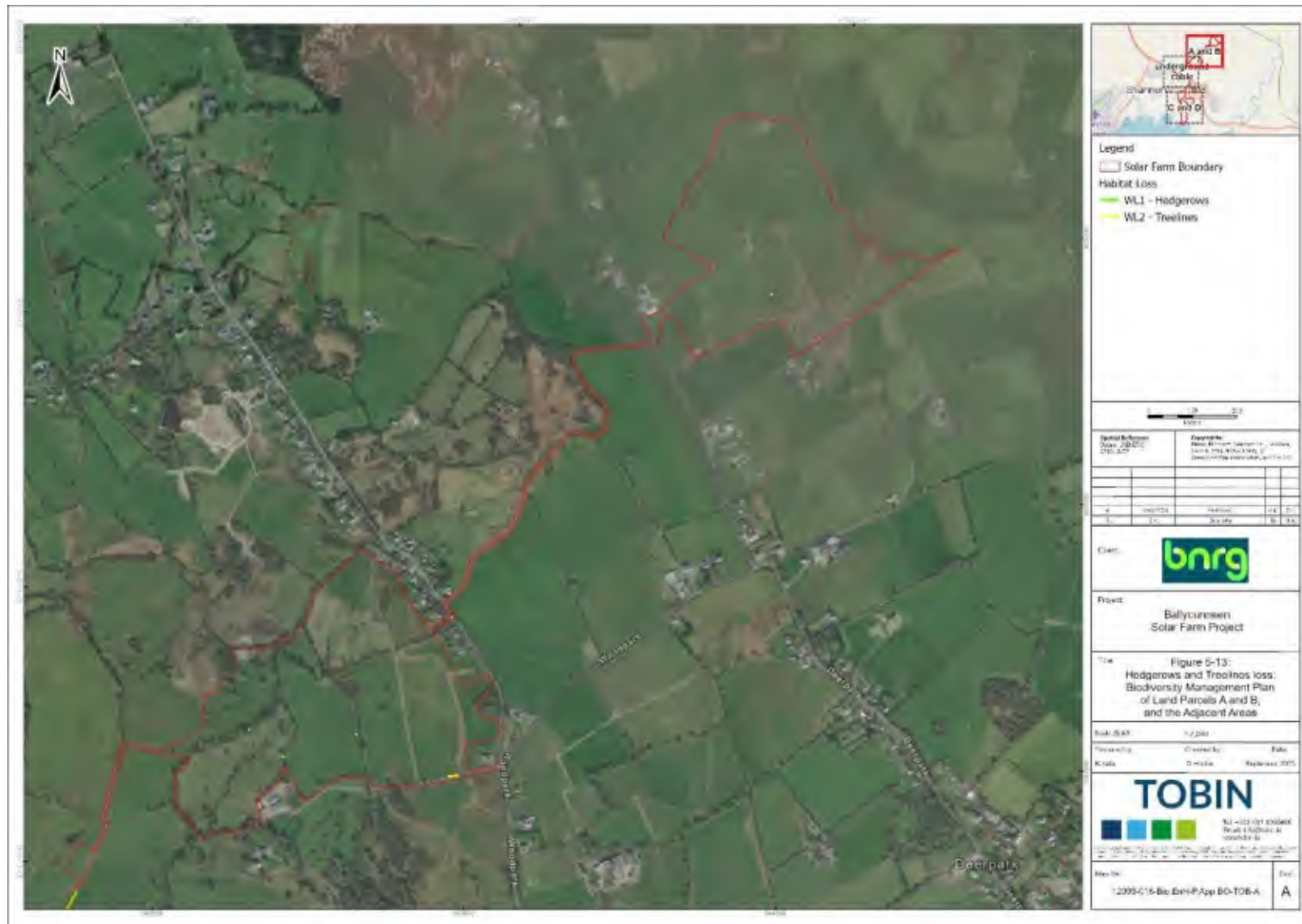


Figure 5.2 Hedgerow and Treeline Loss in Parcel 3 and Parcel 4



Figure 5.3 Hedgerow and Treeline Loss along the underground cable



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Figure 5.5 Proposed planting in Parcel 3 and Parcel 4



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5.3 BIOSECURITY

All works involved with the proposed project must follow the biosecurity measures outlined within the Transport Infrastructure Ireland guidelines to avoid the spread of invasive species (TII, 2020). No invasive species were recorded within the proposed project site. However, it is possible that the movement of construction vehicles and material to and from the site may result in the introduction of invasive species if not appropriately managed. Invasive species may also travel via watercourses if a sufficient buffer is not established from the riparian zone. Colonization of invasive species to an area can inhibit growth and crowd out native plant species, alongside reducing the overall biodiversity of an area.

5.4 MONITORING

Monitoring is a fundamental component of biodiversity management and requires thorough planning to identify key indicators, establish baseline conditions prior to project and assess biodiversity changes through the life of the proposed project. It is recommended that the Ecological Clerk of Works (EcOW) appointed for the project to oversee monitoring programme. Table 5.3 presents a preliminary monitoring programme for the proposed project. The Ecologist will assess the effectiveness of the monitoring and enhancement measures and will prepare a report outlining the findings. This report will be submitted to the planning authority on completion.

Table 5.3: Preliminary Monitoring Programme

Biodiversity Element	Monitoring Activity	Key Indicators	Target	Frequency	Time of the Year
Hedgerows and Treelines	Check for damaged whips and gaps in the structure.	Species diversity and hedgerow/treeline structure have been maintained or improved since the initial visit.	Thick hedgerows/treelines that are species-rich, structurally dense and act as high-quality corridors through the landscape.	Year 1, 5, 10 and 20.	Summer
New Woodland	Walk through the new woodland habitat observing the condition of the planted trees.	Trees are healthy, growing well and the woodland habitat is developing and beginning to connect with the existing woodland.	An extension of the existing oak-ash-hazel woodland.	Year 1, 5, 10 and 20.	Summer
Grasslands	Walk the full length of the grassland habitat observing the habitat condition and advise appropriate	Flower-rich grassland with a number of different flowering plant species.	A species-rich semi-natural grassland type.	Year 1, 5, 10 and 20.	Summer

Biodiversity Element	Monitoring Activity	Key Indicators	Target	Frequency	Time of the Year
	stocking rates if required				
Bird Boxes	Inspect each box.	Check nest has been occupied and check if all boxes are intact, secure, and clean.	Boxes are being occupied by target species.	Annually	Winter
Bat Boxes	Inspect each box.	Check that all boxes are intact, secure and weatherproof.	Boxes are being occupied by target species.	Annually	Summer
Invertebrates	Inspect Bee Posts, Log Piles and Scrapes.	Check if Bee Posts, Log Piles and Scrapes are being utilised by bees and/or other invertebrates.	Structures are being occupied by target species and other invertebrates.	Annually	Summer

6. RECOMMENDED SUPPLIERS

Due to the likelihood that many general plant suppliers may provide material that is unsuitable for biodiversity objectives (such as non-native species, native species not of Irish provenance, which lack the local genetic resilience required to support wildlife, or plants treated with neonicotinoids and other harmful chemicals that negatively impact pollinators) it is essential to exercise care when sourcing plants. Using inappropriate planting stock can undermine the long-term success of biodiversity measures, reduce habitat quality, and compromise wider ecosystem services.

To address this, a list of recommended specialist suppliers is provided in [section/table reference]. These suppliers are known to provide native Irish provenance species that are free from harmful chemical treatments, thereby supporting stronger establishment rates, improved genetic diversity, and higher ecological value. The use of such suppliers also aligns with best practice under the National Biodiversity Action Plan and ensures compliance with the mitigation hierarchy set out in ecological guidance.

Where possible, plants should be sourced as close to the project site as feasible to further maintain regional genetic integrity. In addition, seed mixes should be verified as being of Irish provenance and free from invasive or non-target species. Documentation of provenance and chemical-free certification should be sought from suppliers and retained as part of the project's biodiversity monitoring and reporting framework.

Table 6.1: Recommended Suppliers

Trees and shrubs	Hometree, Ennistymon, Co.Clare (https://www.hometree.ie/tree-nursery)
	Wild Oaks, Feakle, Co. Clare (WILD OAKS)
	Kearneys Nursery, Galbally, Co. Tipperary/Limerick (https://www.irelandtrees.com/collections/native-trees)
	Clarenbridge Nursery Macnamaras, The Bridge Centre, Hillpark, Clarinbridge, Co. Galway (https://clarenbridgegardencentre.ie/)
Wildflowers	Connecting to Nature, Co. Waterford (https://connectingtonature.ie/collections/irish-garden-wildflowers)
	Future Forests, Bantry Co. Cork (Future Forests - The Irish mail order plant people).
	The Garden Shop.ie (https://www.thegardenshop.ie/irish-wildflowers/)
Grass species	Fruithill Farm, Bantry Co. Cork (Organic Farm and Garden Supplies).

7. CONCLUSION

Based on the ecological studies undertaken for the proposed project, a series of biodiversity enhancement measures are recommended within this BEMP. These measures are designed to protect existing biodiversity on the site, including fauna and habitats such as grasslands, woodland, hedgerows, and treelines. Through ongoing management and effective implementation, the biodiversity value of the site will be enhanced and maintained over time.

8. REFERENCES

- All-Ireland Pollinator Plan (2021). *All-Ireland Pollinator Plan 2021-2025*. Available at: [AIPP 2021-2025 » All-Ireland Pollinator Plan](#) [Accessed June 2025].
- Bat Conservation Ireland (2010). *Bats & Lighting Guidance Notes for: Planners, Engineers, Architects and Developers*. Available at: https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Lighting.pdf [Accessed June 2025].
- Bat Conservation Ireland (2015). *Bats & Bat Boxes Guidance Notes for: Agri-environmental Schemes*. Available at: [BCIrelandGuidelines_BatBoxes.pdf](#) [Accessed June 2025].
- Bat Conservation Trust (n.d). *Species info sheet for lesser horseshoe bat*. Available at: [Species-info-sheet-for-lesser-horseshoe-bat-FINAL.pdf](#) [Accessed July 2025].
- BTO (2025). *Putting up a Nest Box*. Available at: [Putting up a nest box | BTO](#) [Accessed June 2025].
- CIEEM-CIRIA-IEMA (2019). *Biodiversity Net Gain. Good Practice Principles for Development, a Practical Guide*. Available at: [Biodiversity Net Gain: Good Practice Principles for Development, A Practical Guide. | CIEEM](#) [Accessed June 2025].
- CIEEM (2024). *Biodiversity Net Gain in Ireland*. Available at: [BE-Position-Paper-Aug-2024.pdf](#) [Accessed June 2025].
- Clare County Council (2021). *Clare County Development Plan 2023-2029*. Available at: <https://clarecdp2023-2029.clarecoco.ie/stage2-draft/display/volume-1-written-statement-45158.pdf> [Accessed July 2025]
- Clare County Council (2024). *The Clare Biodiversity Action Plan 2024-2030* <https://www.clarecoco.ie/services/planning/news/clare-biodiversity-action-plan-2024-2030-issues-paper-54864.pdf> [Accessed July 2025]
- Fossitt, J.A. (2000). *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.
- Foulkes, Fuller, et al. (2013). *Hedgerow Appraisal System Best Practise Guidance on Hedgerow Surveying, Data Collection and Appraisal*. Available at: [HAS-Publication-Final-March-2013.pdf](#) [Accessed June 2025].
- European Commission [EC] (2007). Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg. Available at: Guidance document on Article 6(4) of the [Assessed August 2025]
- Gilbert, G., Stanbury, A. and Lewis, L. (2021). *Birds of Conservation Concern in Ireland 2020 – 2026*.
- Hedgerows Ireland (2024). *Hedgerow Management*. Available at: [Hedgerow Management - Hedgerows Ireland](#) [Accessed June 2025].
- Hedgerows Ireland (2024). *Hedgerow Planting*. Available at: [Hedgerow Planting - Hedgerows Ireland](#) [Accessed June 2025].
- National Biodiversity Data Centre (NBDC) (2025). *Maps*. Available at: [Maps - Biodiversity Maps](#) [Accessed: June 2025].



NPWS (2023). *Ireland's 4th National Biodiversity Action Plan*.

Phelan et al. (2023). *Ireland's Butterfly Series: Gardening for Butterflies*. Available at: [Rewilding-Your-Garden-WEB.pdf](#) [Accessed July 2025].

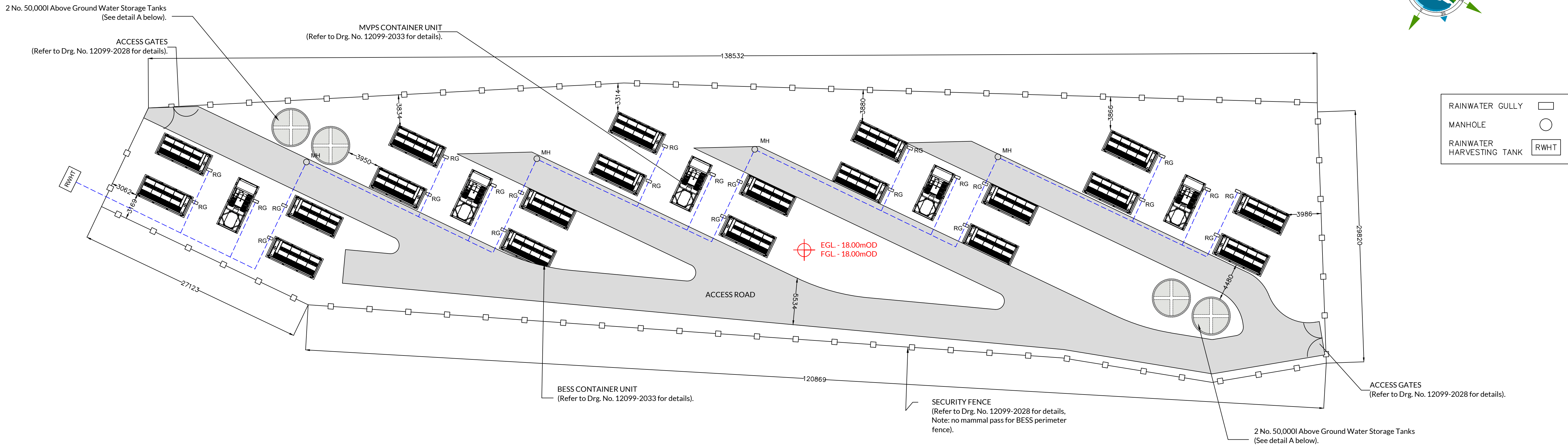
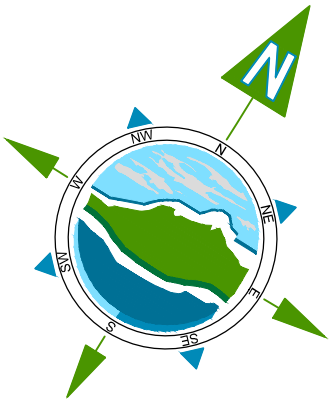
The Convention on Biological Diversity (2020). Available at: www.cbd.int [Accessed June 2025].

Transport Infrastructure Ireland (2020). *The Management of Invasive Alien Plant Species on National Roads-Standard*. Available at: [GE-ENV-01104](#) [Accessed July 2025].

Appendix A EIRE ECOLOGY BAT REPORT



APPENDIX F. BESS LAYOUT AND DRAINAGE DETAIL



A	20.05.26	PLANNING	JR	DH
Rev	Date	Description	By	Chkd.

Client:

Project:

BALLYCUNNEEN SOLAR FARM
PLANNING APPLICATION

Title:

BATTERY ENERGY
STORAGE SYSTEM
DRAINAGE LAYOUT

Scale @ A1:

1:250

Prepared by:

Checked by:

Date:

J. Ryan

D. Hobbs

May 2026

Drawing Status:

Planning

Tel: +353 (0)91 565 211
Email: info@tobin.ie
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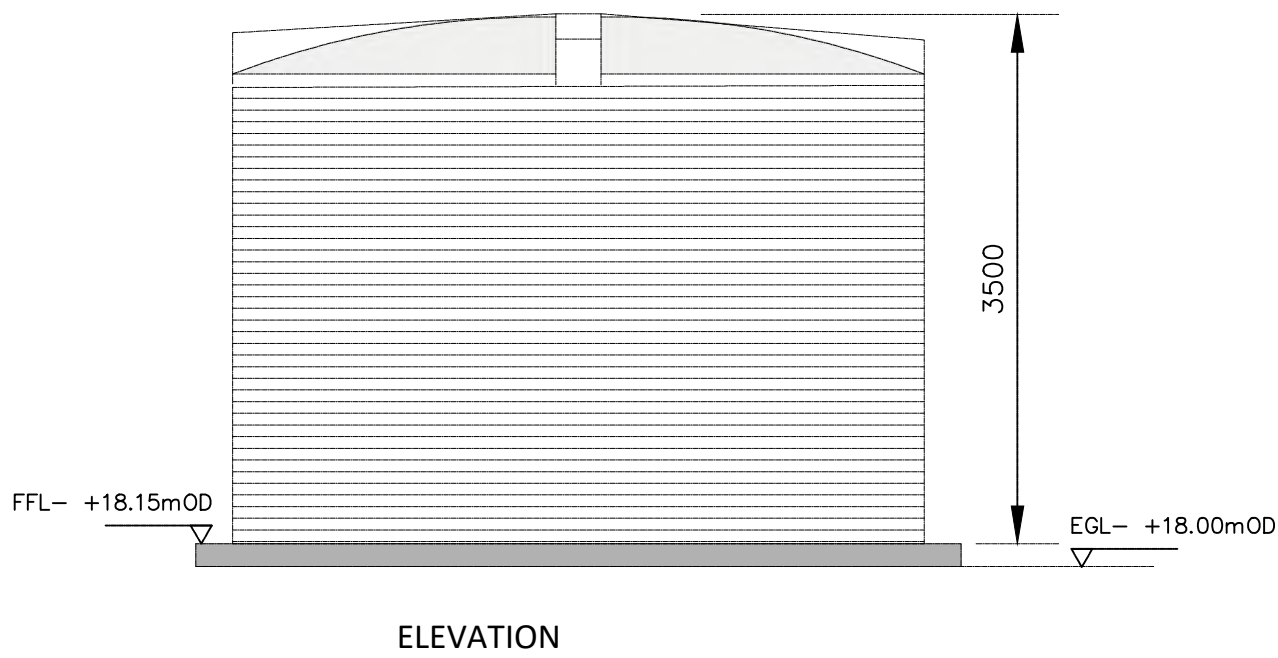
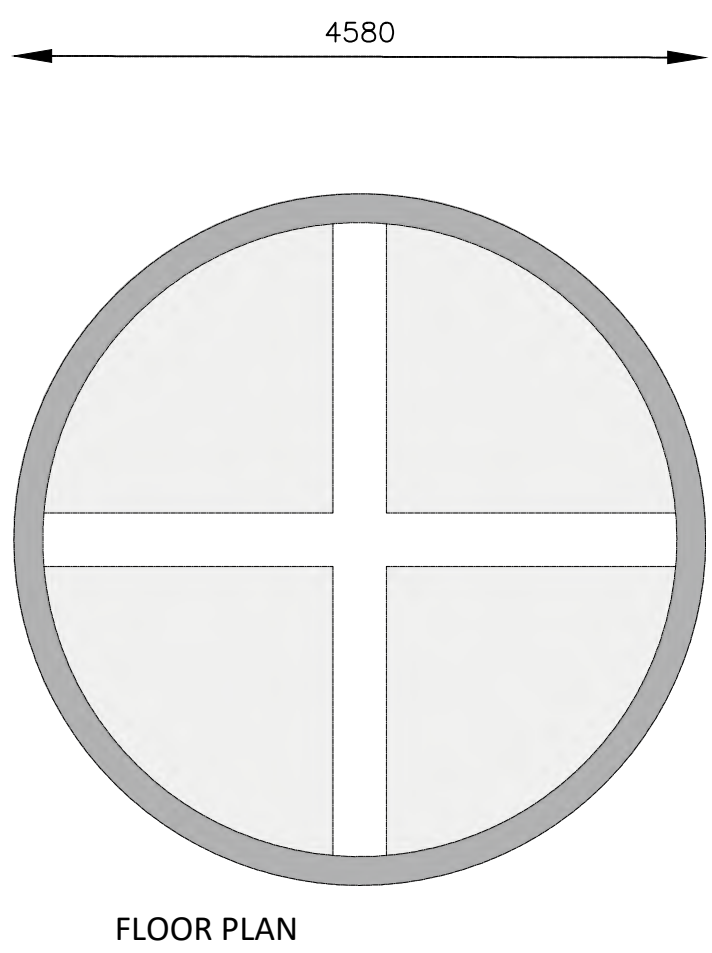
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Drawing No.:

Revision:

12099-2049

B



DETAIL A - ABOVE GROUND WATER STORAGE TANKS
Scale 1:50