HELIOS RENEWABLE ENERGY PROJECT

# Preliminary Environmental Information Report

## Volume 3: Technical Appendices

Appendix 2.1: Scoping Report

# Helios Renewable Energy Project

## Environmental Impact Assessment Scoping Report

### Planning Inspectorate Reference: EN010140

**June 2022**

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## Environmental Impact Assessment Scoping Report

## Planning Inspectorate Reference: EN010140

## Prepared on behalf of Enso Green Holdings D Limited

| | | |
|---|---|---|
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# **APPENDICES** (provided separately)

# 1. Introduction

## 1.1. Purpose of this Report

1.1.1. Helios Renewable Energy Project ('the Proposed Development') comprises the proposed construction, operation and maintenance, and decommissioning of a renewable energy generating project on 757.46 hectares ('ha') (c. 1,872 acres) of land located to the south west of the village of Camblesforth and to the north of the village of Hirst Courtney in North Yorkshire ('the site'), within the administrative areas of Selby District Council ('SDC') and North Yorkshire County Council ('NYCC').

1.1.2. The description of the Proposed Development is as follows:

> *'The installation of ground mounted solar arrays, energy storage and associated development comprising grid connection infrastructure and other infrastructure integral to the construction, operation, and maintenance of the development for the delivery of over 50 megawatts (MW) of electricity.'*

1.1.3. The Proposed Development has an expected energy generating capacity in excess of the 50MW threshold for onshore generating stations in England and therefore constitutes a 'nationally significant infrastructure project' ('NSIP') under sections 14(1)(a) and 15(1) and (2) of the Planning Act 2008 (as amended) ('PA2008'). Accordingly, Enso Green Holdings D Limited, ('the Applicant') intends to make an application for a Development Consent Order ('DCO') to authorise the Proposed Development. The DCO will include a description of the Proposed Development and will be accompanied by an Environmental Statement ('ES') prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'), with the Proposed Development falling under Schedule 2 of the EIA Regulations.

1.1.4. As the first stage in the DCO process, the Applicant has prepared this Environmental Impact Assessment ('EIA') Scoping Report, which presents an initial review of likely significant effects associated with the construction, operation and maintenance, and eventual decommissioning of the Proposed Development. The purpose of the Scoping Report is to request a formal Scoping Opinion from the Secretary of State ('SoS') in accordance with Regulation 10 of the EIA Regulations and to ensure a

proportionate EIA. The benefits of delivering proportionate EIA, as defined by the Institute of Environmental Management and Assessment ('IEMA') (2017)[1], are to:

- drive collaborative action and understanding across the EIA community;
- focus assessments so their findings are accessible to all stakeholders;
- reduce uncertainty and risk within project consenting;
- save time and costs for developers, consenting authorities and consultees; and
- allow more time to be spent exploring the delivery of environmental improvements.

1.1.5. One of the key actions for delivering proportionate EIA is to improve scoping. Therefore, an integral element of this Scoping Report is to focus on aspects which the Applicant believes can be scoped out in the interest of proportionality, and to describe the proposed approach to EIA. The ES, which reports the proportionate EIA, will be based on the Scoping Opinion, informed by the recommendations of the consultees and the information contained within this Scoping Report.

## 1.2. Introduction to the Applicant

1.2.1. The Applicant for the Proposed Development is Enso Green Holdings D Limited.

1.2.2. Enso Green Holdings D Limited is a joint-venture partnership between Enso Energy and Cero Generation. Enso Energy is one of the UK's most experienced renewable energy developers, with an unparalleled focus on solar energy. Cero Generation is a leading solar energy company, working across Europe to support the transition to a net-zero future.

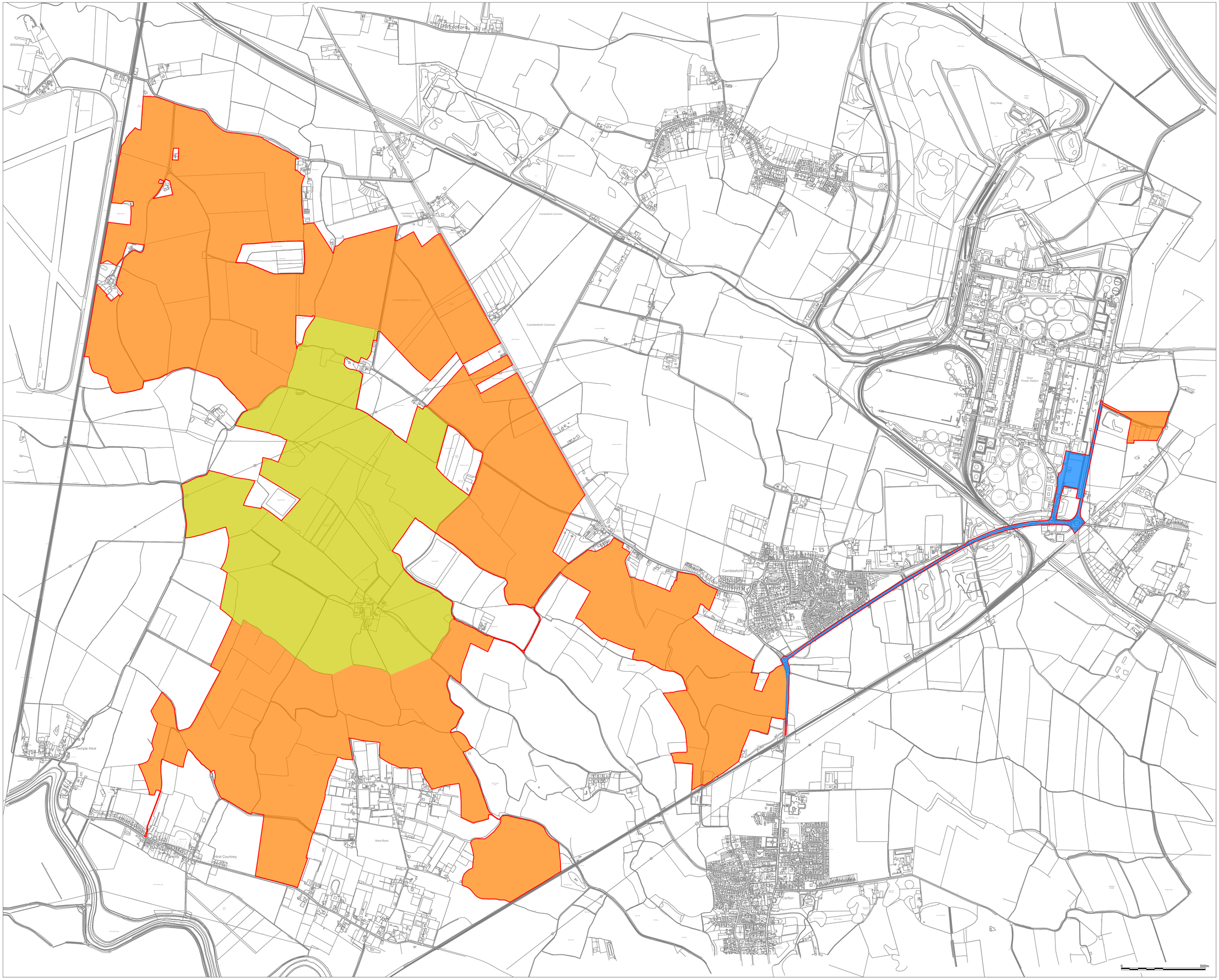
## 1.3. The Scoping Boundary

1.3.1. Figure 1.1: Site Location Plan illustrates the scoping boundary that has been used to inform this Scoping Report. The scoping boundary is defined as the area within which the Proposed Development will be located, including its electrical infrastructure and temporary work areas. The boundary combines the solar PV arrays, energy storage and 132kV substation (the 'Development Area'), as well as the cable route to the Point of Connection ('the Underground Grid Connection Cable

[1] Available at: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia Accessed in April 2022

Area'). It also includes an area in the central part of the site within which underground cable connections would be located (the 'Underground Cable Connection Area'), which would connect the northern and southern parts of the Development Area. The EIA process will inform the design of the Proposed Development which may result in the site boundary being reduced, specifically the Underground Cable Connection area, when the final DCO Order Limits are defined.

## Figure 1.1 Site Location Plan




## KEY

- Site Boundary
- Underground Cable Connection
- Underground Grid Connection Cable
- Development Area

N

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Project Title:

# Helios Renewable Energy Project

Drawing Title:

## Site Location Plan

| DRWG No: | Rev: | Sht no: |
|---|---|---|
| DX-01-P01 | - | - |
| Drawn by : JS | Checked by: KL | |
| Scale: 1:10,000 @ A1 | Date: 03/05/2022 | |

## 1.4. Site Location and Description

1.4.1. The site predominantly comprises agricultural land, consisting of fields used for grazing and arable cropping. It extends to 757.46ha (c. 1,872 acres) of land to the southwest of the village of Camblesforth and to the north of the village of Hirst Courtney. Part of the site also extends to the east of Drax Power Station. There are some residential properties which are close to, but located outside of, the north western part of the site.

1.4.2. As shown on Figure 1.1: Site Location Plan, the site comprises the following areas:

- 'Development Area' - which extends to 550.93ha;
- 'Underground Cable Connection Area' - which extends to 196.7ha; and
- 'Underground Grid Connection Cable Area' – which extends to 9.87ha.

1.4.3. The main part of the site sits within a wider area of land bounded to the northeast by the A1041, to the west by the Selby Branch of the East Coast Mainline railway and to the south by Hirst Road. The surrounding landscape is characterised by large, regular-shaped fields delineated by partially denuded hedgerows or drainage ditches. Occasional woodland blocks and tree belts are also present, but the landscape is primarily flat and open.

1.4.4. Transport routes are a notable feature in the vicinity of the site, with the M62 motorway and A63 extending on east – west alignments in the southern and northern extents of the site, respectively. Public Rights of Way ('PRoW') cross the site and the wider landscape, often following farm tracks or rural lanes. The Trans Pennine Trail long distance walking and cycling route extends south from Selby and in close proximity to the western and southern parts of the site boundary.

1.4.5. Selby is the principal settlement within the area in the vicinity of the site. A number of smaller settlements are dispersed throughout the area, including Camblesforth, Hirst Courtney, Temple Hirst, Carlton, Drax, Barlow and Burn. The industrial complexes of Drax and Eggborough Power Stations form prominent features in the surrounding area. A disused airfield (RAF Burn) is located to the west of the site.

## 1.5. The DCO Process

1.5.1. The process for applying for a DCO is set out in the PA2008. Section 31 of the

PA2008 states that a DCO is required for development that is or forms part of an NSIP. The DCO application process is split into the following six stages, with EIA Scoping being part of the first stage:

- Pre-application;
- Acceptance;
- Pre-examination;
- Examination;
- Decision; and
- Post-decision.

1.5.2. During the pre-application phase, Part 5 of the PA2008 requires promoters of a DCO application to engage in pre-application consultation with statutory consultees under Section 42 of the PA2008 and the local community under Section 47 of the PA2008. The proposed application must also be publicised under Section 48 of the PA2008.

1.5.3. The EIA Regulations make provisions for various matters in connection with making a DCO application, including in respect of the pre-application consultation described above. Details of the pre-application consultation with the local community that the Applicant is intending to carry out for the Proposed Development will be published in a Statement of Community Consultation ('SoCC'). Following the completion of pre-application consultation, the DCO application for the Proposed Development will be prepared and submitted to the Secretary of State via the Planning Inspectorate. In line with the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 ('APFP Regulations'), the application will be accompanied by '*the environmental statement required pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and any scoping or screening opinions or directions'*.

## 1.6. The Environmental Impact Assessment (EIA) Process

1.6.1. The EIA requirement for NSIPs is transposed into law through the EIA Regulations. The EIA Regulations specify which developments are required to undergo EIA and schemes relevant to the NSIP planning process are listed under either 'Schedule 1' or 'Schedule 2'. Those developments listed in Schedule 1 must be subject to EIA, while developments listed in 'Schedule 2' must only be subject to EIA if they are

considered 'likely to have significant effects on the environment by virtue of factors such as its nature, size or location' (Regulation 3(1) of the EIA Regulations). The selection criteria for Schedule 2 development are set out in Schedule 3.

1.6.2. The Proposed Development is a 'Schedule 2' development under paragraph 3(a) of Schedule 2 of the EIA Regulations, as it constitutes *'industrial installations for the production of electricity, steam and hot water*' and is not a project listed in Schedule 1.

1.6.3. The EIA Regulations set out the statutory process and minimum requirements for the provision of adequate environmental information to enable the EIA process. The EIA, activities, surveys and studies will be reported in the ES.

1.6.4. The EIA process can be broadly summarised as consisting of three main elements that take place prior to the submission of the DCO and ES:

- **Scoping**: The project applicant submits a Scoping Report in support of a request for a Scoping Opinion from the Secretary of State, who must consult defined consultation bodies before issuing the Scoping Opinion. This report comprises the Scoping Report for the Proposed Development.
- **Consultation**: The project applicant is required to conduct pre-application consultation in accordance with the PA2008 and associated guidance and Regulations, which includes the EIA Regulations. For EIA development, the applicant must consult on preliminary environmental information which is the information listed in Regulation 14(2) of the EIA Regulations which has been compiled by the applicant and is reasonably required for the consultation bodies to develop an informed view of the likely significant environmental effects of the development and any associated development. A Preliminary Environmental Information Report ('PEIR') will be produced for the Proposed Development which will build upon findings from this Scoping Report. It will incorporate the findings of the surveys and initial assessments and will enable consultees to develop an informed view of any likely significant environmental effects of the Proposed Development. Feedback will be sought from the local communities and other stakeholders on the PEIR.
- **ES Preparation**: The ES is prepared taking into account the responses to the consultation process. The ES for the Proposed Development will advance the content of the PEIR and incorporate the responses from the consultation and

results of the surveys undertaken. It will also describe any changes made to the project and any mitigation measures that need to be implemented. The ES will form part of the DCO application.

## 1.7. Notification that DCO Application will be accompanied by an ES

1.7.1. The Applicant hereby gives notice, pursuant to Regulation 8(1)(b) of the EIA Regulations, that the application for a DCO will be accompanied by an ES. The ES will include at least the information set out in Regulation 14(a) – (e) and any additional information specified in Schedule 4 relevant to the specific characteristics of the Helios Renewable Energy Project and to the environmental features likely to be significantly affected. It will include the information reasonably required for reaching a reasoned conclusion on the significant effects of the Proposed Development.

## 1.8. Request for Scoping Opinion

1.8.1. This Scoping Report has been prepared by Barton Willmore, now Stantec, IEMA qualified assessors, on behalf of the Applicant with regard to land to the south west of the village of Camblesforth and to the north of the village of Hirst Courtney, for the Proposed Development. The Proposed Development will be able to deliver over 50 megawatts (MW) of electricity.

1.8.2. As set out earlier, the Proposed Development is a 'Schedule 2' development under paragraph 3(a) of Schedule 2 of the EIA Regulations.

1.8.3. Following the completion of the surveys, assessments and consultation processes outlined in this EIA Scoping Report, an application for a DCO will be made to the Planning Inspectorate on behalf of the SoS for determination in accordance with the PA2008.

1.8.4. This Scoping Report is submitted in support of a request pursuant to Regulation 10 of the EIA Regulations for a Scoping Opinion from the SoS on the scope, and level of detail, of the information to be provided in the ES. It includes the information required by Regulation 10(3) as follows:

a) *a plan sufficient to identify the land* (see Figure 1.1)*;*

b) *a description of the proposed development, including its location and technical capacity* (see this Section 1)*;*

c) *an explanation of the likely significant effects of the development on the environment* (see Sections 6 to 14)*; and*

d) *Such other information or representations as the person making the request may wish to provide or make* (see Figures and Appendices referenced throughout).

## 1.9. Helios Renewable Energy Project Team

1.9.1. The preparation of the EIA is being led by Barton Willmore, now Stantec ('Barton Willmore, now Stantec') working closely with Avian Ecology Ltd ('Avian Ecology'), Neo Environmental Ltd ('Neo Environmental'), Transport Planning Associates Ltd ('Transport Planning Associates'), Inacoustic Ltd ('Inacoustic'), Pegasus Group ('Pegasus') and Kernon Countryside Consultants Limited ('Kernon Countryside Consultants').

1.9.2. Pursuant to Regulation 14(4) of the EIA Regulations, the ES will be prepared by competent experts and the ES will outline the relevant expertise or qualifications of the experts. In addition, a number of specialist consultancies are providing expert input into the ES, as indicated in Table 1.1.

1.9.3. Burges Salmon LLP has been instructed to provide legal advice throughout the Helios Renewable Energy Project DCO application process.

**Table 1.1: Helios Renewable Energy Project Team**

| Topic | Author |
|---|---|
| Cultural Heritage | Pegasus |
| Landscape and Visual Impact | Barton Willmore, now Stantec |
| Biodiversity | Avian Ecology |
| Water Environment | Neo Environmental |
| Transport and Access | Transport Planning Associates |
| Noise and Vibration | Inacoustic |

| Topic | Author |
|---|---|
| Climate Change | Barton Willmore, now Stantec |
| Socio-economics | Barton Willmore, now Stantec |
| Soils and Agricultural Land | Kernon Countryside Consultants |

## 1.10. General Approach to Scoping Matters In and Out

1.10.1. This Scoping Report has been produced in accordance with the EIA Regulations and appropriate guidance documents. The Inspectorate's *Advice Note Seven; Environmental Impact Assessment: Preliminary Environmental Information and Environmental Statements*[2] (2020) observes that, although not a statutory requirement, the Scoping Opinion is an important document, and the EIA Regulations require the ES to be based on the most recent one adopted. The note identifies that the scoping process allows for an early identification of the likely significant effects applicable to the EIA Regulations and also provides an opportunity to agree where aspects and matters can be scoped out from further assessment.

1.10.2. Section 4.10 of Advice Note Seven highlights the essential need to ensure that ESs are appropriately focused on aspects and matters where a likely significant effect may occur, and thereby ensuring that the EIA process is proportionate. This includes scoping out from the ES the need for further assessment aspects and matters where it is appropriate to do so. Advice Note Seven goes on to advise that applicants should ensure that their scoping request includes sufficient justification for scoping aspects/matters out, and that this justification should be evidence-based and have reference to the assessment process.

## 1.11. Approach to Planning Policy

1.11.1. Under Section 104 of the PA2008, the SoS must have regard to any National Policy Statement ('NPS') which has effect in relation to development of the description to which the application relates (a 'relevant national policy statement') and the application must be determined in accordance with the relevant NPS. Other matters

[2] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-seven-environmental-impact-assessment-process-preliminary-environmental-information-and-environmental-statements/#1 Accessed in April 2022

which the SoS must have regard to under Section 104 include any local impact report, any matters prescribed in relation to development of the description to which the application relates, and any other matters which the SoS thinks are both important and relevant to decision.

1.11.2. NPSs set out the government's objectives for the development of nationally significant infrastructure, and each NPS covers a different aspect of nationally significant infrastructure. There is no current NPS that explicitly deals with solar or energy storage of the nature proposed as part of the Proposed Development. As matters currently stand, therefore, the DCO application for the Proposed Development would need to be determined by the SoS under Section 105 of the PA2008. Section 105 provides that the SoS must, in cases where no NPS has effect, have regard to any local impact report, any matters prescribed in relation to development of the description to which the application relates, and any other matters which the SoS thinks are both important and relevant to the decision.

1.11.3. However, the UK Government published for consultation a suite of draft revised energy NPSs (EN-1 to EN-5) in September 2021. In terms of the current relevance of the draft NPSs, the SoS decision letter for Little Crow (Paragraph 4.3) states:

> *'Although the new NPSs are in draft form and have not been designated, the Secretary of State considers them to be important and relevant for the purpose of Section 105 of the 2008 Act. As such, the Secretary of state has had regard to the draft energy NPSs in deciding the application…'*

1.11.4. The following provisions of the draft NPSs are relevant to the Proposed Development:

- **Draft Overarching NPS for Energy (EN-1) (September 2021)**: Recognises the UK's target to cut greenhouse gas emissions to net zero by 2050. Paragraph 3.3.20 confirms that there is an urgent need for new electricity generating capacity to meet the UK's energy objectives. Paragraphs 3.3.21 to 3.3.23 identify the role of solar (and wind) in meeting that need. The draft NPS states that solar is one of the lowest cost ways of generating electricity, helping reduce costs and providing a clean and secure source of electricity supply. UK government analysis demonstrates that a secure, reliable, affordable and net zero consistent system in 2050 is likely to be composed predominantly of wind and solar. The draft NPS recognises that this will require sustained growth in

the capacity of solar in the next decade. Alongside the development of wind and solar, paragraphs 3.3.24 to 3.3.25 of the draft NPS highlight the need for energy storage to maximise the usable output from intermittent low carbon generation (e.g. solar and wind), reduce the total amount of generation capacity needed on the system, provide a range of balancing services, and reduce constraints on the networks to help defer or avoid the need for costly network upgrades as demand increases;

- **Draft NPS for Renewable Energy Infrastructure (EN-3) (September 2021)**: Covers renewable energy infrastructure comprising solar PV above 50MW in England. The draft NPS at paragraph 2.47.1 recognises solar farms as one of the most established renewable electricity technologies in the UK and the cheapest form of electricity generation worldwide. It provides clear support for large scale solar development, by stating that*: 'the government has committed to sustained growth in solar capacity to ensure that we are on a pathway that allows us to meet net zero emissions. As such solar is a key part of the government's strategy for low cost decarbonization of the energy sector'*. The draft NPS outlines a number of factors that can influence the siting of a solar project including: irradiance and site topography; proximity of a site to dwellings; capacity of a site; grid connection; agricultural land classification and land type and accessibility. It also goes on to state at paragraph 2.48.15 that: *'the development of ground mounted solar arrays is not prohibited on sites of agricultural land classified 1, 2, 3a'* and at paragraph 2.48.13 that: *'land type should not be a predominating factor in determining the suitability of the site location'*. In terms of the matters to be considered in the decision-making process, these include (at sections 2.49 to 2.54):
    - Access tracks;
    - Site layout, design, and appearance (including any flood risk);
    - Security and lighting;
    - Project lifetimes;
    - Flexibility (to account for technology types and advancements);
    - Biodiversity and nature conservation;
    - Landscape, visual and residential amenity;
    - Glint and glare;

- Cultural heritage; and
- Construction impacts including traffic and transport noise and vibration.

- **Draft NPS for Electricity Networks Infrastructure (EN-5) (September 2021)**: The draft NPS covers above any above ground electricity line whose nominal voltage is expected to be 132kV or above with a length greater than 2km which is not a replacement line and not exempted. However, similar to NPS EN-5 (July 2011), paragraph 1.6.2 states that other kinds of electricity infrastructure (including underground cables at any voltage and associated infrastructure such as substations and converter stations) will be covered by this NPS if it constitutes associated development for which consent is sought along with an NSIP such as a generating station. The draft NPS discusses implications for solar photovoltaic generation, outlining factors that influence site selection in paragraph 2.48.2 to 2.48.16:
  - Proximity of a site to dwellings;
  - Capacity of a site;
  - Grid connection;
  - Agricultural land classification and land type; and
  - Accessibility.

1.11.5. The revised draft energy NPSs are expected to be in place by the time the DCO application is submitted. These will replace the existing NPSs EN-1 to EN-5. Paragraph 1.6.2 of the revised draft Overarching NPS for Energy (EN-1) states that: *'The 2021 amendments will… have effect only in relation to those applications for development consent accepted for examination after the designation of those amendments.'* Paragraph 1.6.3 goes on to state that any emerging draft NPSs (or those designated but not having effect) are potentially capable of being important and relevant considerations in the decision-making process. The DCO application for the Proposed Development is anticipated to be submitted in 2023, by which date it is currently expected that the draft NPSs will have been designated. If so, the new NPS EN-1, NPS EN-3 and NPS EN-5 will have effect for the Proposed Development and the DCO application should be determined pursuant to Section 104 of the PA2008.

1.11.6. Although that is the current expectation, it is acknowledged that the Government's

timetable for designation of the draft NPSs might change, or that the final version of the revised NPSs might differ from that consulted on through the revised drafts issued in September 2021. The topic chapters of this Scoping Report make reference to the national policy contained within the emerging NPSs where relevant. The ES will be drafted during 2022 and will make reference to new NPSs (if designated) or, if it appears that the new NPSs will not have been designated by the time the DCO application is submitted, then the ES will make appropriate references to the existing relevant NPSs and the emerging drafts.

1.11.7. In the event that the revised NPSs are not in place by the time the application is submitted, there are two current NPSs that, whilst they do not (currently) have effect for the Proposed Development, are important and relevant to the determination of the DCO application for the Proposed Development. These are:

- **Overarching NPS for Energy (EN-1) (July 2011)**: Sets out a commitment for the UK to transition to a low carbon economy and establishes the national need for energy infrastructure, including energy storage. It also includes a series of Assessment Principles against which DCO applications for energy infrastructure should be determined.
- **NPS for Electricity Networks Infrastructure (EN-5) (July 2011)**: Should be read in conjunction with NPS EN-1. This NPS sets out required assessments and technology-specific matters for consideration. It covers above ground electricity lines whose nominal voltage is expected to be 132kV or above. However, paragraph 1.8.2 states that any other kind of electricity infrastructure (including underground cables at any voltage and associated infrastructure such as substations and converter stations) will be covered by this NPS if it constitutes associated development for which consent is sought along with an NSIP such as a generating station.

1.11.8. The relevance of NPS EN-1 to the development of large-scale solar projects has been confirmed by the SoS's decisions on the Cleve Hill Solar Park project (Ref: EN010085) (28 May 2020) and the Little Crow Solar Project (Ref: EN010101) (5th April 2022). Paragraphs 7.1 and 7.2 of the Cleve Hill decision letter state:

*'The Secretary of State notes… the absence of a type-specific National Policy Statement for solar power or for battery storage (although the general presumption in favour of all types of energy generation in National Policy Statement EN-1 is a relevant and important matter, even if the presumption*

*of need and that the relative weight to be given to specified criteria in EN-1 does not directly apply in this case). In the absence of a type specific National Policy Statement, the Secretary of State is required to determine applications for development consent for nationally significant infrastructure projects against section 105 of the Planning Act 2008.'*

*'National Policy Statement EN-1 which gives support to renewable electricity generating nationally significant infrastructure projects is relevant and important to the consideration of the Application.'*

1.11.9. NPS for Renewable Energy (EN-3) (July 2011) should be read in conjunction with NPS EN-1, and applies to the types of renewable energy infrastructure listed in paragraph 1.8.1. That list does not include solar, and paragraph 1.8.2 confirms that the NPS does not cover other types of renewable energy generation that were not, at that time in 2011, technically viable over 50MW. It goes on to state that: *'When it appears that other renewables technologies will be economically and technically viable over 50MW, the Government will further consider either revisions to this NPS or separate NPSs to cover such technologies.'* This process of review was commenced in 2021.

# 2. The Proposed Development

## 2.1. Introduction

2.1.1. The Proposed Development will comprise ground-mounted solar PV arrays, together with on-site energy storage and associated development, comprising grid connection infrastructure and other infrastructure integral to the construction, operation, and maintenance of the Proposed Development for the delivery of over 50MW of electricity.

## 2.2. Project Overview

2.2.1. The design is expected to evolve throughout the EIA process with infrastructure located to avoid significant impact on any specific designations or assets and, where appropriate, to respond to feedback from consultees. The technologies proposed here (solar PV and energy storage) are rapidly evolving and the application will propose that certain flexibility is maintained to ensure the latest technology can be utilised at the point of construction to maximise the Proposed Development's benefits.

2.2.2. The Proposed Development will include the following key infrastructure:

- Solar PV modules and module mounting structures with string combiner boxes;
- Energy storage (refer to paragraph 2.3.2 for further details);
- Access tracks;
- Transformers, inverters, switchgear and spare parts containers;
- On-site substation and grid connection cabling with a maximum voltage of 132kV; and
- Boundary fencing and closed-circuit television ('CCTV') for security purposes.

2.2.3. In addition, during the construction and decommissioning phases, one or more temporary compound(s) will be required, as well as temporary access tracks, to allow access to all land within the site. The compounds will be located within the site, adjacent to the site entrances, to limit the distance travelled by delivering vehicles after arriving at the site.

2.2.4. All residential properties within the site will be retained as part of the Proposed Development.

## 2.3. Development Components

### Solar PV Infrastructure

2.3.1. Solar PV infrastructure will comprise solar arrays and associated equipment, such as inverters/transformers, fencing, CCTV and cabling. The solar PV panels will include an anti-reflective coating, and will be ground mounted to a piled frame made of galvanized steel or aluminium. The panels will utilise bifacial modules, and a tracker system. The panel framework at its highest point (when tilted at 60º) will be up to 3m above existing ground levels. Framework posts will be pile driven, approximately 1.5-2.5m below ground level, depending on ground condition surveys to be completed prior to construction activities commencing. String inverter boxes for combining multiple strings of solar panels will be located underneath or adjacent to the tracker structures.

### Energy Storage Infrastructure

2.3.2. Energy storage, such as batteries, would be utilised to reinforce the power generation of the solar PV panels. The facility comprises approximately 50 shipping containers or similar, with each unit measuring approx. 12m x 2.4m x 2.9m on supports above a 300mm deep gravel sub-base within a defined energy storage area (location within the site to be confirmed). Due to flood requirements on-site, the energy storage may need to be raised above the existing ground level (heights to be confirmed following assessment design).

### Grid Connection

2.3.3. The site will connect to the national grid substation at the Drax Power Station via underground cabling. The voltage for the underground grid connection cable will be up to 132kV. The grid connection route will be included in the DCO application and the ES will consider the likely significant environmental effects of the entire Proposed Development, including the grid connection.

## 2.4. Construction Programme

2.4.1. The construction of the Proposed Development is anticipated to commence in 2025

and span a period of approximately 12 months. On this basis, the Proposed Development would be completed in 2026. During the construction phase, temporary access tracks and construction compounds will serve the Proposed Development, and these will be located within the site adjacent to the site entrances, thus reducing the distance delivery vehicles will need to travel after reaching the site's entrances.

2.4.2. The activities on-site during the construction phase are expected to include the following:

- Site establishment and enabling works for construction;
- Construction of temporary construction facilities and amenities;
- Construction of solar PV array;
- Construction of on-site electrical infrastructure to facilitate the generation of electricity;
- Testing and commissioning; and
- Landscaping and biodiversity enhancements.

2.4.3. The ES will include detail on the following:

- Outline Construction Environmental Management Plan ('CEMP');
- Outline Construction Traffic Management Plan ('CTMP');
- Location and design of temporary construction compounds and access tracks; and
- Proposed reinstatement and habitat creation to mitigate impact and provide enhancement opportunities.

## 2.5. Operation and Maintenance Phase

2.5.1. The Proposed Development is reversible and will have a modelled operational lifespan of up to 40 years, for the purposes of the assessments in the ES.

2.5.2. During the operational phase, the activities on-site are expected to amount to maintenance activities, including servicing of plant and equipment and vegetation management.

## 2.6. Decommissioning Phase

2.6.1. Following cessation of energy generation and exportation at the site, all solar PV modules, mounting structure, cabling, inverters and transformers will be removed and recycled or disposed of in accordance with good practice and market conditions at that time.

2.6.2. The decommissioning of the Proposed Development is anticipated to take approximately 12 months. During the decommissioning phase, one or more temporary compounds will be required, as well as temporary access tracks. The compounds will be located within the site. All compounds and temporary access tracks will be removed once decommissioning is complete.

2.6.3. The ES will provide details of an Outline Decommissioning Environmental Management Plan ('DEMP'). A detailed DEMP will be agreed with the relevant authority prior to the commencement of decommissioning.

# 3. EIA Methodology

## 3.1. Introduction

3.1.1. This section describes the broad principles of the methodology that will be adopted in the ES, including the approach that will be used to identify, evaluate and mitigate likely significant environmental effects. It also sets out the proposed structure of the ES.

## 3.2. Overall ES Structure

3.2.1. The ES will contain three main volumes as set out in Table 3.1 below.

**Table 3.1: Environmental Statement Structure**

| **Volume 1: ES Non-Technical Summary** |
|---|
| Summary of the ES in non-technical language. |

| **Volume 2: ES Main Text and Figures** | | |
|---|---|---|
| **Chapter No.** | **Chapter Title** | **Description** |
| 1. | Introduction | Introduction to the ES, EIA requirements, details of project team, ES organisation and availability of information. |
| 2. | EIA Methodology | Methods used to prepare each chapter, description of ES structure and content, generic significance criteria, assumptions, limitations, scoping and consultation. |
| 3. | Site & Development Description | Site description and details of the Proposed Development. |
| 4. | Alternatives & Design Evolution | Describes the reasonable alternatives studied by the Applicant, provides a comparison of the environmental effects of those alternatives and identifies the reasoning for the selection the Proposed Development based on environmental |

| Volume 2: ES Main Text and Figures | | |
|---|---|---|
| **Chapter No.** | **Chapter Title** | **Description** |
| | | constraints. |
| 5. | Construction Methodology & Phasing | Details of anticipated programme for development and construction methodology. |
| 6. | Cultural Heritage | Effects of the Proposed Development on built heritage and below-ground archaeology. |
| 7. | Landscape & Views | Effects of the Proposed Development on landscape and visual amenity. |
| 8. | Biodiversity | Effects of the Proposed Development on biodiversity and ecology. |
| 9. | Water Environment | Effects of the Proposed Development on water quality, including effects relating to drainage and flood risk. |
| 10. | Transport & Access | Effects of the Proposed Development on traffic and access, including relating to driver severance and delay, pedestrian severance and delay, pedestrian amenity, accidents and safety and hazardous and dangerous loads. |
| 11. | Noise | Effects of the Proposed Development on noise. |
| 12. | Climate Change | Effects of the Proposed Development on climate change. |
| 13. | Socio-economics | Effects of the Proposed Development on the socio-economic environment. |
| 14. | Soils and Agricultural Land | Effects of the Proposed Development on soils and agricultural land. |
| 15. | Cumulative Effects | Summary of the cumulative effects of the Proposed Development. |

| Volume 2: ES Main Text and Figures | | |
|---|---|---|
| **Chapter No.** | **Chapter Title** | **Description** |
| 16. | Summary & Residual Effects | Summary of the residual effects of the Proposed Development. |

| Volume 3: Technical Appendices |
|---|
| Technical data, figures, plans and reports to support the chapters in Volume 2. |

## 3.3. EIA Methodology

3.3.1. The ES will set out the methodology used in the EIA, state the assumptions applicable to all disciplines, and summarise the EIA scoping process undertaken and the public consultation process. Bespoke methodologies, limitations and assumptions will be contained in the technical chapters of the ES where required.

3.3.2. The significance of an environmental effect is determined by the interaction of magnitude and sensitivity, whereby the effects can be positive (beneficial) or negative (adverse). Generic criteria to be used in carrying out this process are detailed below. Some technical chapters may use discipline-specific criteria with their own terms for magnitude, sensitivity and significance and, where used, this will be explained in the relevant chapter.

3.3.3. An environmental effect can be categorised as either permanent or temporary. The duration of temporary effects comprises:

- Short-term (a period of up to 1 year);
- Medium-term (a period of between 1 year and up to 5 years); and
- Long-term (a period of more than 5 years).

**Prediction of Impact Magnitude**

3.3.4. The methodology for determining the scale or magnitude of impact is set out Table 3.2 below.

**Table 3.2: Methodology for Assessing Magnitude**

| Magnitude of Impact | Criteria for assessing impact |
|---|---|
| **High** | Total loss or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed. |
| **Medium** | Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed. |
| **Low** | A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation. |
| **Very Low** | Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation. |

3.3.5. The sensitivity of a receptor is based on the relative importance of the receptor using the scale set out in Table 3.3 below.

**Table 3.3: Methodology for Determining Sensitivity**

| Sensitivity | Examples of Receptor |
|---|---|
| **High** | The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance. |
| **Medium** | The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance. |
| **Low** | The receptor/resource is tolerant of change without detriment to its character, is of low or local importance. |

| Sensitivity | Examples of Receptor |
|---|---|
| **Very Low** | The receptor/resource is tolerant of change without detriment to its character, or does not make a significant contribution to local character or distinctiveness and is not designated |

**Assessment of Effect Significance**

3.3.6. After the magnitude of the impact and the sensitivity of the receptor/resource have been determined, the effect significance will be classified using the matrix in Table 3.4. This illustrates the interaction between impact magnitude and receptor sensitivity.

**Table 3.4: Effect Significance Matrix**

| Magnitude | Sensitivity | | | |
|---|---|---|---|---|
| | **High** | **Medium** | **Low** | **Very Low** |
| **High** | Major Adverse / Beneficial | Major Adverse / Beneficial | Moderate Adverse / Beneficial | Minor Adverse / Beneficial |
| **Medium** | Major Adverse / Beneficial | Moderate Adverse / Beneficial | Minor Adverse / Beneficial | Negligible |
| **Low** | Moderate Adverse / Beneficial | Minor Adverse / Beneficial | Negligible | Negligible |
| **Very Low** | Minor | Negligible | Negligible | Negligible |

**Generic Effect Definitions**

3.3.7. Table 3.5 below provides generic definitions of the terminology used to categorise effects.

**Table 3.5: Generic Effect Definitions**

| Effect | Description |
|---|---|
| **Major** | An effect that is likely to be an important consideration at a national to regional level because it will contribute to achieving national/regional objectives or is likely to result in exceedance of statutory objectives or breaches of legislation. |
| **Moderate** | An effect that is likely to be an important consideration at a regional level. |
| **Minor** | An effect that is likely to be an important consideration at a local level. |
| **Negligible** | An effect that is likely to have a negligible or neutral influence, irrespective of other effects. |

**Significance**

3.3.8. Significance of effect will be clearly identified in the ES. As a general rule, major and moderate effects will be considered to be significant whilst minor and negligible effects will be considered to be not significant. However, professional judgment will also be applied and may moderate the significance of an effect where necessary, taking into account the professional's understanding of the balance between the magnitude of an impact and the sensitivity of the receptor/resource and whether the effect is permanent or temporary, its frequency, whether it is reversible, and its likelihood of occurrence.

## 3.4. Alternatives and Design Evolution

3.4.1. The ES will describe the evolution of the Proposed Development based on environmental constraints and the reasonable alternatives studied by the Applicant.

## 3.5. Construction and Decommissioning Methodology and Phasing

3.5.1. The ES will outline the anticipated construction and decommissioning programme, phasing and methodology and explain the assumptions made. This chapter will form the basis of the construction and decommissioning phase assumptions documented in each of the technical chapters of the ES.

## 3.6. Technical Assessments

3.6.1. Each ES chapter will follow the headings set out below to ensure the final document is transparent, consistent and accessible.

- Introduction;
- Planning Policy Context;
- Assessment Methodology;
- Baseline Conditions;
- Likely Significant Effects;
- Mitigation Measures;
- Residual Effects;
- Cumulative Effects; and
- Summary.

3.6.2. Each chapter sub-heading is explained in further detail in Table 3.4 below.

**Table 3.4: Technical Chapter Format and Content**

| Sub-Heading | Content |
|---|---|
| **Introduction** | This section will introduce the assessment discipline and the purpose for which it is being undertaken. |
| **Planning Policy Context** | This section will include a summary of national, regional and local policies of relevance to the environmental discipline and assessment. Where applicable, relevant legislation will also be summarised. |
| **Assessment Methodology** | This section will provide an explanation of methods used in undertaking the technical study with reference to published standards, guidelines and best practice. The application of significance criteria will also be discussed. It will also outline any difficulties encountered in compiling the required information. |
| **Baseline Conditions** | This section will include a description of the environment as it is |

| Sub-Heading | Content |
|---|---|
| | currently (at the time of writing the ES or at another appropriate point in time) and as it is expected to change if the project were not to proceed (i.e. 'do-nothing' scenario). The method used to obtain baseline information will be clearly identified. Baseline data will be collected in such a way that the importance of the particular subject area to be affected can be placed in its context and surroundings so that the effects of the proposed changes can be predicted. |
| **Likely Significant Effects** | This section will identify the likely significant effects on the environment resulting from the construction, operational and decommissioning phases of the Proposed Development. |
| **Mitigation Measures** | Adverse effects will be considered for mitigation and specific mitigation measures put forward, where practicable. Mitigation measures considered may be:<br>▪ Primary (embedded): modifications to the location or design of the project made during the pre-application phase that are an inherent part of the project, with no further actions required, such as ensuring that a key habitat or archaeological feature will be unaffected by the development's layout and operation. The first assessment of magnitude, sensitivity and significance of effect takes all embedded mitigation measures into account as an integral part of the Proposed Development;<br>▪ Secondary: actions that require further activity to achieve a particular outcome, secured for example through development consent requirements or section 106 obligations, such as lighting limits that will be subject to the submission of a detailed lighting layout for approval; or<br>▪ Tertiary: actions that would occur regardless of the EIA, including those undertaken to meet other existing legislative requirements, or actions that are standard |

| Sub-Heading | Content |
|---|---|
| | practice to manage commonly occurring environmental effects.<br><br>The extent of the mitigation measures and how these will be effective will be discussed. Where the effectiveness is uncertain or depends upon assumptions about operating procedures, data will be provided to justify these assumptions and monitoring programmes will be proposed to enable subsequent adjustment of mitigation measures, as necessary. |
| **Residual Effects** | The residual effects, i.e. the effects of the Proposed Development assuming implementation of proposed secondary and tertiary mitigation, will be determined. The residual effects represent the overall likely significant effect of the Proposed Development on the environment having taken account of practicable/available mitigation measures. |
| **Cumulative Effects** | The inter-project cumulative effects of the Proposed Development and the identified committed developments will be assessed, as well as the intra-project cumulative effects of the Proposed Development. |
| **Summary** | A summary of the assessment and conclusions will be provided at the end of each technical chapter. |

## 3.7. Mitigation Measures

3.7.1. The ES will include a Schedule of Mitigation summarising the measures proposed under each technical chapter to reduce, avoid or offset the potential adverse effects of the Proposed Development. The schedule will set out the mechanisms that will be used to secure any mitigation that may be required.

## 3.8. Cumulative Effects

3.8.1. The approach to the assessment of the likely significant cumulative effects of the Proposed Development is set out in Section 15 (Cumulative Effects) of this Scoping Report.

## 3.9. Summary and Residual Effects

The residual effects of the Proposed Development will be summarised in one table at the end of the ES, setting out the overall beneficial and adverse likely significant effects of the Proposed Development.

# 4. Topics to be Scoped Out

## 4.1. Introduction

4.1.1. This section presents the technical topics to be 'scoped out' from the ES whereby the Proposed Development is not anticipated to result in likely significant effects in respect of these topics during its construction, operational and decommissioning phases. The following discussion of the technical topics to be scoped out of the ES have been informed by professional judgement, initial on-site surveys and desk-based research.

4.1.2. These topics comprise:

- Air Quality;
- Human Health;
- Land Contamination;
- Vibration;
- Major Accidents and Disasters;
- Electric, Magnetic and Electromagnetic Fields;
- Telecommunications, Television Reception and Utilities;
- Wind Microclimate;
- Daylight, Sunlight and Overshadowing;
- Glint and Glare;
- Lighting;
- Minerals; and
- Waste.

4.1.3. Given the site's location, the Proposed Development is not anticipated to result in transboundary effects, and an assessment of these effects is therefore proposed to be scoped out of the ES.

## 4.2. Air Quality

4.2.1. As discussed in its latest Air Quality Annual Status Report 2021[3] ('ASR'), SDC 'has been monitoring air quality in the district and comparing levels of pollution with health-based standards for a number of years', with available Annual States Reports dating to 2012. SDC monitors nitrogen dioxide ('$NO_2$') and utilises local data to monitor particulate matter ('$PM_{2.5}$' and '$PM_{10}$'). The ASR does not discuss carbon dioxide ('$CO_2$').

4.2.2. The latest ASR (2021) identified that, based on local monitoring, the National Air Quality Objectives ('AQOs') for $PM_{10}$ are currently met in Selby District, and are therefore not of concern. Whilst National AQOs have not been set for $PM_{2.5}$, the existing levels in Selby District are currently well below the EU limit value, and are therefore not of concern. Due to concerns regarding potential exceedances of the AQO for $NO_2$ highlighted in the 2014 ASR[4], an Air Quality Management Area ('AQMA') was implemented by SDC at New Street, Selby. The site is not located within the AQMA, which is approximately 3.4km to the north. Additionally due to the site's rural location, it is not located in an area where concentrations of $NO_2$ and particulate matter are anticipated to exceed their respective air quality targets.

4.2.3. Given the nature of the Proposed Development, significant effects on air quality are not considered likely, as detailed below, and are therefore proposed to be scoped out of the ES:

- **Construction and decommissioning dust**: during construction and decommissioning, the operation of construction plant and construction and decommissioning activities presents a risk of dust generation to local receptors. The risk of dust generation will be managed through the implementation of standard best practice and mitigation measures. These will be incorporated into the outline CEMP, as defined in Section 2 (The Proposed Development), which is an established method of managing environmental effects resulting from construction works. The outline CEMP will be provided as an Appendix to the ES and secured by requirement in the DCO. Its implementation will ensure that dust impacts on existing sensitive receptors resulting from construction

[3] Selby District Council (2021) 2021 Air Quality Annual Status Report. Available at: https://www.selby.gov.uk/sites/default/files/Documents/Selby%20DC%20ASR_Template_England_2021_v1.0%2002.06.2021.docx> Accessed in April 2022
[4] Selby District Council (2014) 2014 Air Quality Annual Status Report. Available at: https://www.selby.gov.uk/sites/default/files/AQ%20Progress%20Report%202014.pdf> Accessed in April 2022

activities will not result in significant effects on these sensitive receptors.

- **Construction vehicle emissions**: changes to existing vehicle flows on the road network due to the Proposed Development's construction vehicles will be temporary. The proposed routing of these vehicles is shown on Figure 10.1. Transport and Access effects resulting from these vehicle movements will be considered in the Transport and Access chapter of the ES. As outlined in Section 10 (Transport and Access), due to the size, scale and nature of the Proposed Development, construction vehicle movements are not anticipated to exceed the threshold within guidance[5] (100 AADT for HGV vehicles) that suggests that there is potential for a significant effect on local air quality due to a proposed development which would require a detailed air quality survey to be completed for the Proposed Development. Mitigation measures set in the outline CTMP will also be implemented to mitigate the effects of traffic during construction. The outline CEMP will ensure that the proposed, appropriate, vehicle routing for the construction phase is implemented.
- **Operational vehicle emissions**: as outlined in Section 10 (Transport and Access), effects arising from vehicular use during the operational phase of the Proposed Development will be negligible, therefore the operational phase of the Proposed Development will result in a negligible impact on air quality. The components of the operational Proposed Development would not produce emissions to air.
- **Decommissioning dust and vehicle emissions**: emissions during the decommissioning phase are anticipated to be similar to, or less than, the construction phase and would be similarly managed, via the implementation of the DEMP, to ensure impacts on air quality are minimal and not significant.

## 4.3. Human Health

4.3.1. The effects of the Proposed Development on human health will be assessed as part of the Noise and Transport and Access ES chapters. The design of the Proposed Development will minimise any impacts on human health. Likely significant effects from the Proposed Development on human health in respect of land contamination and air quality are not anticipated.

[5] Institute of Air Quality Management (IAQM) "Land-Use Planning and Development Control – Planning for Air Quality" (January 2017)

4.3.2. Therefore, a separate topic chapter on human health is proposed to be scoped out of the ES.

## 4.4. Land Contamination

4.4.1. The site is currently a greenfield site, in agricultural use, except for the northeastern part of the site located on the highway verges of the A1041, A645, New Road and Wren Hall Road, where the Proposed Development's underground grid connection cable route is proposed. There is no recorded history of development on-site, and therefore it is unlikely that significant levels of contamination would be present.

4.4.2. During construction, the operation of plant and introduction of hazardous construction materials to the site presents the risk of soil and water contamination due to leaks, improper storage or spills. As identified in Section 11 (Water Environment), there are several field drains which collect surface waters from within the site and discharge into the River Aire and River Ouse, and the majority of the site sits within a Groundwater Source Protection Zone. The risk of contamination during construction will be mitigated through the implementation of standard best practice and mitigation measures, implemented via the CEMP. Therefore, significant effects are not anticipated. Similarly, the risk of contamination during the decommissioning phase will be managed via the implementation of the DEMP to mitigate potentially significant effects.

4.4.3. During operation, no significant effects are anticipated due to contamination, as the operation of the Proposed Development will not produce contaminants.

## 4.5. Vibration

4.5.1. During the construction phase of the Proposed Development, it is assumed that piling to a depth of 1.5m to 2.5m (depending on ground conditions) will be undertaken.

4.5.2. Table 4.1 below sets out indicative distances, based on historical field measurements, at which certain construction activities are expected to result in a level of vibration below 1mm/s peak particle velocity ('PPV').

**Table 4.1: Construction Activities and Vibration Levels**

| Construction Activity | Distance at which vibration levels could exceed 1mm/s, metres |
|---|---|
| Rotary Bored Piling* | 30m |
| Bulldozer** | 20m |
| Heavy Vehicles (e.g. dump trucks) | 10m |

Note:

* BS5228-2 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration, Table D.6

** Transport Research Laboratory ('TRL'), Research Report 53, Ground vibration caused by civil engineering works, Figure 3

4.5.3. There will be no sensitive properties located within 30m of construction activity during the construction phase of the Proposed Development. Therefore, it can be concluded that construction vibration will not exceed the lowest observed adverse effect level ('LOAEL') at sensitive receptors, and effects would be 'Not Significant". Vibration effects during the decommissioning phase are considered to be less than, or equal to, vibration effects during the construction phase and therefore also 'Not Significant'.

4.5.4. Given the nature of the Proposed Development, there will be no vibration effects generated during its operational phase.

4.5.5. Therefore, it is proposed to scope out an assessment of the Proposed Development's vibration effects from the ES.

## 4.6. Major Accidents & Disasters

4.6.1. There is no definition of "major accidents or disasters" provided in the EIA Regulations. However, the IEMA Quality Mark Article on 'Assessing Risks of Major Accidents/ Disasters in EIA'[6] produced by WSP in 2016 provides the following definition: *'man-made and natural risks which are considered to be likely, and are anticipated to result in substantial harm that the normal functioning of the project is*

[6] Available at: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer#:~:text=What%20is%20a%20Major%20Accidents,major%20accidents%20and%2For%20disasters Accessed in March 2022

*unable to cope with/rectify i.e. a significant effect.'*

4.6.2. The following risks have been further considered and will be reported on within the relevant chapters of the ES:

- Flooding;
- Climate Change;
- Fire (an Outline Battery Safety Management Plan will be appended to the ES);
- Road Accidents; and
- Glint and Glare.

4.6.3. To manage any potential risks, the Proposed Development will be developed in accordance with the relevant health and safety legislation, regulations and industry guidance.

4.6.4. It is proposed that a separate topic chapter on major accidents and disasters is scoped out of the ES, as likely significant effects on sensitive receptors resulting from major accidents and disasters will be considered in the relevant chapters scoped in to the ES.

## 4.7. Electric, Magnetic and Electromagnetic Fields

4.7.1. The planning system does not include a statutory provision regarding protection from magnetic, electric, and electromagnetic fields. In 2012, the Department for Energy and Climate Change ('DECC')[7] advised that guidelines published by the International Commission on Non – Ionizing Radiation Protection ('ICNIRP') in 1998[8] for both occupational and public exposure should be considered.

4.7.2. These guidelines state that *'overhead power lines at voltages up to and including 132 kV, underground cables at voltages up to and including 132 kV and substations at and beyond the publicly accessible perimeter'* are not capable of exceeding the ICNIRP exposure guidelines for electromagnetic fields.

4.7.3. The Proposed Development will use cables and infrastructure with a maximum voltage up to and including 132kV. In light of this, it is proposed that this topic is

[7] DECC (2012), Power Lines: Demonstrating compliance with EMF public exposure guidelines, A Voluntary Code of Practice
[8] International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998); ICNIRP Guidelines: For limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300GHz), Health Physics 74 (4): 494-522

scoped out of the ES.

## 4.8. Telecommunications, Television Reception & Utilities

4.8.1. Given the nature of the Proposed Development, likely significant effects on television reception are not anticipated.

4.8.2. Although the design of the Proposed Development will aim to avoid any diversions of existing telecommunications or utilities, if this is required, the Applicant will consult with the relevant providers and evidence of agreement to any diversions will be included in the ES.

4.8.3. It is therefore proposed that telecommunications, television reception and utilities as a topic is scoped out of the ES.

## 4.9. Wind Microclimate

4.9.1. Likely significant wind effects are not anticipated given that energy generation uses are proposed that will not include large areas of public realm and outdoor amenity space where the public or site users will experience significant wind effects. The Proposed Development will not include any high-rise buildings or high-rise structures which could influence wind patterns. Therefore, likely significant wind effects are not anticipated, and it is proposed that this topic will be scoped out of the ES.

## 4.10. Daylight, Sunlight and Overshadowing

4.10.1. The scale and massing of the Proposed Development will not cause changes to daylight or sunlight availability or cause overshadowing of residents or amenity space. It is therefore proposed to scope this topic out of the ES.

## 4.11. Glint and Glare

### Introduction

4.11.1. Within this section, the approach, extent, and documentation used to inform and undertake an initial ground-based Glint and Glare Assessment is set out.

4.11.2. Solar panels are designed to absorb as much light as possible and not to reflect it. However, glint and glare can be produced as a reflection of the sun from the surface of the solar PV panel. Glint and glare can be defined by the following:

- Glint – 'A momentary flash of bright light'
- Glare – 'A continuous source of bright light'

4.11.3. Glare is significantly less intense in comparison to glint and can be described as a continuous source of bright light, relative to diffused lighting. This is not a direct reflection of the sun, but a reflection of the sky around the sun.

4.11.4. An initial Glint and Glare Assessment has therefore investigated the potential Glint and Glare impacts in the study area of the Proposed Development outlined above. The assessment has considered the identification of receptors and potential initial impacts upon ground-based receptors, visibility assessment and mitigation (where necessary).

4.11.5. Guidance for assessing glint and glare impacts on aviation receptors can be found in the Federal Aviation Authority's ('FAA') Interim Policy from 2012[9], in which the FAA states the following for a solar PV development to be granted FAA approval:

> *'No potential for glint or glare in the existing or planned Air Traffic Control Tower (ATCT); [and]*
>
> *No potential for glare (glint) or "low potential for after-image" along the final approach path for any existing or future runway landing thresholds (including planned or interim phases), as shown by the approved layout plan (ALP). The final approach path is defined as 2 miles from 50 feet above the landing threshold using a standard 3-degree glide path.'*

4.11.6. The Civil Aviation Authority ('CAA') published its interim guidance on Solar Photovoltaic Cells in 2010[10]. However, this was based on the FAA's interim policy. Therefore, the FAA guidance is used when determining impacts at aviation receptors.

4.11.7. All the guidance outlined above will be considered as part of the Glint and Glare Assessment.

[9] FAA (2013), Interim Policy, FAA Review of Solar Energy System Projects on Federally Obligated Airports. Available at https://www.federalregister.gov/documents/2013/10/23/2013-24729/interim-policy-faa-review-of-solar-energy-system-projects-on-federally-obligated-airports Accessed in April 2022
[10] CAA (2010) Interim CAA Guidance – Solar Photovoltaic Systems. Available at: https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&appid=11&mode=detail&id=4370&filter=1 Accessed in April 2022

### Baseline Conditions

4.11.8. An initial desk-based assessment has been conducted to identify the ground-based receptors where there is a potential for Glint and Glare impacts from the Proposed Development.

4.11.9. A 1km study area for ground-based receptors has been deemed appropriate, as this contains a variety of ground-based receptors in all directions from the Proposed Development. For aviation receptors, all aerodromes within 30km have been identified. However, generally, detailed assessments are only required within 20km for large international aerodromes, 10km for military aerodromes and 5km for small aerodromes from a major proposed development.

4.11.10. These study areas outlined above are based on best practice and have been widely accepted across the UK and Ireland.

### Ground Based Reflection Zones

4.11.11. Based on the relatively flat topography in the area, solar reflections between five degrees below the horizontal plane to five degrees above it are described as near horizontal. Reflections from the Proposed Development within this arc have the potential to be seen by receptors at or near ground level.

4.11.12. Further analysis showed that this will only occur between the azimuth of 238.15 degrees and 298.73 degrees in the western direction (late day reflections) and 64.76 degrees and 129.14 degrees in the eastern direction (morning reflections) and therefore any ground-based receptor outside these arcs will not have any impact from solar reflections.

4.11.13. Figures 4.1, 4.2 and 4.3 show the respective study areas, whilst also subtracting from this the areas where solar reflections will not impact on ground-based receptors due to the reasons set out in the paragraphs above.

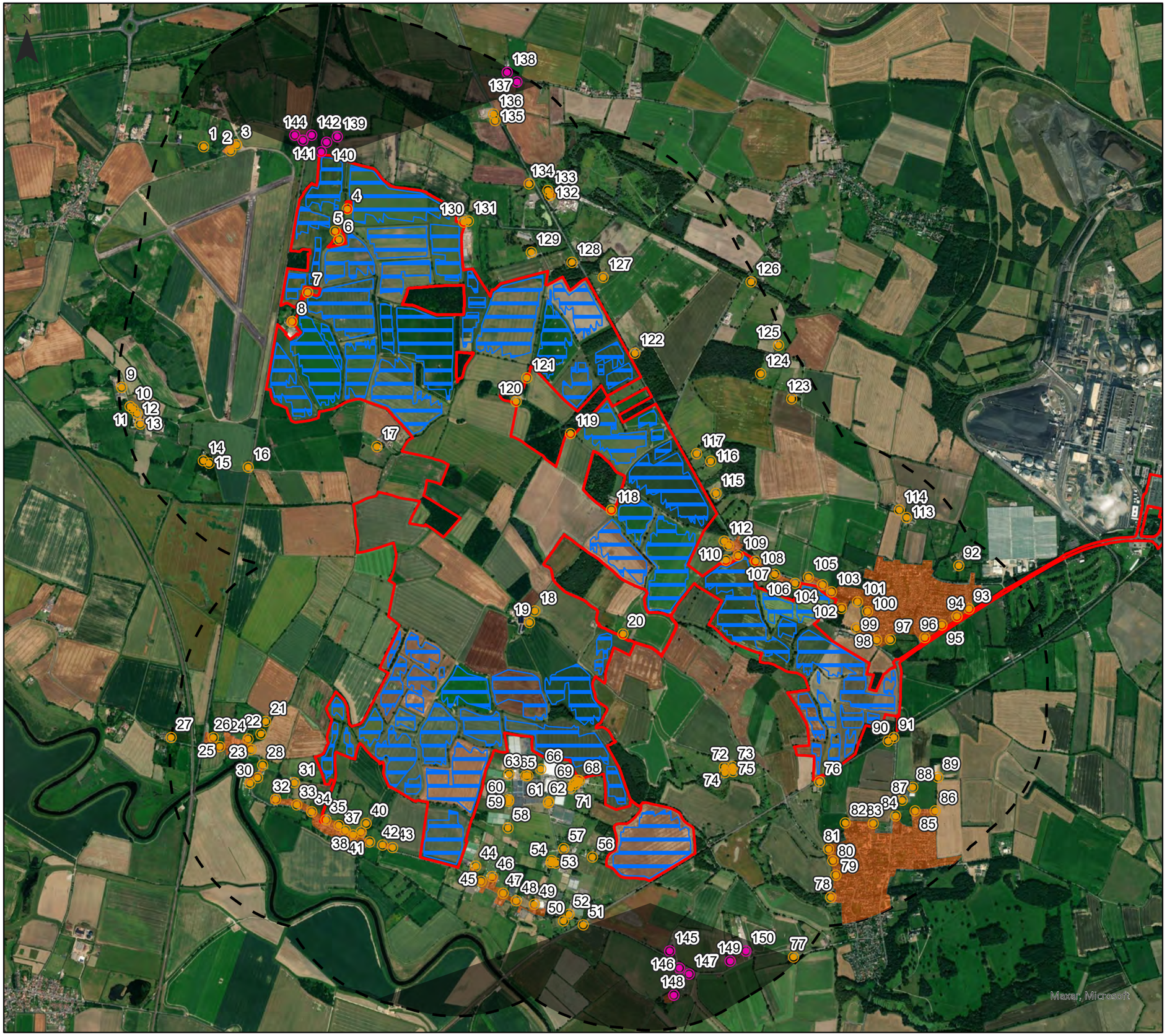
### Residential Receptors

4.11.14. Residential receptors located within 1km of the site have been identified (Table 1: Appendix 4.1A). Glint was assumed to be possible if the receptor is located within the ground-based receptor zones outlined previously.

4.11.15. There are 14 residential receptors (Receptors 137 - 150) which are within the no-reflection zones and are clearly identifiable in Figure 4.1 and Table 1: Appendix 4.1A.

## Figure 4.1 Residential Based Receptors

# Helios Renewable Energy Project
# Residential Based Receptors
# Figure 4.1




0 0.25 0.5 1 Kilometers

Key

- Site Boundary
- Panel Boundary
- 1km Study Area
- Glare Not Possible at Receptor
- Glare Possible at Receptor
- Residential Area
- Non-Reflection Zones

Neo Office Address:
Wright Business Centre, 1 Lonmay Road, Glasgow, G33 4EL


Date: 05/05/2022
Drawn By: Scott Griffin
Scale (A3): 1:25,000
Drawing No: NEO00980/001I/A

neo ENVIRONMENTAL

### Road Receptors

4.11.16. There are 14 roads within the 1km study area that require detailed glint and glare analysis, which are Common Lane, Burn Lane, Eastfield Lane, Main Street, Hirst Road, A1041, Lynwith Lane, Sandwith Lane, Hardenshaw Lane, Jowland Winn Lane, Chester Court Road, Barlow Road, A645 and Brigg Lane. There are some minor roads which serve dwellings; however, these have been discounted, as vehicle users of these roads will likely be travelling at low speeds and therefore, there is a negligible risk of safety impacts resulting from glint and glare of the Proposed Development.

4.11.17. Table 2: Appendix 4.1A shows a list of receptors points within the study area which are 200m apart and if the receptor has potential for glint and glare impacts. There are 12 road receptors (Receptors 132 – 143) which are within the no-reflection zones and are clearly identifiable in Figure 4.2 and Table 2: Appendix 4.1A.

## Figure 4.2 Road Based Receptors

# Helios Renewable Energy Project
# Road Based Receptors
# Figure 4.2

Key

- Site Boundary
- Panel Boundary
- 1km Study Area
- Glare Not Possible at Receptor
- Glare Possible at Receptor
- Non-Reflection Zones

0 0.25 0.5 1 Kilometers

Neo Office Address:
Wright Business Centre, 1 Lonmay Road, Glasgow, G33 4EL


Date: 05/05/2022
Drawn By: Scott Griffin
Scale (A3): 1:25,000
Drawing No: NEO00980/002I/A

neo ENVIRONMENTAL

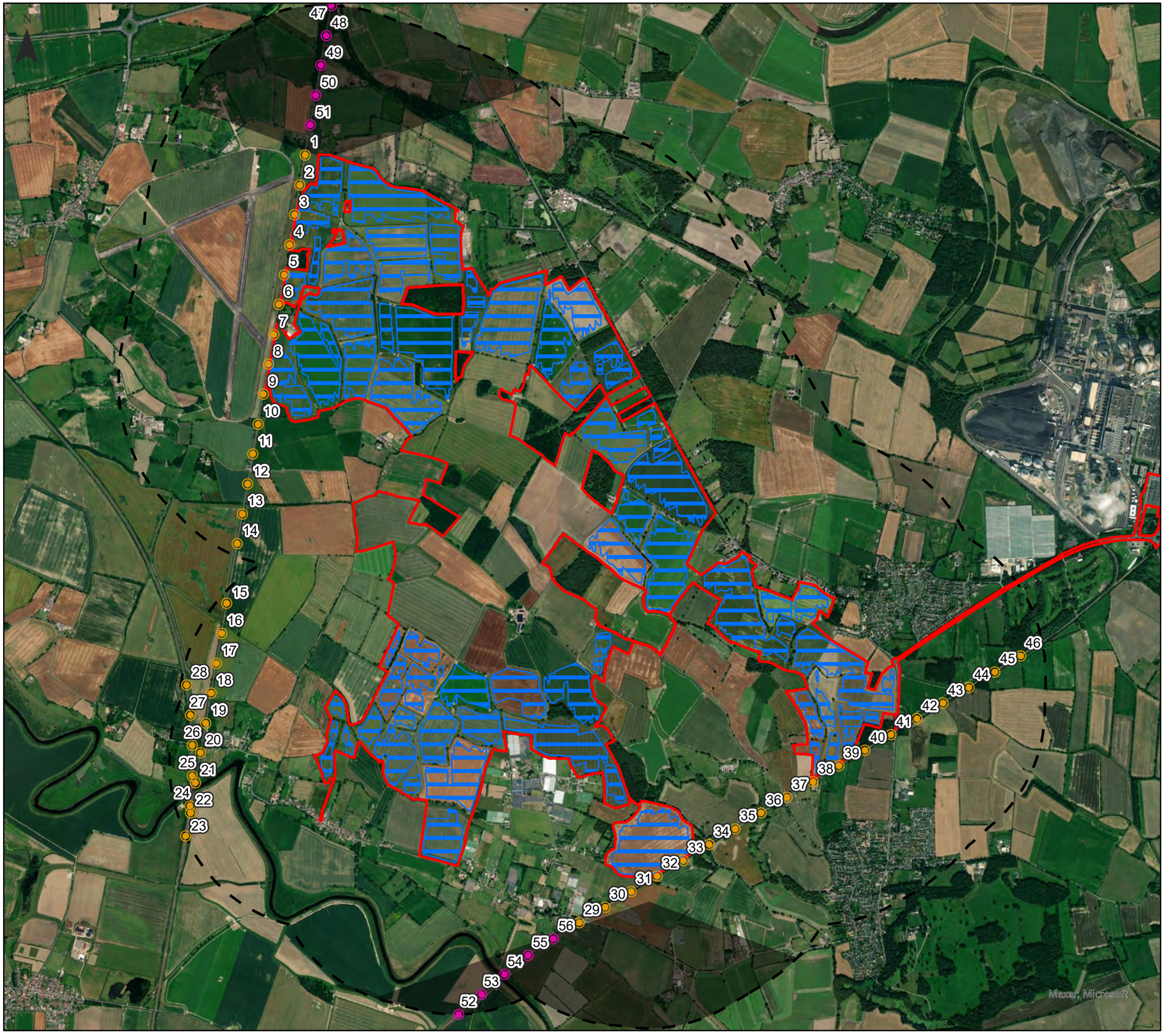
### Rail Receptors

4.11.18. There are a number of railway lines which require an assessment to the southeast and west within the 1km study area of the Proposed Development.

4.11.19. Table 3: Appendix 4.1A shows a list of receptors points within the study area which are 200m apart. There are 10 rail receptors (Receptors 47 – 56) which are within the no-reflection zones and are clearly identifiable in Figure 4.3 and Table 3: Appendix 4.1A.

## Figure 4.3 Rail Based Receptors

# Helios Renewable Energy Project
# Rail Based Receptors
# Figure 4.3

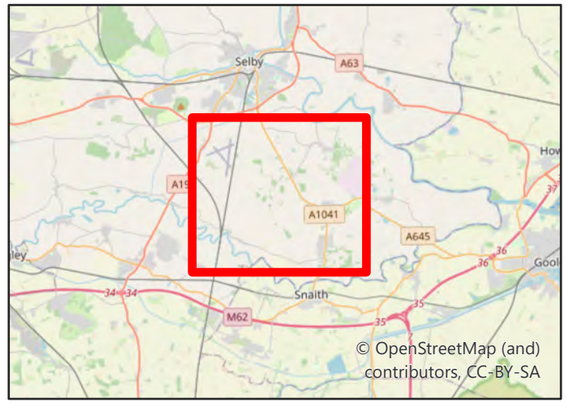



0 0.25 0.5 1 Kilometers

Key

- Site Boundary
- Panel Boundary
- 1km Study Area
- Glare Not Possible at Receptor
- Glare Possible at Receptor
- Non-Reflection Zones


Neo Office Address:
Wright Business Centre, 1 Lonmay Road, Glasgow, G33 4EL


Date: 05/05/2022
Drawn By: Scott Griffin
Scale (A3): 1:25,000
Drawing No: NEO00980/003I/A

neo ENVIRONMENTAL

### Aviation Receptors

4.11.20. It is not anticipated that any aviation receptors will be significantly affected by the Proposed Development. Burn Airfield is directly to the west of the Proposed Development and is used by a gliding club, whose operating hours are between 09:30 and 17:00, typically on Thursdays, Saturdays and Sundays. It is expected that any glare impacts at this airfield will be before 09:30; Burn Airfield will be consulted as part of a thorough assessment process. Whilst Sherburn-in-Elmet Airfield and Leeds East Airport (Church Fenton Airfield) fall within the aviation safeguarding buffer zones, these airfields are located approximately 9.76km and 11.75km northwest of the site, respectively. Therefore, it is likely that there will be little to no impact upon aviation receptors due to their orientation and distance from the Proposed Development.

## Initial Assessment Results

4.11.21. An initial geometric analysis comparing the azimuth and horizontal angle of the receptors from the Proposed Development and the solar reflection has been conducted. This was based on the description of the Proposed Development set out in Section 2 (The Proposed Development) of this Scoping Report to provide an early indication of potential glint and glare effects, if any.

4.11.22. This initial assessment has assessed a realistic ‘worst case’ for the Proposed Development and includes all fields with solar PV modules within the Proposed Development in the analysis. The modelling used has assumed that the entire field comprises a reflective surface.

### Residential Receptors

4.11.23. Table 4: Appendix 4.1A identifies the receptors that will experience solar reflections based on solar reflection modelling and whether the reflections will be experienced in the morning (AM), evening (PM), or both. Whilst Appendix 4.1B and 4.1C show the geometric analysis results with the ocular impact charts for each residential receptor.

4.11.24. The 14 receptors which were within the no-reflection zones outlined previously have been excluded from the detailed modelling as they will never receive any glint and glare impacts from the Proposed Development.

4.11.25. As can be seen in Table 4: Appendix 4.1A, there are predicted to be no impacts at any residential receptor from the Proposed Development.

**Road Receptors**

4.11.26. Table 5: Appendix 4.1A shows a summary of the modelling results for each of the Road Receptor Points whilst the detailed results and ocular impact charts can be viewed in Appendix 4.1D and 4.1E.

4.11.27. The 12 receptors within the no-reflection zones outlined previously have been excluded from the detailed modelling as they will never receive glint and glare impacts from the Proposed Development.

4.11.28. As can be seen in Table 5: Appendix 4.1A, there are predicted to be no impacts at any road receptor from the Proposed Development.

**Rail Receptors**

4.11.29. Table 6: Appendix 4.1A shows a summary of the modelling results for each of the Rail Receptor Points whilst the detailed results and ocular impact charts can be viewed in Appendix 4.1F.

4.11.30. The 10 receptors within the no-reflection zones outlined previously have been excluded from the detailed modelling as they will never receive glint and glare impacts from the Proposed Development.

4.11.31. As can be seen in Table 5: Appendix 4.1A, there are predicted to be no impacts at any rail receptor from the Proposed Development.

4.11.32. It is therefore proposed that the initial Glint and Glare Assessment, which has assessed a realistic ‘worst case scenario’ for the Proposed Development, will be updated to assess the ‘frozen’ scheme and submitted as a Technical Appendix to the ES and on this basis, be scoped out of further assessment in the ES. The LVIA will reference the conclusions of the Glint and Glare Assessment and consider impacts resulting from reflectivity in the assessment of the Proposed Development’s likely significant landscape and visual effects, as well as incorporating any necessary landscape mitigation into the landscape mitigation strategy identified in the Glint and Glare Assessment.

## 4.12. Lighting

4.12.1. Lighting will be operated in line with relevant best practice during the Proposed Development's construction and decommissioning phases. As the site is not located in an area sensitive for dark skies and given that lighting effects during construction and decommissioning works are expected to be limited in extent, intensity and duration, effects on the night-sky and sensitive ecology during these phases are unlikely to be significant and therefore an assessment of these effects is proposed to be scoped out of the Landscape and Views ES chapter and Biodiversity ES chapter.

4.12.2. During the operational phase, the Proposed Development will not be permanently lit. Manually operated lights or passive, infrared ('PIR') systems may be attached to the substation buildings, transformer/inverter cabinets and energy storage units in the event of an emergency maintenance visit being required in the hours of darkness. On this basis, it is not anticipated to result in likely significant effects on sensitive ecology or the existing character of the night-sky. Further details are provided in Section 7 (Landscape and Views) and Section 8 (Biodiversity) of this Scoping Report.

4.12.3. Therefore, it is proposed to scope this topic out of the ES.

## 4.13. Minerals

4.13.1. The site is not located within a Mineral Safeguarding Area ('MSA'). Therefore, the Proposed Development is not expected to sterilise any mineral resource at the site. On this basis, it is proposed to scope out minerals as a topic in the ES.

## 4.14. Waste

4.14.1. A description of the potential types of construction waste and estimated volumes will be described in the Site and Proposed Development Chapter of the ES. The CEMP will detail the mitigation measures to be implemented during the construction phase to minimise waste, as will the DEMP detail the mitigation measures to be implemented during the decommissioning phase. The CEMP and DEMP will be secured by requirement to the DCO. No operational phase waste from the Proposed Development is anticipated, except for limited volumes of waste resulting from maintenance activities.

## 4.15. Conclusion

4.15.1. A summary of the topics proposed to be scoped out of the ES is provided in Table 4.2 below.

**Table 4.2: Summary of Topics to be Scoped Out**

| Topic | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Justification for Scoping Out |
|---|---|---|---|---|
| Air Quality | Very Low | Low | Negligible | Potential impacts from dust emissions during the construction and decommissioning phases of the Proposed Development will not be significant and standard mitigation measures to control these emissions will be outlined in the CEMP and DEMP, to be secured by requirement in the DCO. The CTMP will control construction and decommissioning traffic movements will be and mitigation measures will be implemented to ensure that effects will not be significant.<br><br>During the Proposed Development's operational phase, vehicle movements associated with maintenance activities will be limited and the Proposed Development will not comprise any sources of pollutant emissions to air. |
| Human Health | Very Low - Medium | Very Low - High | Negligible - Minor | The effects of the Proposed Development on human health will be assessed in the Noise and Transport and Access ES chapters. The design of the Proposed Development will minimise any impacts on human health. Likely significant |

**Table 4.2: Summary of Topics to be Scoped Out**

| Topic | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Justification for Scoping Out |
|---|---|---|---|---|
| | | | | effects from the Proposed Development on human health in respect of land contamination and air quality are not anticipated |
| Land Contamination | Very Low | Very Low | Negligible | As the site is greenfield and predominantly in agricultural use, it is unlikely that significant levels of contamination are present on-site. Potential risks to contamination of soil and water resources would be managed during construction and operation via the CEMP and DEMP, respectively. No contamination risks are associated with the operational phase of the Proposed Development. |
| Vibration | Very Low | Low - High | Negligible | There will be no sensitive properties located within 30m of construction activity during the construction phase of the Proposed Development. Therefore, construction vibration will not exceed the LOAEL at sensitive receptors, and effects would be 'Not Significant". Vibration effects during the decommissioning phase are considered to be less than, or equal to, vibration effects during the construction phase |

**Table 4.2: Summary of Topics to be Scoped Out**

| Topic | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Justification for Scoping Out |
|---|---|---|---|---|
| | | | | and therefore also 'Not Significant'.<br>Given the nature of the Proposed Development, there will be no vibration effects generated during its operational phase.<br>Therefore, it is proposed to scope out an assessment of the Proposed Development's vibration effects from the ES. |
| Major Accidents and Disasters | Very Low - Medium | Very Low - High | Negligible - Minor | The Proposed Development will be developed in accordance with the relevant health and safety legislation, regulations and industry guidance to control and manage any potential risks.<br>Effects on receptors resulting from major accidents or disasters will be reported in the relevant topic chapters (Landscape and Views, Transport and Access, Water Environment and Climate Change). |
| Electric, Magnetic and | Very Low | Very Low | Negligible | The Proposed Development will use cables and infrastructure with a maximum voltage up to and including |

**Table 4.2: Summary of Topics to be Scoped Out**

| Topic | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Justification for Scoping Out |
|---|---|---|---|---|
| Electromagnetic Fields | | | | 132kV. |
| Telecommunica-tions, Television Reception and Utilities | Very Low – Medium | Very Low | Negligible | Given the nature of the Proposed Development, likely significant effects on television reception are not anticipated.<br>Although the design of the Proposed Development will aim to avoid any diversions of existing telecommunications or utilities, if this is required, the Applicant will consult with the relevant providers and evidence of agreement to any diversions will be included in the ES. |
| Wind Microclimate | Very Low | Very Low | Negligible | The Proposed Development will not include large areas of public realm and outdoor amenity space where the public or site users will experience significant wind effects or include any high-rise buildings or high-rise structures which could influence wind patterns. |
| Daylight, Sunlight and | Very Low | Very Low | Negligible | The Proposed Development will not cause changes to daylight or sunlight availability or cause overshadowing of |

**Table 4.2: Summary of Topics to be Scoped Out**

| Topic | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Justification for Scoping Out |
|---|---|---|---|---|
| Overshadowing | | | | residents or amenity space. |
| Glint and Glare | Very Low - Low | Very Low - Medium | Negligible - Minor | Due to existing vegetation, topography and development, no significant impacts on sensitive receptors are anticipated from the Proposed Development. |
| Lighting | Very Low | Very Low | Negligible | Lighting will be operated in line with relevant best practice during the Proposed Development's construction and decommissioning phases. As the site is not located in an area sensitive for dark skies and given that lighting effects during construction and decommissioning works are expected to be limited in extent, intensity and duration, effects on the night-sky and sensitive ecology during these phases are unlikely to be significant and therefore an assessment of these effects is proposed to be scoped out of the ES.<br>During the operational phase, the Proposed Development will not be permanently lit. On this basis, likely significant environmental effects are not anticipated. |

**Table 4.2: Summary of Topics to be Scoped Out**

| Topic | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Justification for Scoping Out |
|---|---|---|---|---|
| Minerals | Very Low | Very Low | Negligible | The site is not located within an MSA. Therefore, the Proposed Development is not expected to sterilise any mineral resource at the site. |
| Waste | Very Low | Very Low | Negligible | The mitigation measures to minimise waste will be controlled by the CEMP and DEMP. The Proposed Development will not result in significant waste effects on the environment during the construction, operational or decommissioning phases. |

# 5. Topics to be Scoped In

## 5.1. Introduction

5.1.1. As set out in Section 4 (Topics to be Scoped Out), this scoping exercise has been informed by desk-based research, professional judgment and other information available for the site. The Proposed Development is anticipated to result in likely significant environmental effects on the environmental topics considered in this section.

## 5.2. Overview of Topics to be Scoped In

5.2.1. The following topics are proposed to be scoped in to the ES:

- Cultural Heritage;
- Landscape and Views;
- Biodiversity;
- Water Environment;
- Transport and Access;
- Noise;
- Climate Change;
- Socio-economics; and
- Soils and Agricultural Land.

5.2.2. Table 5.1 provides a summary of the topics to be scoped in to the ES.

**Table 5.1: Summary of Topics to be Scoped In**

| Topics | Potential Effects | | | Likely Significant Effects (Pre-Mitigation) | Comments |
|---|---|---|---|---|---|
| | Construction | Operation | Decommissioning | | |
| Cultural Heritage | ✓ - S | ✓ - L | ✓ - S | ✓ | Chapter to be prepared |
| Landscape and Views | ✓ - S | ✓ - M | ✓ - S | ✓ | Chapter to be prepared |
| Biodiversity | ✓ - S/L | ✓ - L | ✓ - S | ✓ | Chapter to be prepared |
| Water Environment | ✓ - S | ✓ - L | ✓ - S | ✓ | Chapter to be prepared |
| Transport and Access | ✓ - S | x | x | ✓ | Chapter to be prepared |
| Noise | ✓ - S | ✓ - L | ✓ - S | ✓ | Chapter to be prepared |
| Climate Change | ✓ - S | ✓ - L | x | ✓ | Chapter to be prepared |
| Socio-economics | ✓ - S | ✓ - L | ✓ - S | ✓ | Chapter to be prepared |
| Soils and Agricultural Land | ✓ - L | ✓ - L | x | ✓ | Chapter to be prepared |
| Human Health | ✓ - S | ✓ - L | ✓ - S | ✓ | Separate topic chapter scoped out of the ES (topic considered in |

**Table 5.1: Summary of Topics to be Scoped In**

| Topics | Potential Effects | | | Likely Significant Effects (Pre-Mitigation) | Comments |
|---|---|---|---|---|---|
| | Construction | Operation | Decommissioning | | |
| | | | | | Noise and Transport and Access ES chapters) |
| Major Accidents and Disasters | ✓ - S | ✓ - L | ✓ - S | ✓ | Separate topic chapter scoped out of the ES (topic considered in Climate Change, Water Environment, Transport and Access and Landscape and Views ES chapters) |

Key:

✓ Likely Significant Effect / x No Likely Significant Effect

S – Short-Term Effect / M – Medium-Term Effect / L – Long-Term Effect (refer to Section 3 (EIA Methodology) of this Scoping Report for definitions)

# 6. Cultural Heritage

## 6.1. Introduction

6.1.1. An assessment of the likely significant effects of the Proposed Development with respect to cultural heritage will be undertaken.

6.1.2. The Cultural Heritage chapter will consider all aspects of the historic environment, comprising archaeology, built heritage and the historic landscape, both designated and non-designated. The chapter will identify heritage assets with the potential to experience effects from the Proposed Development and will assess their importance, the magnitude of the impact and conclude with the resultant residual effect.

## 6.2. Study Area

6.2.1. Best practice guidance does not suggest a specific radius for assessing the effects resulting from a Proposed Development on the historic environment, and therefore professional judgement has been used. Two study areas are proposed to assess the likely significant effects of the Proposed Development upon the historic environment resource, as shown on Figures 6.1 to 6.4.

6.2.2. For designated heritage assets (comprising scheduled monuments, listed buildings, conservation areas, registered parks and gardens, registered battlefields and World Heritage Sites), a study area of 3km from the site will be used. The 3km study area has been measured from the edge of the site boundary. Given the scale and height of the Proposed Development's solar arrays, at a height of approximately 3m above existing ground levels, it is considered that a radius of 3km from the site boundary is proportionate and provides a sufficient extent to identify any designated assets for which the site might form part of the setting of, and therefore contribute to the significance of, either through visual aspects, or historic association. The designated heritage assets within the 3km study area are shown on Figures 6.1 and 6.2 and the name and distance of each asset from the site is included in Appendix 6.1.

6.2.3. For non-designated heritage assets (comprising archaeological sites and findspots, locally listed buildings, locally important parks and gardens or other historic landscapes), a study area of 1km from the site boundary will be used. It is considered that this is an appropriate and proportionate scale of study area to establish the below-ground archaeological context of the site in its surroundings, particularly given

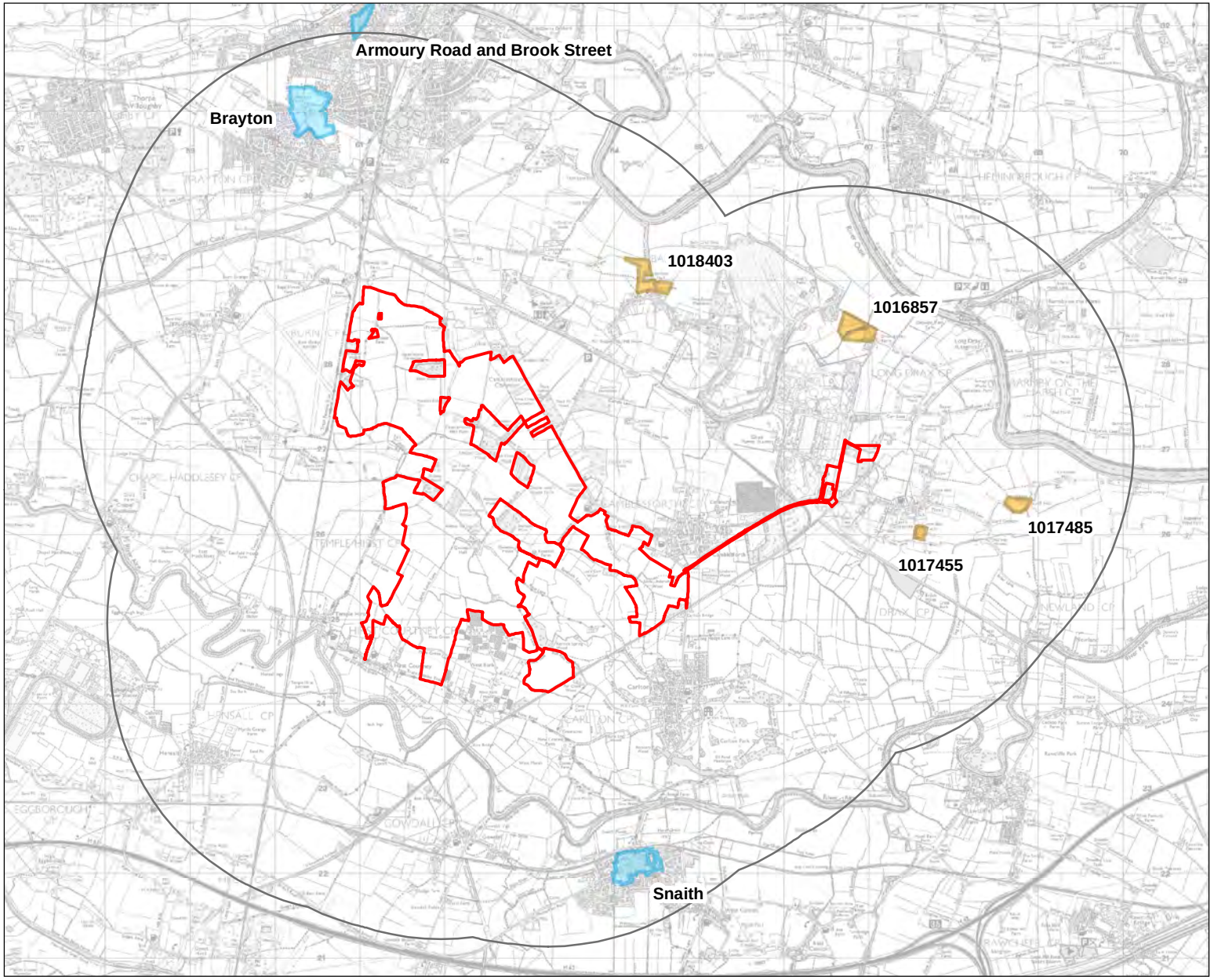
the size of the site at 757.46ha and the scale of the Proposed Development. The locations of the non-designated assets and archaeological events within the study area are shown on Figures 6.3 and 6.4.

6.2.4. In addition to the study area, the preliminary Zone of Theoretical Visibility ('ZTV') (Figure 7.1) has been referenced to identify areas where the Proposed Development may be theoretically visible within the surrounding landscape. The preliminary ZTV produced at this scoping stage is a 'bare earth' ZTV, using the topography of the landscape to provide an indication of visibility, with no existing blocks of vegetation or built form taken into account. This provides a 'worst-case' scenario for visibility. The preliminary ZTV indicated that the majority of the 3km study area would have some level of visibility of the Proposed Development due to the flat topography of the surrounding landscape and the majority of the designated assets identified within the 3km study area would, theoretically, have visibility of the Proposed Development. Therefore, at this stage, with the 'bare earth' ZTV, no assets have been excluded from assessment. As the assessment progresses and 'screened' ZTVs are produced, which comprise ZTVs that account for existing vegetation and built form, it may be that larger areas where the Proposed Development would not be visible from the surrounding landscape will emerge and subsequently, heritage assets will be removed from consideration, if the asset has no historic setting association with the site.

6.2.5. At this scoping stage, assets beyond the 3km study area and within the preliminary ZTV have also been considered for their potential to experience significant effects resulting from the Proposed Development. It has been assessed that there are no heritage assets beyond the 3km study area which have the potential to experience significant adverse effects from the Proposed Development.

6.2.6. The site also includes land for an underground grid connection cable route and land for an underground connection cable between the land parcels to be developed for solar PV. As shown on Figures 6.1 and 6.2, the 3km study area for the assessment of likely significant effects on designated heritage assets has been measured from the site boundary, which incorporates both underground cable route areas, to ensure a comprehensive baseline is obtained. This study area, and the study area for non-designated heritage assets of 1km from the site boundary, encompass the land for both the underground grid connection cable route and the underground connection cable.

## Figure 6.1 Designated Heritage Assets – Scheduled Monuments & Conservation Areas




## KEY

- Site
- 3km Study Area
- Scheduled Monuments
- Conservation Areas

Revisions:
First Issue- 28/04/2022 RGO

# Figure 6.1: Designated Heritage Assets - Scheduled Monuments & Conservaton Areas

## Helios Renewable Energy Project

Client: Enso Green Holdings D Limited
DRWG No: P22-0212_1 Sheet No: - REV: -
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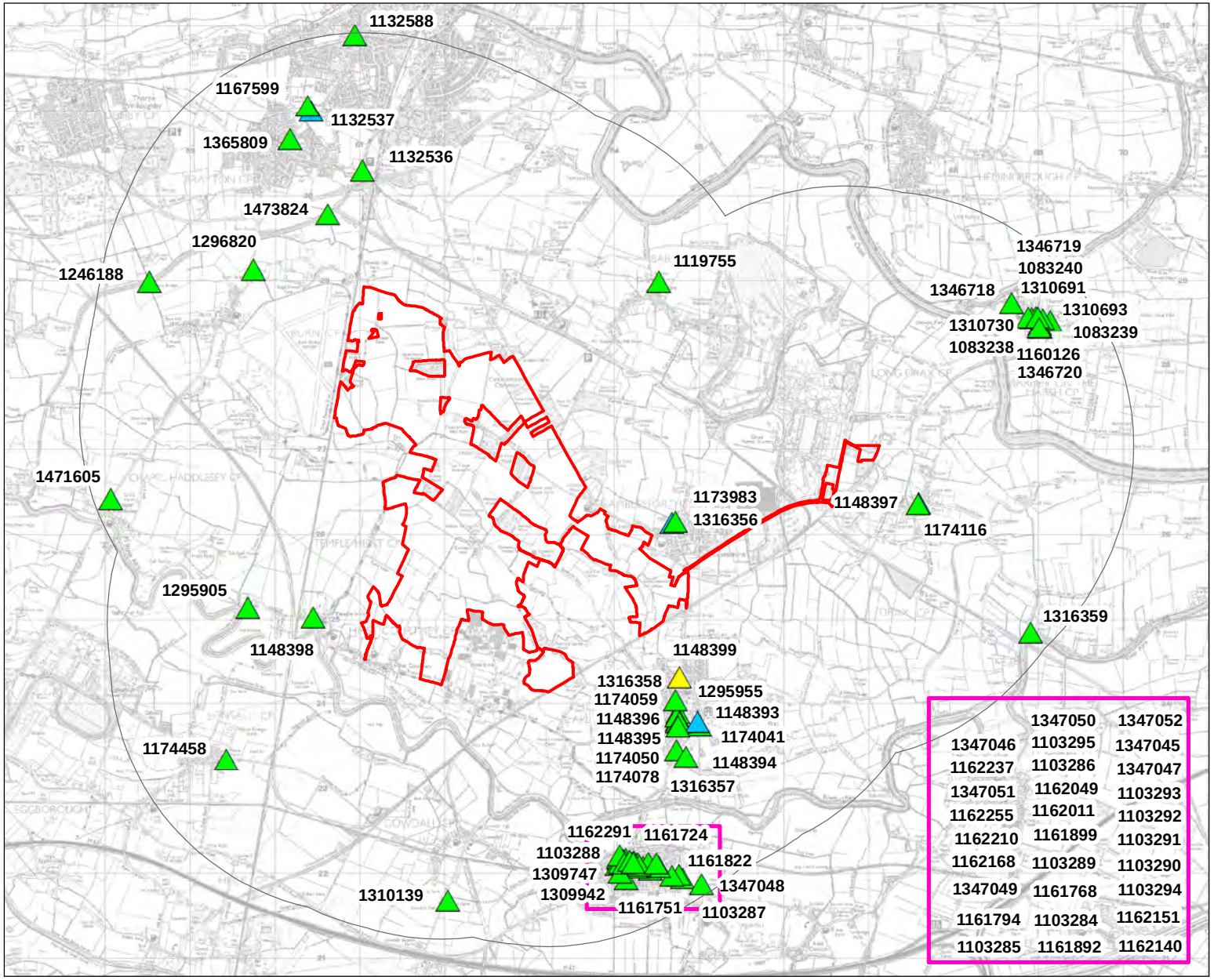
## Figure 6.2 Designated Heritage Assets – Listed Buildings




## KEY

Site

3km Study Area

**Listed Buildings**

**Grade**

I

II*

II

Revisions:
First Issue- 28/04/2022 RGO

# Figure 6.2: Designated Heritage Assets - Listed Buildings

## Helios Renewable Energy Project

Client: Enso Green Holdings D Limited

DRWG No: P22-0212_2 Sheet No: - REV: -

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Date: 04/05/2022

Scale: 1:70,000 @ A3

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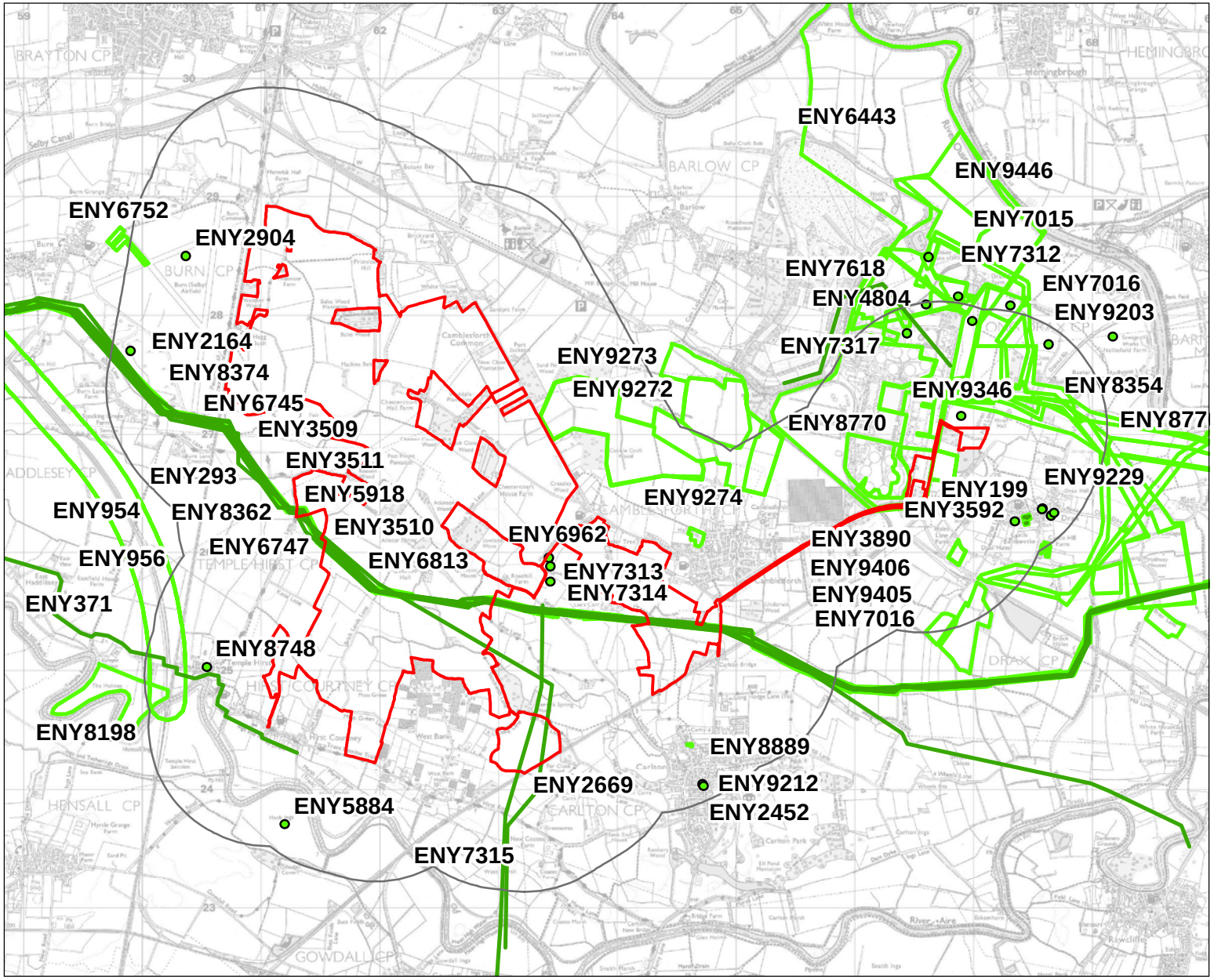
PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | HERITAGE

## Figure 6.3 HER 'Events'




**KEY**

- Site
- 1km Study Area
- HER 'Event' point
- HER 'Event' line
- HER 'Event' area

Revisions:
First Issue- 28/04/2022 RGO

# Figure 6.3: HER 'Events'

## Helios Renewable Energy Project

Client: Enso Green Holdings D Limited
DRWG No: P22-0212_3 Sheet No: - REV: -
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Date: 04/05/2022
Scale: 1:50,000 @ A3

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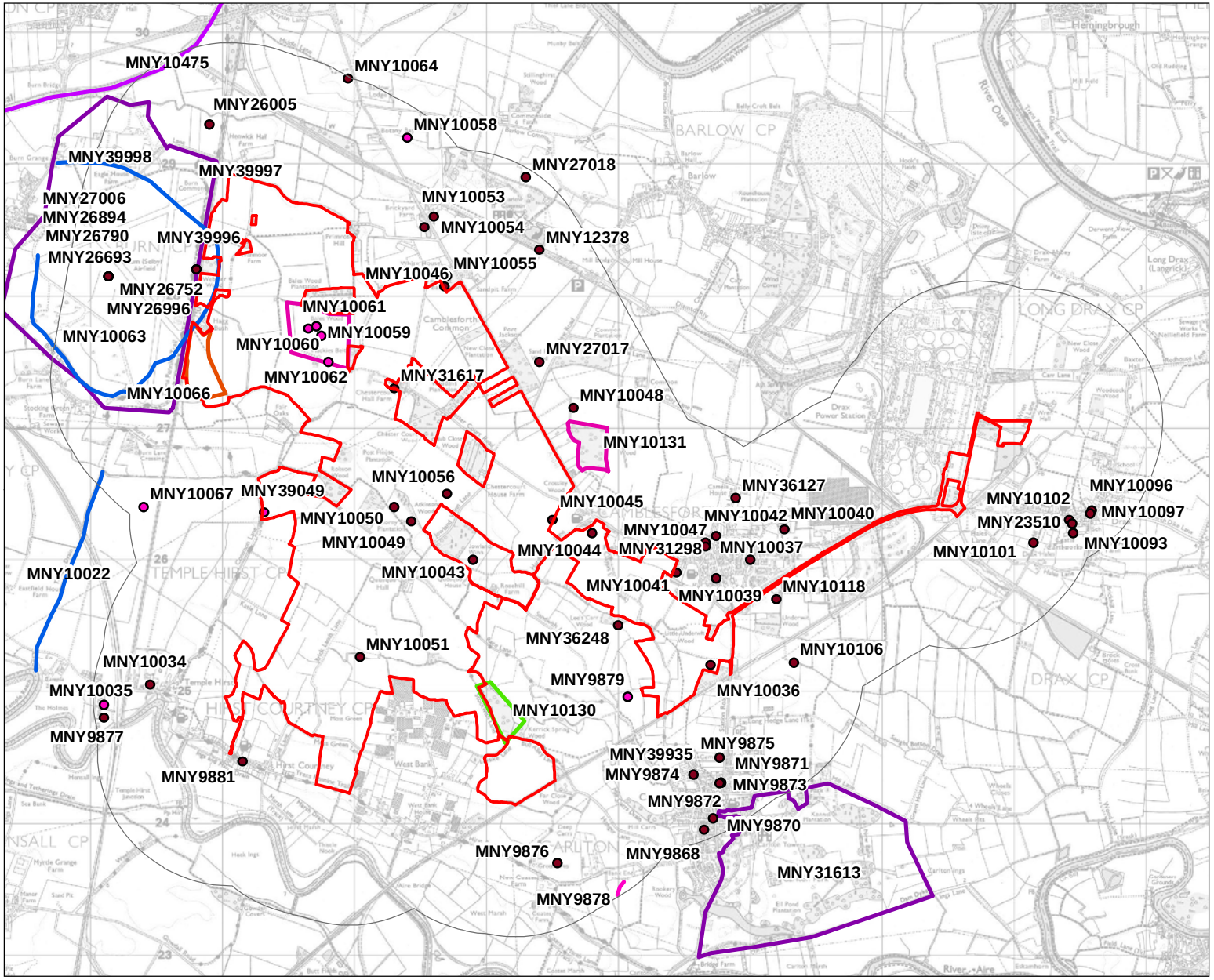
PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | HERITAGE

## Figure 6.4 HER ‘Monuments’




KEY

Site

1km Study Area

**HER 'Monument' point**

**Period**

- Neolithic
- Prehistoric
- Roman to Modern
- Medieval
- 12th CENTURY to Modern
- Medieval to 19th Century
- Medieval to Modern
- Post Medieval
- Post Medieval to Modern
- 17th Century to Modern
- 18th Century
- 19th Century
- 19th Century to Modern
- 20th Century
- 20th Century to Unknown
- Modern
- Unknown

**HER 'Monument' line**

**Period**

- Medieval
- Medieval to 19th Century
- 18th Century
- Unknown

**HER 'Monument' area**

**Period**

- Early Neolithic to Medieval
- Roman to Modern
- 17th Century to Modern
- 20th Century
- Unknown

Revisions:
First Issue- 28/04/2022 RGO

# Figure 6.4: HER 'Monuments'

## Helios Renewable Energy Project

Client: Enso Green Holdings D Limited

DRWG No: P22-0212_4 Sheet No: - REV: -

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PLANNING | DESIGN | ENVIRONMENT | ECONOMICS | HERITAGE

## 6.3. Baseline Environment

### Designated Heritage Assets

6.3.1. There are no designated heritage assets located within the site.

6.3.2. Within the 3km study area from the site, the following designated heritage assets are located (as presented in Appendix 6.1 and shown on Figures 6.1 and 6.2):

- Five grade I listed buildings;
- One grade II* listed building;
- 72 grade II listed buildings;
- Four scheduled monuments; and
- Three conservation areas.

6.3.3. In accordance with paragraph 5.8.14 of the Overarching National Policy Statement for Energy (EN-1)[11] (and re-stated within draft NPS EN-1 at paragraph 5.9.22), grade I and II* listed buildings and scheduled monuments are considered to be designated heritage assets of the highest significance. Grade II listed buildings are considered to be designated heritage assets of less than the highest significance. Conservation areas are considered to hold heritage significance of a level proportionate to their special historic and architectural interest.

6.3.4. As stated, the preliminary ZTV prepared to support the scoping stage of the assessment indicated that virtually all of the identified heritage assets within the 3km study area would theoretically have visibility of the Proposed Development due to the topography of the site. Therefore, no assets, designated or non-designated, have been removed from consideration at this scoping stage as a result of analysis of the preliminary ZTV.

### Listed Buildings

6.3.5. The nearest designated heritage asset to the site is the grade I listed Camblesforth Hall with its associated grade II listed dovecote, both located approximately 250m from the eastern part of the site. The grade II listed Manor Farmhouse is located

[11] Department of Energy & Climate Change, 2011., *Overarching National Policy Statement for Energy (EN-1)*

approximately 560m to the west of the site, within the settlement of Temple Hirst. To the south-east of the site is the settlement of Carlton, which although not containing a conservation area, contains a number of listed buildings, with two located within 1km of the site. These comprise the grade II* listed Church of St. Mary (Roman Catholic) and the grade II listed Church of St. Mary.

6.3.6. Of the other grade I listed buildings within the study area, one is an early 17th century country house, Carlton Towers, which has been converted into an events venue. It is located approximately 1.2km south of the site. The other three grade I listed buildings comprise the three churches of the Church of St. Lawrence in Snaith (located approximately 2.1km south-east of the site), the Church of St. Peter and Paul in Drax (located approximately 700m east of the site), and the Church of St. Wilfred in Brayton (located approximately 2.2km northwest of the site).

6.3.7. The grade II listed buildings within the study area comprise a mix of different buildings and structures. There are several structures relating to transport uses including bridges, milestones, tunnels and a number of buildings and ancillary features relating to the higher graded country houses and estates. There are also a large number of smaller scale, residential dwellings and buildings with uses associated with settlement, such as commercial, leisure and civic. There are also a small number of assets associated with churchyards within the study area.

6.3.8. All of the listed buildings within the 3km study area are shown on Figure 6.1.

**Scheduled Monuments**

6.3.9. All four scheduled monuments within the 3km study area date from the medieval period (1066 – 1540). There are two moated sites of Castle Hill and Scurff Hall, Drax Augustinian priory and evidence of a medieval settlement and post-medieval gardens around Barlow Hall. All four of these assets are located over 1km from the site, with three located surrounding the Drax Power Station to the north, south and east. The moated site of Castle Hill is located approximately 700m to the southeast of the site. The moated site of Scurff Hall is located approximately 1.7km east of the site. The Drax Augustinian priory is located approximately 1.2km north of the site. Finally, the medieval settlement and post-medieval gardens at Barlow are located approximately 1.7km northeast of the site.

6.3.10. All of the scheduled monuments within the 3km study area are shown on Figure 6.2.

### Conservation Areas

6.3.11. The majority of the listed buildings within the 3km study area are located within the boundaries of three conservation areas. All three of the conservation areas are located at the outer extent of the 3km study area. The conservation areas of Brayton and Armoury Road and Brook Street are located to the north of the site boundary, approximately 1.9km and 2.9km, respectively. They are both located within, and surrounded by, the urban conurbation of Selby and Brayton. Snaith Conservation Area within Snaith is located approximately 2.1km to the south of the River Aire and focussed on the historic core of the settlement.

### Non-Designated Heritage Assets

6.3.12. Within the 1km study area from the site, there are several records of potential non-designated heritage assets identified from the North Yorkshire Historic Environment Record ('NYHER') and the National Record of the Historic Environment ('NRHE'). These include isolated findspots of individual artefacts, such as pottery sherds, flint objects or metal objects such as coins, former locations of buildings, evidence of possible prehistoric, Roman and medieval activity and widespread evidence of agricultural activity spanning centuries. In addition, there is evidence of modern activity in the 1km study area in the form of the World War Two ('WWII') bomber station of Burn Airfield, with a number of associated assets throughout the study area, including the recorded site of a WWII heavy anti-aircraft battery within the site, west of Camblesforth.

6.3.13. Within the site, there are relatively few records from the NYHER and NRHE. In the south-eastern part of the site, there are records of a field boundary and a former area of woodland and further west, north of Hirst Courtney is a record of a findspot of a flint object. In the northern part of the site, there are records of possible archaeological sites identified through examination of aerial photographs. In particular, in the area east of Burn Airfield (in the north-western part of the site), there are records of possible field systems, ring ditches and enclosures of an unknown date visible on aerial photographs of the area and recorded within the NYHER and NRHE.

6.3.14. There is evidence of medieval, post-medieval and early modern agricultural activity in the form of ridge and furrow ploughing across the site, identified from analysis of aerial photographs. It should be noted that, in many cases, the traces of this evidence

have been removed by later agricultural activity. There are several medieval assets within the vicinity of the site, including the scheduled monuments discussed above and there is also evidence of a Knights Templar preceptory or administrative centre for the Templar estate in this area, located at Temple Hirst, approximately 1.3km to the west of the site boundary.

6.3.15. The historic landscape of the site has been assessed within the Historic Land Characterisation ('HLC') study, undertaken by NYCC. The data resulting from this study is provided by the NYHER as a data set. The HLC describes and categorises areas of land according to their landscape character features, which can be historic or modern. Categories can include medieval strip fields, Parliamentary Enclosure fields, modern housing estates, woodlands, and leisure uses, such as golf courses. The HLC is used to identify where areas of historic landscape might survive. Within the site, the HLC has characterised the majority of the site as "Modern Improved Fields". This means that the landscape within the site has experienced significant internal boundary changes occurring from the 19th century onwards. Evidence of earlier, medieval or post-medieval field boundaries have been removed in these areas.

6.3.16. There are pockets of landscape with historic elements within the site, with an area characterised by the HLC as "Planned Large Scale Enclosure". This describes landscapes deriving from the 18th century to 19th century. These areas of historic landscape within the site are all located in the part of the site near Camblesforth Common.

6.3.17. The site and surrounding area occupy a relatively flat, open landscape. There are very slight undulations within the site. However, the site lies generally between 3m and 11m Above Ordnance Datum ('mAOD'), with the course of the River Aire to the south forming a flat, fenland plateau. The surrounding landscape is dominated by the presence of the Drax Power Station and the 12 cooling towers which, given the topography, are visible for many kilometres. To the north of the Drax Power Station and to the east of Barlow, there is a large, profiled mound of ash, the by-product of the power station which has been formed into an earthwork, which given the topography of the surrounding landscape, is also readily visible and not typical of this landscape. In addition, in the surrounding landscape and immediately south of the site are large areas of polytunnels and greenhouses, used for the production and distribution of fruits and vegetables. Whilst the site itself remains relatively free of

large-scale modern development, the immediate surrounding landscape, within both study areas, contains modern developments of a substantial size and scale, which have a significant influence on the surrounding landscape.

6.3.18. In addition to the Drax Power Station in the vicinity of the site, just beyond the 3km study area to the south-west of the site is the former Eggborough Power Station. This power station is in the process of decommissioning, with the cooling towers having been demolished in 2021.

## 6.4. Project Basis for Scoping Assessment

6.4.1. For the scoping of the cultural heritage assessment, it is assumed that the Proposed Development's solar arrays will be no higher than 3m above existing ground level. It is also assumed that the required cable-runs will be located below-ground.

## 6.5. Embedded Mitigation

6.5.1. At this scoping stage, embedded mitigation within the design of the Proposed Development is limited to the assumption that effects on the settings of the designated and non-designated heritage assets identified above will be mitigated through the incorporation of appropriate landscaping.

## 6.6. Likely Significant Effects

6.6.1. There are considered to be potentially significant effects upon the heritage significance of the heritage assets discussed below resulting from the Proposed Development.

6.6.2. Whilst potentially significant effects may arise from the Proposed Development to the heritage assets discussed below, there may also be effects on other heritage assets, designated or non-designated, within the study area arising from the Proposed Development that are not considered 'significant' under the EIA Regulations. Paragraph 5.8.15 of NPS EN-1 states regarding the decision-maker that *'Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be*

*needed for any loss.'*[12] The draft NPS EN-1 goes into more detail with regards to the approach the decision-maker should take with regards to assessing harm to heritage assets both designated and non-designated, with the approach set out in paragraphs 5.9.21 – 5.9.26. The wording of paragraph 5.8.15 of the current NPS EN-1 is set out in the draft NPS EN-1, at paragraph 5.9.23 with a slight amendment stating: *'Any harmful impact on the significance of a designated heritage asset should be given significant weight when weighed against the public benefit…'.*

6.6.3. Further, paragraph 5.8.18 of NPS EN-1 states *'When considering applications for development affecting the setting of a designated heritage asset, the IPC should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the IPC should weigh any negative effects against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval'*. Within the draft NPS EN-1, this is restated at paragraph 5.9.29 with slight amendments changing references to the IPC to the Secretary of State and the addition of the word *'significant'* to the sentence – *'When considering applications that do not do this, the Secretary of State should give significant weight to any negative effects…'.*

6.6.4. Therefore, heritage assets will be assessed within the baseline, and if necessary, within the PEIR and ES chapter to ensure all effects arising from the Proposed Development are recorded.

6.6.5. When considering decision-making for large solar voltaic generation schemes which have the potential to affect heritage assets, draft NPS EN-3[13], which for the first time includes solar generation for schemes over 50MW, includes guidance to the consideration of project lifetimes. The draft NPS states:

> *'2.49.12 Where the consent for a solar farm is to be time-limited, the DCO should impose a requirement setting that time-limit from the date the solar farm starts to generate electricity… A limit of 25 years is typical, although*

[12] Department of Energy & Climate Change (2011)., *Overarching National Policy Statement for Energy (EN-1)*, p.92-93

[13] Department for Business, Energy and Infrastructure (2021), *Draft National Policy Statement for Renewable Energy Infrastructure EN-3*

*applicants may seek consent for differing time-periods for operation.*

*2.49.13 The time-limited nature of solar farms, where a time-limit is sought by an applicant as a condition of consent, is likely to be an important consideration for the Secretary of State when assessing impacts such as landscape and visual effects and potential effects on the settings of heritage assets. Such judgements should include consideration of the period of time sought by the applicants for the generating station to operate. The extent to which the site will return to its original state may also be a relevant consideration.'*

6.6.6. This is clear in stating that when permission is granted for proposed solar schemes, this is a temporary permission – time limited even where the time is beyond a typical range of 25-40 years and that this time limited nature is likely to be an important consideration for a decision-maker assessing impacts upon the setting of heritage assets.

6.6.7. Importantly, this reference to the consideration of the time-limited nature of solar farms is repeated within paragraph 2.53.8 in a section specifically discussing impacts from solar photovoltaic generation to cultural heritage. It states:

*'The Secretary of State should therefore consider the length of time for which consent is sought when considering the impacts of any indirect effect on the historic environment, such as effects on the setting of designated heritage assets'*

6.6.8. It is not considered that there would be any effects arising from the decommissioning of the Proposed Development.

**Construction Phase**

6.6.9. There is the potential that if archaeological remains are found to exist within the site, that the Proposed Development would cause some harm to these. However, given the nature of the Proposed Development and the relatively small impact footprint of the panels and cable runs, it is considered that this would not result in a significant effect upon non-designated archaeological assets.

**Operational Phase**

6.6.10. It is considered that there is the potential for the Proposed Development to cause a significant effect on the heritage significance of the grade I listed Camblesforth Hall (National Heritage List for England ('NHLE') reference: 1173983). This is due to the proximity of this designated heritage asset approximately 250m east of the site boundary, and the potential for the site to therefore form part of its setting through historic association.

6.6.11. At this scoping stage, it is also considered there is the potential for a likely significant effect resulting from the Proposed Development upon the heritage significance of the grade II listed Manor Farmhouse (NHLE reference: 1148398) at Temple Hirst, approximately 560m west of the western part of the site boundary, arising from changes within the setting of this designated heritage asset. The asset is in relatively close proximity to the western edge of the site. This, coupled with the flat topography and the relative lack of other large-scale development to the west of the site indicates that the Proposed Development has the potential to be a visible element within views of this asset, within the wider landscape. However, this will be assessed in the context of a wider landscape which already contains contemporary features, including large-scale agricultural features, power stations with substantial cooling towers and other modern elements within it.

6.6.12. Although it is not considered likely that significant effects would arise from the Proposed Development on the heritage significance of the grade I listed Carlton Towers (NHLE reference: 1295955) through changes within its setting, the designated heritage asset has a tall and prominent tower, from which there is the possibility of views towards the Proposed Development from the upper floors. Whilst it is not considered at this scoping stage that these views make any particular key contribution to the heritage significance of this asset, this will be assessed in the ES chapter.

## 6.7. Impacts Scoped Out of the Assessment

6.7.1. The Proposed Development will not result in any physical impacts to designated heritage assets.

6.7.2. There will be no impacts to the heritage significance of any registered parks and gardens, registered battlefields or World Heritage Sites.

## 6.8. Proposed Approach to the ES

### Methodology

6.8.1. There is no specific heritage guidance or proscribed heritage methodology for undertaking an EIA. Therefore, the proposed methodology has been developed (refer to Appendix 6.2) using ICOMOS guidance[14] and Historic England guidance and advice notes, which include *Statements of Heritage Significance: Analysis Significance in Heritage Assets*[15], *Commercial Renewable Energy Development and the Historic Environment*[16], *The Setting of Heritage Assets*[17] and *Managing Significance in Decision-Taking in the Historic Environment*[18]. In addition, the Chartered Institute for Archaeologists *Code of Conduct*[19] will be followed.

6.8.2. The tables utilised for the assessment methodology (refer to Appendix 6.2) differ slightly from those within Chapter 3 (EIA Methodology) of this Scoping Report.

### Baseline

6.8.3. A baseline will be prepared which will identify the heritage resource within the study areas identified above. Data has already been sourced from a number of repositories, with further data to be obtained during the preparation of the baseline assessment. The sources of data include:

- National Heritage List for England;
- NYHER;
- NRHE;
- National Mapping Programme data;
- North Yorkshire Archives, Northallerton, for documentary and cartographic resources;
- Selby Library local studies collection;
- Historic England Archive, Swindon for aerial photographs;

[14] ICOMOS, 2011., *Guidance on Heritage Impact* Assessment for Cultural Heritage World Heritage Properties
[15] Historic England, 2019., Historic England Advice Note 12: *Statements of Heritage Significance: Analysis Significance in Heritage Assets*
[16] Historic England, 2021., Historic England Advice Note 15: *Commercial Renewable Energy Development and the Historic Environment*
[17] Historic England, 2017., Historic England Good Practice Advice in Planning - 3: *The Setting of Heritage Assets 2nd Ed*
[18] Historic England, 2015., Historic England Good Practice Advice in Planning – 2: *Managing Significance in Decision-Taking in the Historic Environment*
[19] CIfA, 2021., *Code of Conduct: professional ethics in archaeology*

- LiDAR; and
- Other sources identified during the preparation of the baseline assessment.

6.8.4. To assist in the identification of assets for consideration within the assessment and the ES chapter, the preliminary ZTV prepared by Barton Willmore, now Stantec (the project Landscape specialists), will be used as a tool to assist in the assessment. The preliminary ZTV (see Figure 7.1) has been produced to support this scoping stage and the initial baseline assessment of heritage assets. This is a 'bare earth' ZTV, produced using the topography of the landscape only where no existing blocks of vegetation or built form were included in the model, giving a 'worst-case' scenario for visibility. Based on the preliminary ZTV, there are few areas of land within the 3km study area which are shown to have zero visibility of any element of the Proposed Development. The preliminary ZTV indicates that only one heritage asset, a grade II listed bridge, is located in an area of zero visibility of the Proposed Development. However, as the design of the Proposed Development evolves and a 'screened' ZTV is produced, which will include existing built form and vegetation, this may indicate that there are larger areas within the study areas which have no visibility of the Proposed Development and therefore these may include greater numbers of heritage assets which could be excluded from assessment, should it be established that there are no other historic associations between the relevant heritage asset and the site.

6.8.5. The baseline will consider the archaeology, built heritage and historic landscape resource within the relevant study area. The baseline will identify and describe assets and their significance, including the contribution to significance made by their setting. This will help to identify which assets have the potential to experience likely significant effects resulting from the Proposed Development. There will be heritage assets which will clearly not experience any effect from the Proposed Development, either due to their function or location in an area with no visibility of the site and with no historic association. These assets will be discussed in broader terms, grouped where appropriate and dismissed from further assessment within the baseline.

6.8.6. The baseline will be supplemented by a site and study area walkover. The walkover will focus on visiting surrounding heritage assets identified in the initial baseline to assess their setting and relationships with surrounding assets.

6.8.7. Although it is not considered likely to be necessary at this scoping stage, should it

be required, Pegasus, the project Heritage specialist, will liaise with Barton Willmore, now Stantec, to identify any viewpoints which may assist with the assessment of the Proposed Development's likely significant effects on heritage assets.

6.8.8. Throughout the completion of the baseline, PEIR and ES chapter, consultation will be undertaken with relevant stakeholders including Historic England, the NYCC Archaeological Advisors, and the SDC Conservation Officer.

6.8.9. Given the scale of the site and the potential for archaeological deposits identified through analysis of aerial photographs, archaeological fieldwork in the form of a geophysical survey will be undertaken within the site to assist in identifying areas of archaeological activity. This information will be incorporated into the baseline, PEIR and ES chapters.

6.8.10. The scope of the pre-determination fieldwork has been discussed with the NYCC Archaeological Advisor.

**Proposed Approach to the ES**

6.8.11. Baseline data will be used to inform the PEIR and ES chapter. The PEIR will be prepared as a 'draft ES' and will provide a summary of the findings of the assessment at that point in time. The PEIR will set out any likely significant effects which have been predicted, including any considered to be significant under the EIA Regulations. The assessment will be finalised within the ES.

6.8.12. For both PEIR and ES chapters, the same general methodology will be used. Both will assess the potential for the Proposed Development to cause significant effects upon the significance of the heritage resource. Should potentially significant adverse effects be identified, mitigation will be proposed seeking to reduce the significance of the identified adverse effects.

6.8.13. When discussing heritage assets, the term 'significance' is used in the NPS EN-1 document to describe the sum of the heritage interests that a heritage asset holds (this definition is set out in draft NPS EN-1 – also adding that significance derives not only from a heritage asset's physical presence, but also from its setting) and that some assets have a level of significance that justifies official designation. The term 'significance' has a specific meaning within EIA and therefore to avoid confusion, when discussing heritage significance, this will be made clear and distinct from

discussion of significance in EIA terms.

6.8.14. In order to assess the effect of the Proposed Development upon heritage assets, these will first be assigned a value. This is not merely a reflection of any designated status but also accounts for the heritage interests of the asset. This will be expressed as the value/sensitivity of the asset to change. Following this, the magnitude of impact or change to the significance of the asset will be assessed, including impacts to its significance through changes within its setting. The value of the asset will be considered against the magnitude of impact and the resultant effect will be assessed.

6.8.15. The ES chapter will also assess any likely significant cumulative effects upon the heritage resource resulting from the Proposed Development in combination with other schemes, as appropriate.

6.8.16. The assets with the potential to experience likely significant effects from the Proposed Development will be set out in a summary table at the end of the ES chapter.

6.8.17. In accordance with the requirements of the EIA Regulations, the ES chapter will assess the significance of effects resulting from the Proposed Development's impacts. However, the NPS EN-1 (and the draft NPS EN-1) considers impacts in terms of levels of harm or loss to the significance of an asset from a Proposed Development. A significant effect identified in the ES chapter would not necessarily equate to a finding of substantial harm, as defined in NPS EN-1. Equally, a less significant effect identified in the ES chapter may result in a higher level of harm according to NPS EN-1. A level of professional judgement will be used throughout the EIA process to ensure that where a matrix-based system is employed, this accounts for professional judgement to ensure that a robust assessment of the level of effect to the significance (in EIA terms) of the heritage asset is reported within the ES chapter. In addition, a narrative conclusion will be set out which will discuss the level of harm (if any) the Proposed Development will have upon the significance of the heritage assets. As a DCO, this application will be judged against the policies contained within the NPS documents and these require an assessment of harm and a judgement of whether the Proposed Development results in no harm, less than substantial harm or substantial harm.

**Table 6.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Camblesforth Hall grade I listed building, impact to significance through changes within setting, operational phase<br><br>(construction and decommissioning phases scoped out) | Minor | High | Minor Adverse | Scoped In (Operational phase only) |
| Carlton Towers grade I listed building, impact to significance through changes within setting, operational phase<br><br>(construction and decommissioning phases scoped out) | Negligible | High | Neutral/Minor Adverse | Scoped In (Operational phase only) |
| Manor Farmhouse grade II listed building, impact to significance through changes within setting, operational phase | Minor - Moderate | Moderate | Minor – Moderate Adverse | Scoped In (Operational phase only) |

**Table 6.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| (construction and decommissioning phases scoped out) | | | | |
| Listed buildings within the study areas, excluding grade I listed Camblesforth Hall and Carlton Towers and grade II listed Manor Farmhouse<br><br>(construction, operational and decommissioning phases) | No change | Moderate - High | Neutral | Scoped Out |
| Conservation Areas<br><br>(construction, operational and decommissioning phases) | No change | Moderate | Neutral | Scoped Out |
| Scheduled Monuments, impact to significance through changes within the setting, operational phase | No change - Moderate | High | Neutral – Moderate Adverse | Scoped In (Operational phase only) |

**Table 6.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| (construction and decommissioning phases scoped out) | | | | |
| Non-designated Heritage Assets, physical impact during construction phase<br><br>(operational and decommissioning phases scoped out) | No change - Major | Low - Medium | Neutral – Moderate Adverse | Scoped In (Operational phase only) |

# 7. Landscape and Views

## 7.1. Introduction

7.1.1. An assessment of the likely significant landscape and visual effects of the Proposed Development will be undertaken in accordance with '*Guidelines for Landscape and Visual Impact Assessment*', Third Edition, 2013[20] ('GLVIA').

## 7.2. Study Area

7.2.1. A preliminary Zone of Theoretical Visibility ('ZTV') (refer to Figure 7.1 Preliminary ZTV) was prepared to identify the broad areas where the Proposed Development could potentially be visible and to guide field survey work which was subsequently carried out in January 2022. The study area was then defined on the basis of a visual appraisal carried out in the field.

7.2.2. The study area proposed for the assessment of likely significant landscape and visual effects arising from the Proposed Development broadly equates to the extents shown on Figure 7.2 Visual Appraisal Plan. Based on the survey and professional judgment, effects from the Proposed Development on landscape and visual receptors located beyond these extents are considered highly unlikely to be significant.

[20] Landscape Institute and Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment.

## Figure 7.1 Preliminary Zone of Theoretical Visibility (ZTV)

The scaling of this drawing cannot be assured

| Revision | Date | Drn | Ckd |
|---|---|---|---|
| - | - | - | - |

N

## LEGEND

- Site Boundary
- Existing Woodlands, Copses and Tree Belts ^
- Existing Water Courses and Water Features ^
- Contours/Spot Heights (Metres AOD) ^
- Public Rights of Way
- Long Distance Walks ^

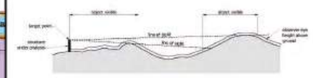
Zone of Theoretical Visibility (ZTV)

- Most Visible
- Least Visible

**Notes:**

The Zone of Theoretical Visibility (ZTV) provides an approximate portrayal of the greatest possible extent of visibility of the Proposed Development, on the basis of a digital ground model (DTM). The extent and nature of specific views towards the Proposed Development is to be verified through fieldwork to take account of other visual barriers, such as existing buildings, woodland, trees and infrastructure.

- The ZTV is produced using the specialised software package Key-Terra Firma which is an AutoCAD based application.
- The ZTV is produced by calculating the 'line of sight' from target points to analysis end.



Parameters:

- The study area for the ZTV is 17.6 x 13.9 km; (1:25,000 @A1)
- The ZTV accounts for ground topography on the basis of a model made from Ordinance Survey Terrain 50 data in the form of 3D points data on a 50m grid;
- The ZTV does not account for any other features, including infrastructure, woodland, trees and hedgerows, and existing built forms;
- The ZTV is based on 249 targets on a regular grid across the site and following the boundary at 50-200m intervals, at a height of 3m above existing ground level;
- The ZTV assumes an observer height of 1.7m above existing ground level;
- The ZTV portrays the extent of visibility of the Proposed Development on the basis of if a target point is visible within a given 50m grid square.

Project:
**Helios Renewable Energy Project**

Drawing Title
**Preliminary Zone of Theoretical Visibility (ZTV)**

| Date | Scale | Drawn by | Check by |
|---|---|---|---|
| 09.05.2022 | 1:25,000 @A1<br>1:50,000 @A3 | ML | JM |
| Project No | Drawing No | | Revision |
| 33627 | LN-LP-02 | | B |

0 1km 2km 3km

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## Figure 7.2 Visual Appraisal Plan

The scaling of this drawing cannot be assured

| Revision | Date | Drn | Ckd |
|---|---|---|---|
| - | - | - | - |

## LEGEND

- Site Boundary
- Existing Woodlands, Copses and Tree Belts ^
- Existing Water Courses and Water Features ^
- Contours/Spot Heights (Metres AOD) ^
- Public Rights of Way
- Long Distance Walks ^
- Location of Photographic Viewpoints (Site Context Photographs: 1-37)

Zone of Theoretical Visibility (ZTV)

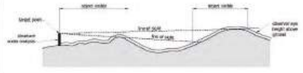
Most Visible

Least Visible

**Notes:**

The Zone of Theoretical Visibility (ZTV) provides an approximate portrayal of the greatest possible extent of visibility of the Proposed Development, on the basis of a digital ground model (DTM). The extent and nature of specific views towards the Proposed Development is to be verified through fieldwork to take account of other visual barriers, such as existing buildings, woodland, trees and infrastructure.

- The ZTV is produced using the specialised software package Key-Terra Firma which is an AutoCAD based application.
- The ZTV is produced by calculating the 'line of sight' from target points to analysis end.



Parameters:

- The study area for the ZTV is 17.6 x 13.9 km; (1:25,000 @A1)
- The ZTV accounts for ground topography on the basis of a model made from Ordnance Survey Terrain 50 data in the form of 3D points data on a 50m grid;
- The ZTV does not account for any other features, including infrastructure, woodland, trees and hedgerows, and existing built forms;
- The ZTV is based on 249 targets on a regular grid across the site and following the boundary at 50-200m intervals, at a height of 3m above existing ground level;
- The ZTV portrays the extent of visibility of the Proposed Development on the basis of if a target point is visible within a given 50m grid square.

Project:
**Helios Renewable Energy Project**

Drawing Title
**Visual Appraisal Plan**

| Date | Scale | Drawn by | Check by |
|---|---|---|---|
| 09.05.2022 | 1:20,000 @A1<br>1:40,000 @A3 | ML | JM |
| Project No | Drawing No | | Revision |
| 33627 | LN-LP-12 | | B |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J:\33000\33627 - Drax Solar Farm DCO\A4 - Drawings & Reports\Landscape\33627 LN-LP-12 Visual Appraisal Plan.dwg - A1

## 7.3. Baseline Environment

7.3.1. The site predominantly comprises agricultural land, consisting of fields used for grazing and arable cropping, on land to the southwest of the village of Camblesforth and to the north of the village of Hirst Courtney. Part of the site also extends to the east of Drax Power Station.

7.3.2. The main part of the site sits within a wider area of land bounded to the north-east by the A1041, to the west by the Selby branch of the East Coast Mainline railway and to the south by Hirst Road. This landscape is characterised by large, regular shaped arable fields delineated by partially denuded hedgerows or drainage ditches. Occasional woodland blocks and tree belts are also present, but the landscape is primarily open.

7.3.3. Transport routes are a notable feature, with the M62 motorway and A63 extending on east-west alignments in the southern and northern extents of the study area, respectively. A network of minor roads and lanes is present throughout the local landscape containing the site, with railway lines also a common feature. PRoWs cross the site and the wider landscape, often following farm tracks or rural lanes. The Trans Pennine Trail long distance walking and cycling route extends south from Selby and in close proximity to the western and southern site boundaries.

7.3.4. Selby is the principal settlement within the study area. However, several smaller settlements are dispersed throughout the study area, including Camblesforth, Hirst Courtney, Temple Hirst, Carlton, Drax, Barlow and Burn. Farmsteads and clusters of agricultural buildings are also present within the landscape. The industrial complexes of Drax and Eggborough Power Stations are prominent features within the landscape to the east and south-west of the site. The former RAF Burn airfield is located to the west of the site.

7.3.5. With respect to landform, the site is virtually flat, lying at approximately 3m – 11m AOD with an almost imperceptible fall from west to east. The wider landscape is similar, with the only exceptions to the otherwise low-lying level landscape comprising two hills in the north-west of the study area (Hambleton Hough and Brayton Barff), and a large, partially remediated ash heap to the north of Drax Power Station.

7.3.6. The site is within National Character Area 39: Humber Levels[21], which is described as *'a flat, low-lying and large scale agricultural landscape', where the 'Statements of Environmental Opportunity'* include safeguarding and expanding wetland habitats, managing landscape features to enhance people's understanding and enjoyment of the landscape and protecting *'the open and expansive character of the landscape, its cultural features and sense of remoteness, by ensuring that new development is sensitively located'.*

7.3.7. The North Yorkshire and York Landscape Characterisation Project[22] provides further detail, with the site located within Landscape Character Types 23: Levels Farmland and 24: River Floodplain. These describe a flat, low-lying landscape, encompassing a patchwork of arable fields and river corridors, with flood meadows and large-scale open fields defined by dykes and ditches. Also noted are *'Industrial scale farm buildings, large embankments and drains, and major energy and transport infrastructure'.*

7.3.8. In visual terms, the open landscape is such that expansive views of the site are available from local roads and PRoWs. However, due to the flat, low-lying landform and weak but regular vegetation pattern, views of the site diminish rapidly with distance, such that the site has a relatively local visual envelope, with the exception of elevated positions in the north-west of the study area (at Brayton Barff and Hambleton Hough).

7.3.9. The substantial cooling towers and flues of Drax are prominent and visible from within the site and the wider area, rising above the lowland landscape, with high voltage power lines also seen crossing the site. As a result, the character of the site is influenced by existing infrastructure and industrial activity.

7.3.10. The site and study area are not subject to any landscape designations.

## 7.4. Project Basis for Scoping Assessment

7.4.1. This scoping assessment is based on the description of the Proposed Development set out in Section 2 (The Proposed Development) of this Scoping Report.

[21] Natural England (2014). NCA Profile: 39 Humberhead Levels - NE339. [online] Available at: http://publications.naturalengland.org.uk/publication/1843305 Accessed in April 2022
[22] Chris Blandford Associates (2011) North Yorkshire County Council North Yorkshire and York Landscape Characterisation Project. [online] Available at: https://www.northyorks.gov.uk/sites/default/files/fileroot/Environment%20and%20waste/Conservation/North_Yorkshire_and_York_landscape_character_assessment_report.pdf Accessed in April 2022

## 7.5. Embedded Mitigation

7.5.1. The design of the Proposed Development is guided by an iterative mitigation-by-design rationale based on a robust understanding of the landscape and visual baseline. Embedded mitigation is likely to include the following:

- Buffers to sensitive visual receptors;
- Reinforcement of existing vegetation structures and patterns; and
- New planting to provide visual screening, break up the extent of built development and link together existing habitats as part of a site-wide landscape and habitat improvement strategy.

7.5.2. Mitigation measures will be incorporated into the planting strategy for the Proposed Development (to be secured within an Outline Landscape and Environmental Management Plan ('LEMP')).

## 7.6. Likely Significant Effects

7.6.1. The Proposed Development is likely to result in significant effects on the landscape features of the site, as well as local landscape character areas ('LCAs') and visual receptors.

7.6.2. As part of the assessment of likely significant effects, the ES chapter will assess the susceptibility to change of the landscape and visual receptors (the receiving environment), the value of landscape and views, and the resultant sensitivity of receptors.

7.6.3. The chapter will also assess the likely magnitude and significance of landscape and visual effects arising from the construction of the Proposed Development, as well as from the operational phase of the Proposed Development (at 'Year 1' and at 'Year 15'). The likely magnitude and significance of landscape and visual effects arising from the decommissioning of the Proposed Development will also be assessed.

7.6.4. Mitigation measures to avoid, minimise or reduce adverse impacts, where possible, will also be identified in the assessment. The outline LEMP will set out mitigation measures for the Proposed Development and will be prepared with ecological input from Avian Ecology.

## 7.7. Impacts Scoped Out of the Assessment

7.7.1. The site is not located in an area designated for dark skies. Furthermore, the nature of the Proposed Development, which will not require permanent lighting during operation (only emergency lighting and motion activated security lighting around ancillary structures), is such that significant effects resulting from the operational phase on the nighttime landscape and on the perception of night skies are not anticipated and have therefore been scoped out of the assessment. Similarly, lighting effects during construction and decommissioning works are expected to be limited in extent, intensity and duration, and as such are unlikely to be significant and therefore scoped out of the assessment.

## 7.8. Proposed Approach to the ES

7.8.1. The LVIA will provide a review of the existing landscape planning policy context, published sources of landscape character, physical and visual appraisal of the site and study area and an assessment of the likely significant landscape and visual effects of the Proposed Development during the construction, operational and decommissioning phases.

7.8.2. Baseline information for the study area will be collated, which will include settlement patterns and access, topography, vegetation, landscape designations, relevant planning policy and published landscape character information, as well as appraisals of the character of the site and its visual relationship with the study area. Appraisals will be based on a baseline timeframe of winter 2021/ 2022.

7.8.3. Assessments will be carried out to identify the likely significant landscape and visual effects arising from the Proposed Development during construction, on completion (‘Year 1’) and 15 years thereafter with the benefit of established planting mitigation (‘Year 15’) which will be set out in a Landscape Strategy Plan within the outline LEMP to be submitted as part of the DCO application and secured by requirement. Mitigation planting will be assumed to grow approximately 1m in height every 3 years.

7.8.4. In accordance with the GLVIA, this assessment will address landscape and visual effects as separate issues. Landscape effects relate to both the effect on the physical features of the site, and on the landscape character of the site and surrounding area. Visual effects relate to the experience of views of the Proposed Development by visual receptors from publicly accessible vantage points in the study area. Where

appropriate, the effects of the Proposed Development on residential receptors will also be assessed.

7.8.5. A series of representative viewpoints have been selected for consideration in the visual assessment, located in publicly accessible locations such as roads, PRoW and designated open space/access land.

7.8.6. The quantity and location of these viewpoints are the subject of ongoing consultations with officers of NYCC and are indicated on Figure 7.2 in the context of the ZTV.

7.8.7. Representative views are not intended to be exhaustive and will not cover every possible view of the site; rather, they will be selected to proportionately represent the range of views available, taking into account the activity and sensitivity of visual receptors. In accordance with the GLVIA, the assessment of visual effects will be based on the identified visual receptors and not specific views, unless specifically appropriate.

7.8.8. A Glint and Glare Assessment will be prepared by Neo-Environmental and will contribute to informing the LVIA. The LVIA will include reference to the findings of the Glint Assessment, and where appropriate, will consider the impact of any reflectivity in the assessment of landscape and visual effects. Where relevant to landscape, any mitigation recommendations identified within the Glint and Glare Assessment will be indicated as part of the landscape mitigation strategy.

7.8.9. In summary, the LVIA will:

- define the study area for the assessment, based on ZTV mapping and a visual appraisal in the field, identifying key representative views to be used for the visual impact assessment;
- provide an appraisal of the landscape and visual baseline;
- assess the susceptibility to change of the landscape and visual receptors (the receiving environment), the value of landscape and views, and the resultant sensitivity of receptors;
- assess the likely magnitude of landscape and visual effects arising from construction and operation of the Proposed Development (at ‘Year 1’);
- assess the likely significance of landscape and visual effects arising from

construction and operation of the Proposed Development (at 'Year 1');

- identify requirements for any mitigation measures;
- summarise any residual effects following the establishment of mitigation planting (at 'Year 15'); and
- assess the likely significant cumulative effects of the Proposed Development with committed developments in the area.

**Table 7.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Landscape Features (e.g. Hedgerows)<br>(construction, operational and decommissioning phases) | None - Large | Low - High | Nil - Major | Scoped In |
| Landscape Character (e.g. character of the site, LCAs)<br>(construction, operational and decommissioning phases) | None - Large | Low - High | Nil - Major | Scoped In |
| Visual Receptors (e.g. Users of PRoW)<br>(construction, operational and decommissioning phases) | None – Large | Low – High | Nil – Major | Scoped In |
| Night-time Landscape and Perception of the Night-Sky<br>(construction, operational and decommissioning phases) | Very Small | Very low | Negligible | Scoped Out |

# 8. Biodiversity

## 8.1. Introduction

8.1.1. An assessment of the likely significant effects of the Proposed Development on the environment with respect to biodiversity will be undertaken. This section provides a summary of baseline ecological information collected to date, and the further baseline data collection to be undertaken to inform the assessment of the likely significant effects of the Proposed Development. An overview of likely significant effects proposed to be assessed within the ES chapter is also provided.

8.1.2. Baseline data has been compiled from a desk study, as well as from habitat and species surveys undertaken at the site.

## 8.2. Study Area

8.2.1. The study area for the project has been based on 'zones of influence' for different ecological features which may be affected by biophysical changes as a result of the Proposed Development and associated activities (refer to Figures 8.1 and 8.2). The zones of influence that extend beyond the direct land-take required for the Proposed Development have been identified based upon the nature of the project and the construction, operation and decommissioning activities to be undertaken, informed by the consultation and Scoping process and Chartered Institute of Ecology and Environmental Management ('CIEEM') and Natural England guidance, where available.[23 & 24]

8.2.2. The zone of influence will therefore vary for different ecological features depending on their sensitivity to an environmental change. The identified zones of influence were used to establish the scope of baseline ecological surveys and the extent of survey area and desk study.

8.2.3. Zones of influence for the site that have been considered comprise (refer to Figures 8.1 and 8.2):

- **Statutory designated sites** - within 5km from the site, extended to 10km for

[23] Chartered Institute of Ecology and Environmental Management 'Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater, Coastal and Marine'. CIEEM (2018).
[24] Where specific guidance documents do not stipulate specific required zones of influence from a proposed Site, professional judgement has been applied based on the understanding of the site and developments similar in nature, size, and scale to the Proposed Development.

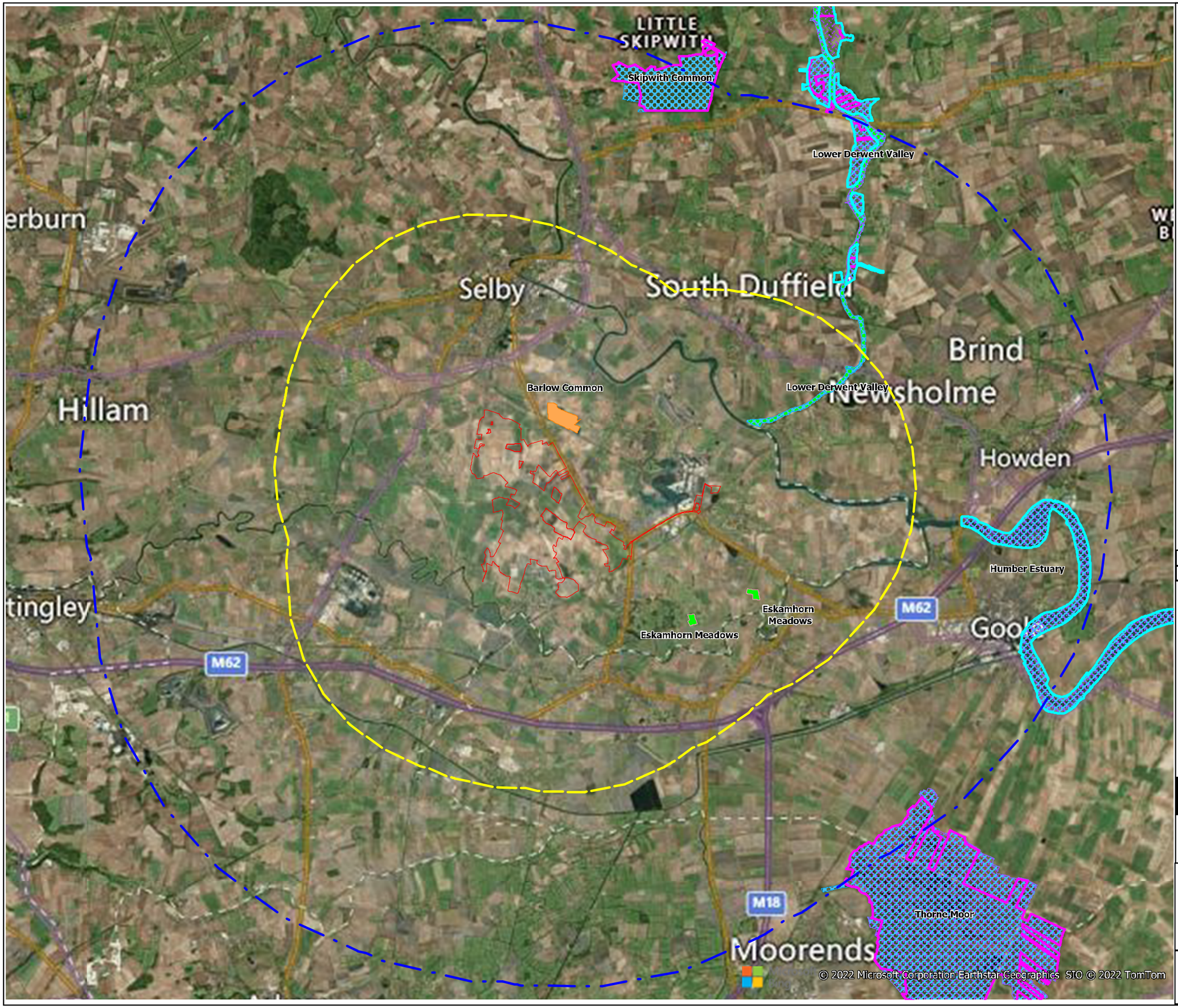
European-designated Sites (comprising Special Protection Areas ('SPA'), Special Areas of Conservation ('SAC')) and Ramsar sites[25];

- **Non-statutory designated sites, protected and priority habitats and species** - within 2km from the site (e.g. Natural Environment and Rural Communities Act 2006 Section 41 Species of Principal Importance and Priority Habitats)[26];
- **Habitats** - land within the site and immediately surrounding habitats where these could be surveyed from within the site[27];
- **Great crested newts** - on-site ponds/water bodies and accessible ponds/waterbodies within 250m of the site[28];
- **Wintering birds** - the site and surrounding fields up to 600m from the site where access was possible, or where land could be viewed from publicly accessible locations[29]; and
- **Breeding birds** - the site and adjacent boundary habitats viewable from within the site[30].

8.2.4. Whilst they cover the large majority of the site, it is acknowledged that in some instances, the wintering bird survey and breeding bird survey study areas do not include the entire area within the site boundary. This is due to the evolution of the site boundary since the surveys were undertaken. However, it is considered that the baseline data gathered during the surveys provides an appropriately sufficient amount of information regarding breeding bird and wintering bird assemblages within the site and wider environment to robustly inform an assessment of the likely significant effects of the Proposed Development on these receptors.

[25] Based on professional judgement and guidance provided within Nature Scot. (2016). Assessing Connectivity with Special Protection Areas (SPAs) – Version 3.
[26] This is a standard requirement to inform planning applications, as detailed within CIEEM (2020) Guidelines for Accessing, Using and Sharing Biodiversity Data in the UK. 2nd Edition. Chartered Institute of Ecology and Environmental Management. Winchester, UK.
[27] Undertaken in adherence to the guidance provided in Butchery, B. Carey, P. Edmonds, R. Norton, L. Treweek, J. (2020). The UK Habitat Classification Manual Version 1.1
[28] Based on the guidance provided in the Natural England's *Method Statement Template for Great Crested Newt Mitigation Licence* provided here: https://www.gov.uk/government/publications/great-crested-newts-apply-for-a-mitigation-licence (accessed on: 29 April 2022)
[29] Based on professional judgement and guidance provided within M. Ruddock & D.P. Whitfield. (2007). A Review of Disturbance Distances in Selected Bird Species. Nature Scot
[30] The methodology employed was based-upon a scaled-down version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) technique, as detailed in Gilbert et al. (1998).

## Figure 8.1 Statutory Designated Site Study Area




Legend

- Site
- Statutory Designated Site Standard Zone of Influence
- Extended European Site Zone of Influence

Designated Sites

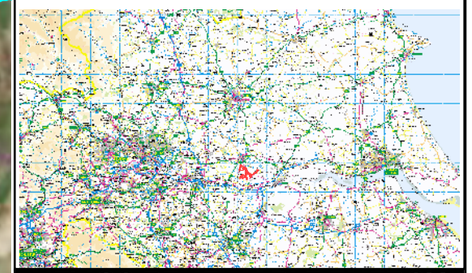
- LNR
- SAC
- SSSI
- SPA
- Ramsar
- NNR

| Rev | Date | Description | De | App |
|---|---|---|---|---|
| 00 | 06/06/2022 | | KW | HD |

This map contains data from the following sources: Ordnance Survey (2021)



Co-ordinate System : British National Grid
Projection: Traverse Mercator
Datum: OSGB 1936
Units: Metres



# HELIOS RENEWABLE ENERGY PROJECT

FIGURE 8.1 - STATUTORY DESIGNATED SITE STUDY AREA

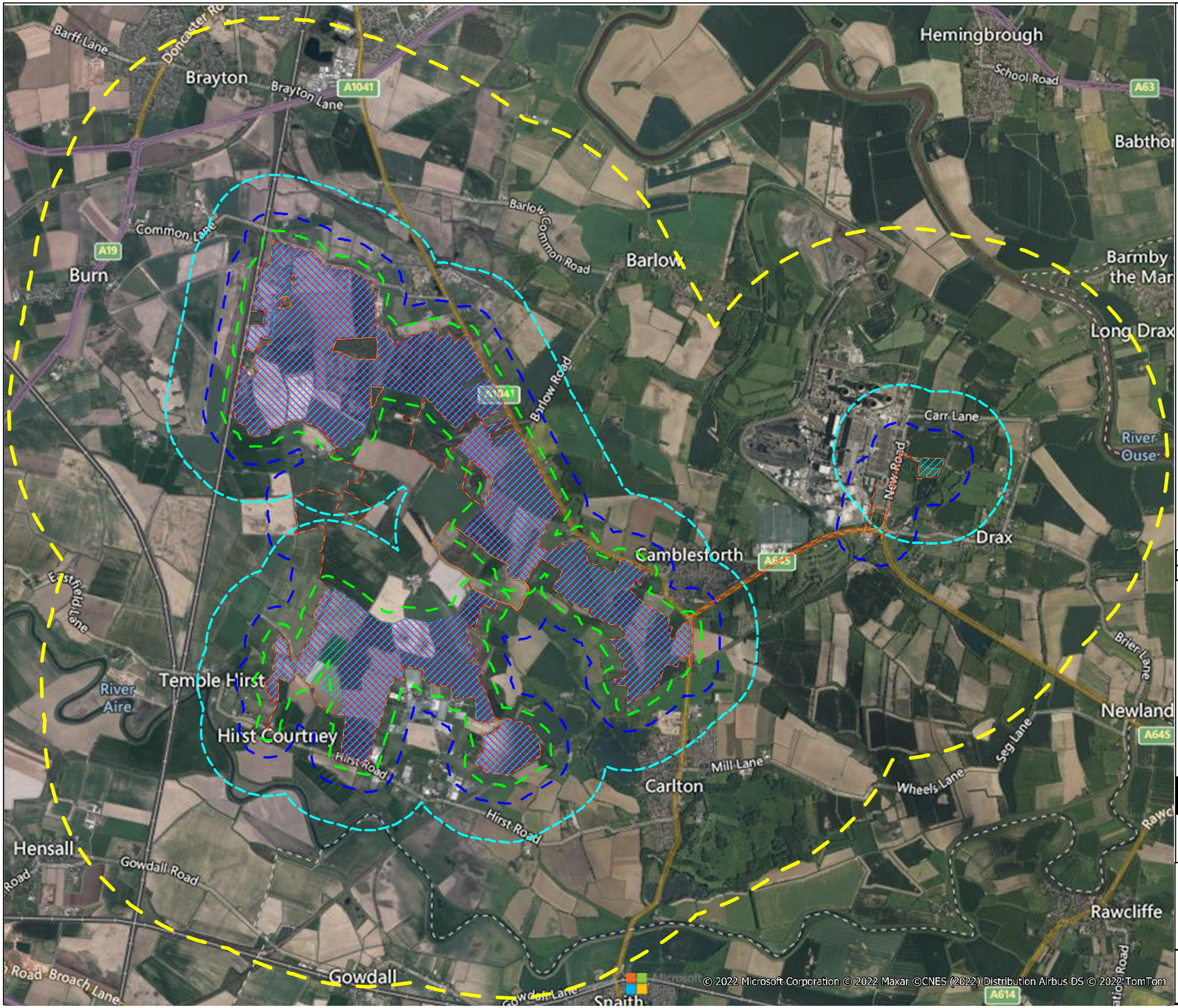
avian ecology

Avian Ecology, Suite 3c Walnut Tree Farm, Northwich Road, Lower Stretton WA4 4PG
Tel: 0843 506 5116
www.avianecology.co.uk

0 3
kilometres

N W E S

## Figure 8.2 Survey Study Areas



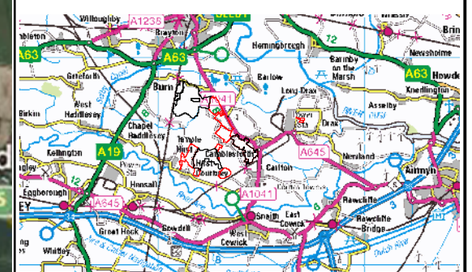

Legend

- Site Boundary
- Habitat Survey Area
- Wintering Bird Survey Area
- Wintering Bird Survey Buffer
- Breeding Bird Survey Area
- Breeding Bird Survey Buffer
- Great Crested Newt Survey Area
- Desk Study Search area (Non-statutory designated sites, protected and priority habitats and species)

| Rev | Date | Description | De | App |
|---|---|---|---|---|
| 00 | 06/06/2022 | | MR | MJR |



Co-ordinate System : British National Grid
Projection: Traverse Mercator
Datum: OSGB 1936
Units: Metres



# HELIOS RENEWABLE ENERGY PROJECT

FIGURE 8.2 - SURVEY STUDY AREAS

avian ecology

Avian Ecology, Suite 3c Walnut Tree Farm, Northwich Road, Lower Stretton
WA4 4PG
Tel: 0843 506 5116
www.aviancecology.co.uk

0 1
kilometres

N W E S

## 8.3. Baseline Environment

8.3.1. Baseline information in relation to ecological features which may be affected by the Proposed Development has been collected through desk study and ecological field surveys.

8.3.2. Full details of baseline studies, field surveys and any consultation will be provided within the ES. Appropriate survey areas have been adopted or will be adopted or updated as necessary during the preparation of the EIA to account for any changes to the design of the Proposed Development as it evolves, and where permitted land access allows.

**Initial Desk Study**

8.3.3. An initial desk study was undertaken in June 2021 to inform the proposed approach to baseline information gathering, including the scope and requirement for baseline ecological surveys. This was updated in April 2022.

8.3.4. The following key sources were consulted in April 2022:

- Natural England Designated Sites View[31] and Joint Nature Conservation Committee ('JNCC') websites[32];
- The Multi Agency Geographic Information for the Countryside ('MAGIC') website[33];
- The Natural England Open Data Geoportal[34]; and
- Aerial imagery.

8.3.5. In addition, biological data (including non-statutory designated site data) has recently been requested from North and East Yorkshire Ecological Data Centre ('NEYEDC') and North Yorkshire Bat Group. Full results obtained from the desk study will be provided in the ES.

**Baseline Ecology Surveys**

8.3.6. The following field surveys, which are typically required by statutory organisations

[31] Available at: https://designatedsites.naturalengland.org.uk/ Accessed in April 2022
[32] Available at: http://jncc.defra.gov.uk/ Accessed in April 2022
[33] Available at: https://magic.defra.gov.uk/MagicMap.aspx Accessed in April 2022
[34] Available at: https://naturalengland-defra.opendata.arcgis.com/ Accessed in April 2022

and Local Planning Authorities to inform similar renewable energy developments within lowland England, have been undertaken to establish the baseline ecological features within the site, and surrounding area:

- Ecological constraints walkover survey (March 2022);
- Great crested newt eDNA surveys (June 2021);
- Breeding bird survey (April to June 2021); and
- Wintering bird surveys (October 2021 to March 2022).

8.3.7. All surveys have been undertaken by suitably competent and qualified ecologists in accordance with industry standard guidance. Full details of survey methodologies will be presented within the ES.

8.3.8. Additional targeted ecological surveys will be undertaken in the appropriate survey season in 2022, these include:

- Extended Habitat Survey (during the optimal habitat survey season);
- Great crested newt eDNA surveys (additional ponds);
- Badger surveys;
- Water vole surveys; and
- Otter surveys.

8.3.9. Full details of ecological survey methodology, results and analysis will be provided within the ES.

**Designated Sites**

8.3.10. A review of MAGIC[35] confirmed that the site is not located within any statutory designated site for nature conservation. The search identified 10 internationally statutory designated sites within 10km of the site and four UK statutory designated sites located within a 5km radius of the site boundary. These sites are detailed in Table 8.1 below.

[35] [35] Available at: https://magic.defra.gov.uk/MagicMap.aspx Accessed in April 2022

**Table 8.1: Statutory Designated Sites**

| Designated Site Name | Approximate Distance and Direction from the Site | Description |
|---|---|---|
| Barlow Common Local Nature Reserve ('LNR') | 495m to the north east | This LNR was previously used for tipping ballast and has since been reclaimed. The LNR has a mosaic of woodland, wetland, reedbeds and four large ponds. |
| River Derwent SAC | 1.8km to the north east | Annex 1 watercourse with lamprey species. |
| River Derwent Site of Special Scientific Interest ('SSSI') | 1.7km to the north east | The Yorkshire Derwent is considered to represent one of the best British examples of the classic river profile. This lowland section, stretching from Ryemouth to the confluence with the Ouse, supports diverse communities of aquatic flora and fauna, many elements of which are nationally significant. |
| Eskamhorn Meadows SSSI | 2.1km to the south east | Eskamhorn Meadows SSSI is a nationally important site for species-rich neutral grassland. The relevant National Vegetation Classification ('NVC') types are predominantly 'MG4' meadow foxtail *Alopecurus* pratensis – great burnet *Sanguisorba officinalis* grassland, and a community transitional between this type and the 'MG5' crested dog's-tail *Cynosurus cristatus* – common knapweed *Centaurea nigra* grassland. |
| Burr Closes, Selby | 5km to the | Burr Closes, Selby SSSI, is a small area of damp alluvial meadowland, agriculturally |

**Table 8.1: Statutory Designated Sites**

| Designated Site Name | Approximate Distance and Direction from the Site | Description |
|---|---|---|
| SSSI | north west | unimproved and rich in flowering plant species, of a type which is now scarce in the Vale of York. |
| Lower Derwent Valley SAC | 6.2km to the north | Lower Derwent Valley SAC contains a greater area of high-quality examples of lowland hay meadows than any other UK site. The abundance of the rare narrow-leaved water-dropwort *Oenanthe silaifolia* is a notable feature. Traditional management has ensured that ecological variation is well-developed, particularly in the transitions between this grassland type and other types of wet and dry grassland, swamp and fen vegetation. |
| Lower Derwent Valley SPA | 6.2km to the north | Lower Derwent Valley SPA contains extensive areas of traditionally managed, species rich, alluvial flood meadow of a kind highly restricted in the UK. Qualifying bird species include Bewick's swan *Cygnus columbanius*, golden plover *Pluvialis apricaria*, ruff *Philomachus pugnax*, shoveler *Anas clypeata*. It is also of international importance to waterfowl assemblages. |
| Lower Derwent Valley Ramsar site | 6.2km to the north | The Lower Derwent Valley Ramsar site includes one of the most important examples of traditionally managed species-rich alluvial flood meadow habitat remaining in the UK. |

**Table 8.1: Statutory Designated Sites**

| Designated Site Name | Approximate Distance and Direction from the Site | Description |
|---|---|---|
| | | The Ramsar site is of particular importance for several species of breeding waders, and nationally important numbers of ducks and swans breed or winter at this site. |
| Humber Estuary SAC | 6.3km to the east | The Humber is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain, including extensive intertidal mudflats and sandflats not covered by seawater at low tide. The SAC upstream from the Humber Bridge includes extensive mud and sand bars which in places form semi-permanent islands. |
| Humber Estuary SPA | 6.3km to the east | The Humber Estuary comprises extensive wetland and coastal habitats. The estuary within the SPA supports extensive areas of reedbed, with areas of mature and developing saltmarsh backed by grazing marsh in the middle and outer estuary. On the north Lincolnshire coast, the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. Parts of the estuary are owned and managed by conservation organisations. The estuary supports important numbers of waterbirds (especially geese, ducks and waders) during the migration periods and in winter. In summer, it supports important breeding |

**Table 8.1: Statutory Designated Sites**

| Designated Site Name | Approximate Distance and Direction from the Site | Description |
|---|---|---|
| | | populations of bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus*, avocet *Recurvirostra avosetta* and little tern *Sterna albifrons*. |
| Humber Estuary Ramsar Site | 6.3km to the east | An estuary with a maximum 7.4m tidal range exposing vast mud and sand flats at low tide. Vegetation with the Ramsar site includes extensive reedbeds, areas of mature and developing saltmarsh, backed by grazing marsh or low sand dunes with marshy slacks and brackish pools. The area regularly supports internationally important numbers of various species of breeding and wintering waterbirds. Many passage birds, notably internationally important populations of ringed plover *Charadriu hiaticula*, and sanderling Caldris alba stage in the area. The Ramsar site supports Britain's most south easterly breeding colony of grey seal *Halichoerus grypus*. |
| Skipwith Fold SAC | 8.5km to the north | Skipwith Fold SAC consists of northern Atlantic wet heaths with *Erica tetralix* and European dry heaths. The SAC is of entomological and ornithological importance, with nearly 80 species of birds recorded, including European nightjar *Caprimulgus europaeus*. |

**Table 8.1: Statutory Designated Sites**

| Designated Site Name | Approximate Distance and Direction from the Site | Description |
|---|---|---|
| Thorne Moor SAC | 9.4km to the south east | Thorne Moor is England's largest area of raised bog. Although recent management has increased the proportion of active raised bog at Thorne Moors, the inclusion of Goole Moors, where peat-extraction has now ceased, means that the Thorne Moor SAC is still predominantly degraded raised bog. The restored secondary surface is rich in species of active raised bogs. |
| Thorne & Hatfield Moors SPA | 9.4km to the south east | A breeding population of European nightjar *Caprimulgus europaeus*, which is of European importance is present at the Thorne & Hatfield Moors SPA. |

8.3.11. Data regarding non-statutory designated sites has been requested from NEYEDC and will be provided in the ES.

**Habitats**

8.3.12. Arable land is the dominant habitat of the site, with a large proportion of the site consisting of fields in arable use at the time of the ecological walkover survey. Most fields consisted of growing cereals or grass leys with some brassicas, winter stubble and freshly ploughed areas. Blocks and margins of a brassica / tall ruderal mix were scattered throughout, likely to be a wild bird seed or game cover mix.

8.3.13. Some of the fields have grass arable field margins and un-cultivated corners. The vast majority of these appeared species poor, some may represent tussocky grass mixes to support farmland bird species and / or provide game-bird cover.

8.3.14. Species-rich grassland margins were identified in one location, centrally along the

roadside grass verge within the land for the underground grid connection cable route.

8.3.15. Grassland fields are present within the far eastern part of the site, in the form of horse grazing paddocks.

8.3.16. Field boundaries consist predominantly of species-poor hedgerows, with dominant hawthorn *Crataegus monogyna*, often with mature oak *Quercus robur* and ash *Excelsior Fraxinus* trees present. Most of these are regularly trimmed, some are intact, and others have multiple open gaps. Occasionally hedges are more outgrown, and a small number of non-native hedges are present adjacent to residential properties. Rows of mature trees are also present along some boundaries without hedgerows, occasionally associated with dense scrub, with occasional standalone mature trees within field compartments.

8.3.17. Small blocks of woodland are scattered across and surrounding the site, dominated by broadleaved or mixed plantation woodlands, usually with mature trees. Some have substantial amounts of non-native invasive plant species, consisting of rhododendron *Rhododendron ponticum* and Himalayan balsam *Impatiens glandulifera*.

8.3.18. The site is drained by a network of ditches, which appear to be well maintained and of biodiversity interest, with steep earth banks generally vegetated by grass with some tall ruderal vegetation. There are also a number of ponds present within, and adjacent to, the site.

8.3.19. Road-side verges in the eastern parts of the site, adjacent to the land for the underground grid connection cable route, generally consist of a mix of species-poor and species-rich grasslands, with species-poor hedgerows and rows of trees (and occasional woodland and scrub) lining the roads.

**Protected and Priority Species**

8.3.20. Full details of survey methodologies will be provided within the ES.

**Breeding Birds**

8.3.21. Breeding bird surveys were undertaken between April and June 2021. The breeding bird assemblage recorded within the site is representative of farmland habitats within the Humber region. 49 species were recorded breeding within the site, or within 100m

of the site boundary. Of these, 12 were notable 'red-listed' species[36]; corn bunting *Emberiza calandra*, greenfinch *Chloris chloris*, house martin *Delichon urbicum*, house sparrow *Passer domesticus*, lapwing *Vanellus vanellus*, linnet *Linaria cannabina*, mistle thrush *Turdus viscivorus*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, tree sparrow *Passer montanus*, yellowhammer *Emberiza citrinella* and yellow wagtail *Motacilla flava.* A further 13 were notable 'amber-listed' species.

8.3.22. The notable species breeding assemblage was almost entirely associated with vegetation along field boundaries on-site, principally hedgerows, scrub, watercourses, tree-lines, woodland habitats and urban structures located outside of the site boundary.

8.3.23. Notable ground-nesting breeding species, which use open fields on-site, consisted of corn bunting, lapwing, skylark and yellow wagtail. Corn bunting and skylark were recorded in moderate breeding numbers, with seven to 13 corn bunting territories and 18 to 31 skylark territories located throughout and immediately adjacent to the site. Low to moderate breeding numbers of yellow wagtail were recorded within the site, with four to six estimated territories. Low breeding numbers of lapwing were recorded on-site, with a maximum of four territories.

**Wintering Birds**

8.3.24. Wintering bird activity within the site was low throughout the survey period (October 2021 to March 2022), with activity being limited to sporadic small flocks of mainly farmland species. Lapwings were recorded within the site in eight of the 12 survey visits, with a maximum flock size of 72 birds in February 2022 and a maximum of two golden plover recorded during one out of 12 surveys. Wetland birds recorded comprised of very low numbers of mallard *Anas platyrhynchos*, little egret *Egretta garzetta*, grey heron *Ardea cinerea*, little grebe *Tachybaptus ruficollis* and common gull *Larus canus*. Other notable species included kestrel *Falco tinnunculus*, mistle thrush *Turdus viscivorus*, starling and corn bunting.

**Mammals**

8.3.25. An ecological walkover survey was undertaken within the study area in March 2022 by suitably competent ecologists. The survey sought to identify the presence or

[36] Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: p.723-747.

potential presence of protected and priority species within the site.

8.3.26. The ecological walkover survey confirmed the presence of badger *Meles meles* within the site and the potential presence (due to habitat suitability) was also noted for water vole *Arvicola amphibius* and otter *Lutra lutra* along ditch networks within and surrounding the site.

8.3.27. Further species-specific surveys will be undertaken to ensure legislative compliance and to inform the assessment of likely significant effects from the Proposed Development, as well as any embedded mitigation within its design. These surveys will consist of water vole and otter surveys to be undertaken between May – June 2022 (first survey) 2022 and July – September 2022 (second survey).

8.3.28. In addition, it is considered that the site may potentially support the following priority species:

- Brown hare *Lepus europaeus*;
- European hedgehog *Erinaceus europaeus*;
- Western polecat *Mustela putorius*; and,
- Harvest mouse Micromys minutus.

8.3.29. A number of mature trees were noted to have potential bat roosting features during the ecological baseline walkover survey. The likelihood of impacts upon potential roost sites and the requirement for further survey work pre-construction in line with '*Bat surveys for professional ecologists: good practice guidelines'* (2016[37]) best practice guidance will be considered in the ES .

**Amphibians and Reptiles**

8.3.30. The arable fields (and grazed pastoral fields) are considered to be of sub-optimal value to amphibians and reptiles. The boundary hedgerows, ditches, field boundaries, roadside verges, ponds and woodlands are considered to offer more suitable habitat for amphibians and reptiles if present, providing breeding, foraging, refuge and commuting opportunities.

8.3.31. In June 2021, five accessible ponds and two ditches within / immediately surrounding the site were subject to great crested newt presence / absence surveys using e-DNA

[37] Collins, J. (ed.) (2016*) Bat surveys for professional ecologists: good practice guidelines* (3rd edn). The Bat Conservation Trust, London.

water samples. Laboratory sample results were received from Surescreen Scientifics which confirmed that all surveyed water bodies were negative for great crested newt e-DNA.

8.3.32. If access can be agreed, additional ponds / ditches will be surveyed between May and June 2022, the results of which will be considered within the ES.

## 8.4. Project Basis for Scoping Assessment

8.4.1. The Proposed Development's design evolution will seek to avoid areas of significant biodiversity value, such as field boundary hedgerows and ditch networks. Habitat enhancement measures and ongoing management practices will be proposed in line with guidance published by the Building Research Establishment (*Biodiversity Guidance for Solar Developments*[38]) ('the BRE Guidance') that will enhance and safeguard key habitats for the benefit of wildlife, and enhance the ecological value of land currently under agricultural use.

8.4.2. The BRE Guidance states that:

> *'with appropriate land management, solar farms have the potential to support wildlife and contribute to national biodiversity targets. Indeed, solar farms may have several additional advantages in that they are secure sites with little disturbance from humans and machinery once construction is complete. Recent research suggests biodiversity gains on solar farms can be significant'.*

8.4.3. The site-specific approach within the ES chapter will provide recommendations for long-term management of the land to conserve and improve landscape habitat connectivity with the wider landscape for wildlife through protecting and enhancing potentially important wildlife corridors and habitats. This will contribute to the establishment of coherent ecological networks, supporting the biodiversity net-gain targets of the Environment Act 2021 and the current and Draft Overarching NPS for Energy (EN-1)[39].

[38] BRE (2014). *Biodiversity Guidance for Solar Developments*. Eds G E Parker and L Greene.
[2] Pywell, Richard & Bullock, James & Hopkins, Alan & Walker, Kevin & Sparks, Tim & Burke, Mike & Peel, Steve (2002). *Restoration of species-rich grassland on arable land: Assessing the limiting processes using a multi-site experiment*. Journal of Applied Ecology. 39. 294 - 309.
[39] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf (accessed on: 25th April 2022)

## 8.5. Embedded Mitigation

8.5.1. The following are measures which will be considered as embedded mitigation incorporated into the design of the Proposed Development to protect ecological features:

- Species-specific buffer zones will be adopted, where required, further detailed information will be provided within the ES;
- A minimum buffer of 5m around watercourses / ditch bank tops and existing hedgerow / field boundaries will be applied, which all elements of the Proposed Development will avoid, where possible;
- The most ecologically valuable habitats (such as woodland and species-rich grasslands) will be avoided, where practicable; and
- New watercourse / ditch crossings will be minimised and sensitively designed to allow the continued movement of wildlife along the watercourse.

## 8.6. Likely Significant Effects

8.6.1. The assessment will consider the potentially significant effects associated with the construction, operational and decommissioning phases of the Proposed Development.

8.6.2. Potential construction phase ecological effects associated with the Proposed Development are considered to relate to:

- Direct land take (habitat loss) to accommodate the Proposed Development;
- Temporary disturbance and land take for laydown areas and construction compounds;
- Disturbance to, fragmentation or severance of connecting habitat or potential commuting routes within and adjacent to the site; and
- Disturbance and pollution (indirect effects such as noise and vibration, dust, pollution from surface water run-off) resulting from site clearance and construction, plant and vehicles movements and site workers' activities.

8.6.3. Operational phase effects are defined as effects following the construction of the Proposed Development. Operational phase effects generally relate to disturbance of habitats or species, on either a temporary or permanent basis. Some effects may

reduce with habituation or remain for the lifetime of the Proposed Development.

8.6.4. There are no additional operational effects relating to land take or habitat loss other than those already addressed in the construction phase.

8.6.5. Decommissioning effects are defined as effects following the end of the operational period of the Proposed Development. Decommissioning effects relate to disturbance of habitats or species, on a temporary basis and disturbance and pollution (indirect effects such as noise and vibration, dust, pollution from surface water run-off) resulting from site decommissioning activities, plant and vehicles movements.

8.6.6. The CIEEM Guidelines (2018[40]) define a 'significant effect' as an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general (i.e. the feature could be positively or negatively significantly affected).

8.6.7. In regard to ecological impact assessment, the CIEEM Guidelines note that:

> *'A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process.'*

8.6.8. Any potentially significant effects identified will be expressed with reference to an appropriate geographic scale. For example, a significant effect on a nationally designated site is likely to be of national significance; however, the scale of significance does not necessarily always relate to the importance of an ecological feature. For example, an effect on a species which is considered of national importance may not have a significant effect upon its national population.

8.6.9. In line with the principles of proportionate EIA, embedded mitigation, including avoidance through the design process and application of industry standard good practice, will be considered at the outset of the assessment. Important ecological feature status will only be assigned where there is still considered to be the potential for significant effects on the identified feature arising from the Proposed

[40] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (version 1.1). Chartered Institute of Ecology and Environmental Management, Winchester.

Development after the application of embedded mitigation measures.

8.6.10. Where it is not possible to robustly justify a conclusion of no significant effect, a significant effect will be assumed as a precautionary approach to ensure that a realistic 'worst case' scenario has been assessed. Where uncertainty exists, this will be acknowledged.

8.6.11. Where the ES chapter proposes measures to mitigate potentially significant adverse effects on ecological features, an assessment of residual ecological effects, taking into account any ecological mitigation recommended, will be undertaken.

## 8.7. Impacts Scoped Out of the Assessment

### Potential Effects Scoped out of the Assessment

8.7.1. It is proposed that the potential for indirect effects upon statutorily designated sites for nature conservation (without mobile qualifying criteria[41]) located greater than 2km from the site, or for which embedded mitigation and good practice will be sufficient to prevent any impacts, is scoped out of the assessment, due to the static nature of the sites' qualifying habitats interests, spatial separation and / or absence of hydrological pathways of connectivity.

8.7.2. Statutory designated sites within 10km of the site with associated qualifying bird assemblages will be scoped out of the assessment, unless suitable habitat for pertinent species is present within or surrounding the site (within 600m of the site boundary).

8.7.3. Impacts to existing common and widespread habitats of low sensitivity and/ or conservation interest, such as arable fields and improved grazing pasture are proposed to be scoped out of the assessment.

8.7.4. Due to the presence of a largely arable and pastoral intensive farmland habitat within the site, it is not considered that the field parcels within the site provide suitable habitat mosaics to support locally or regionally important invertebrate assemblages and therefore impacts on invertebrate assemblages are proposed to be scoped out

[41] Qualifying species (or species assemblages) associated with a designated site that may regularly rely upon habitats located outside of the designated site boundary to sustain their population (such as waterbirds which regularly utilise farmland for foraging/roosting purposes), such supporting habitats are referred to as functionally linked land.

of the assessment.

8.7.5. Although these ecological features are proposed scoped out of the assessment, consideration will, however, be afforded to the provision of standard mitigation to be included in the CEMP and Operational Management Plans for the Proposed Development.

8.7.6. Any lighting required during construction, operation and decommissioning of the Proposed Development will be temporary and / or low impact (e.g. PIR lighting). Lighting will be directed away from trees, hedgerows and other surrounding habitats. On the basis that lighting is designed in a sensitive manner, no discernible effects are anticipated on biodiversity during the construction, operational and decommissioning phases of the Proposed Development and therefore an assessment of lighting effects is proposed to be scoped out of the ES chapter.

## 8.8. Proposed Approach to the ES

8.8.1. The assessment of the likely significant effects of the Proposed Development on ecological features to be presented within the ES chapter will be based on the CIEEM Guidelines.

8.8.2. The assessment process will include the following stages:

- determination and evaluation of important ecological features;
- identification and characterisation of impacts;
- outline of mitigation measures to avoid and reduce significant impacts;
- assessment of the significance of residual effects after the implementation of such measures;
- identification of appropriate compensation measures to offset significant residual effects; and
- identification of opportunities for ecological enhancement.

8.8.3. Whilst not yet a mandatory requirement, the EIA will seek to demonstrate biodiversity net-gain in accordance with NERC obligations and the Environment Act 2021. Therefore, the DEFRA Biodiversity Metric Calculator will be utilised in order to provide evidence of achievable biodiversity net-gains associated with the Proposed Development.

8.8.4. The ES chapter will be supported by Technical Appendices detailing the desk study results, consultation, survey methods and results, and will be further supported by relevant figures, tables and photographs, where necessary. Where sensitive data is recorded, the ES chapter will be supported by confidential appendices which will not be released into the public domain.

8.8.5. The assessment within the ES chapter will only assess in detail impacts upon important ecological features i.e., those that are considered important and potentially significantly affected by the Proposed Development. A detailed assessment of features that are sufficiently widespread, unthreatened and resilient to the Proposed Development's impacts will not be undertaken and justification for scoping such detailed assessment out of the ES chapter will be provided.

8.8.6. Relevant European[42], national and local legislation policy and guidance will be referred to in order to determine the importance (or 'sensitivity') of ecological features. In addition, importance will also be determined using professional judgement, the results of baseline surveys and the importance of features within the context of the geographical area.

8.8.7. Importance will not necessarily relate solely to the level of legal protection that a feature receives: ecological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species, or the geographical location of species relative to their known range.

8.8.8. The importance of ecological features will be defined in a geographical context from "Local" to "International".

8.8.9. The identification and characterisation of impacts on important ecological features will be undertaken in accordance with the CIEEM Guidelines, with reference made to magnitude (e.g. area or number of individuals of a species to be impacted), extent, duration and reversibility, as appropriate. The tables utilised for the assessment methodology (refer to Appendix 8.1) differ slightly from those within Chapter 3 (EIA Methodology) of this Scoping Report.

8.8.10. Impacts will be considered during the construction, operational and decommissioning phases of the Proposed Development (the decommissioning phase will not be

[42] via the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019

considered in detail) and will be assessed on the basis that a clearly defined range of avoidance and standard best practice measures are implemented.

8.8.11. The assessment will consider the potentially significant effects associated with the construction, operation and maintenance, and decommissioning of the Proposed Development as detailed below.

**Table 8.2: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Statutory Designated Sites (without mobile qualifying criteria) located greater than 2km from the site<br>- construction, operational and decommissioning phases | Negligible | High | Negligible | Scoped Out |
| Statutory Designated Sites (within 2km of the site)<br>- construction, operational and decommissioning phases | Low | High | Negligible | Scoped In |
| Statutory Designated Sites (with mobile qualifying criteria) up to 10km from the site<br>- construction, operational and decommissioning phases | Low | High | Negligible | Scoped In |
| Non-statutory Designated Sites (within 2km of the site) | Low | Medium | Negligible | Scoped In |

**Table 8.2: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| - construction, operational and decommissioning phases | | | | |
| Impacts to common and widespread habitats of low sensitivity and/or conservation interest<br>- construction, operational and decommissioning phases | Negligible | Negligible | Negligible | Scoped Out |
| Impacts to priority habitats (or otherwise of biodiversity importance)<br>- construction, operational and decommissioning phases | Low | Low/Medium | Minor Adverse | Scoped In |
| Off-site habitats<br>- construction, operational and decommissioning | Low | Low | Negligible | Scoped In |

**Table 8.2: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| phases | | | | |
| Breeding Birds<br>- construction, operational and decommissioning phases | Moderate | Medium | Minor Adverse | Scoped In |
| Wintering Birds<br>- construction, operational and decommissioning phases | Moderate | High | Minor Adverse | Scoped In |
| Bats (roosting)<br>- construction, operational and decommissioning phases | Moderate | Medium | Minor Adverse | Scoped In |
| Bats (foraging / commuting) | Moderate | Medium | Minor Adverse | Scoped In |

**Table 8.2: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| - construction, operational and decommissioning phases | | | | |
| Otter and water vole<br>- construction, operational and decommissioning phases | Moderate | Medium | Minor Adverse | Scoped In |
| Badger (brown hare, polecat, harvest mouse and Western hedgehog)<br>- construction, operational and decommissioning phases | Moderate | Medium | Minor Adverse | Scoped In |
| Amphibians<br>- construction, operational and decommissioning phases | Moderate | High | Minor Adverse | Scoped In |

**Table 8.2: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Reptiles<br>- construction, operational and decommissioning phases | Low | Medium | Minor Adverse | Scoped In |
| Invertebrates<br>- construction, operational and decommissioning phases | Negligible | Low | Negligible | Scoped Out |
| Lighting Impacts on Sensitive Ecology<br>- construction, operational and decommissioning phases | Negligible | Low – Medium | Negligible | Scoped Out |

# 9. Water Environment

## 9.1. Introduction

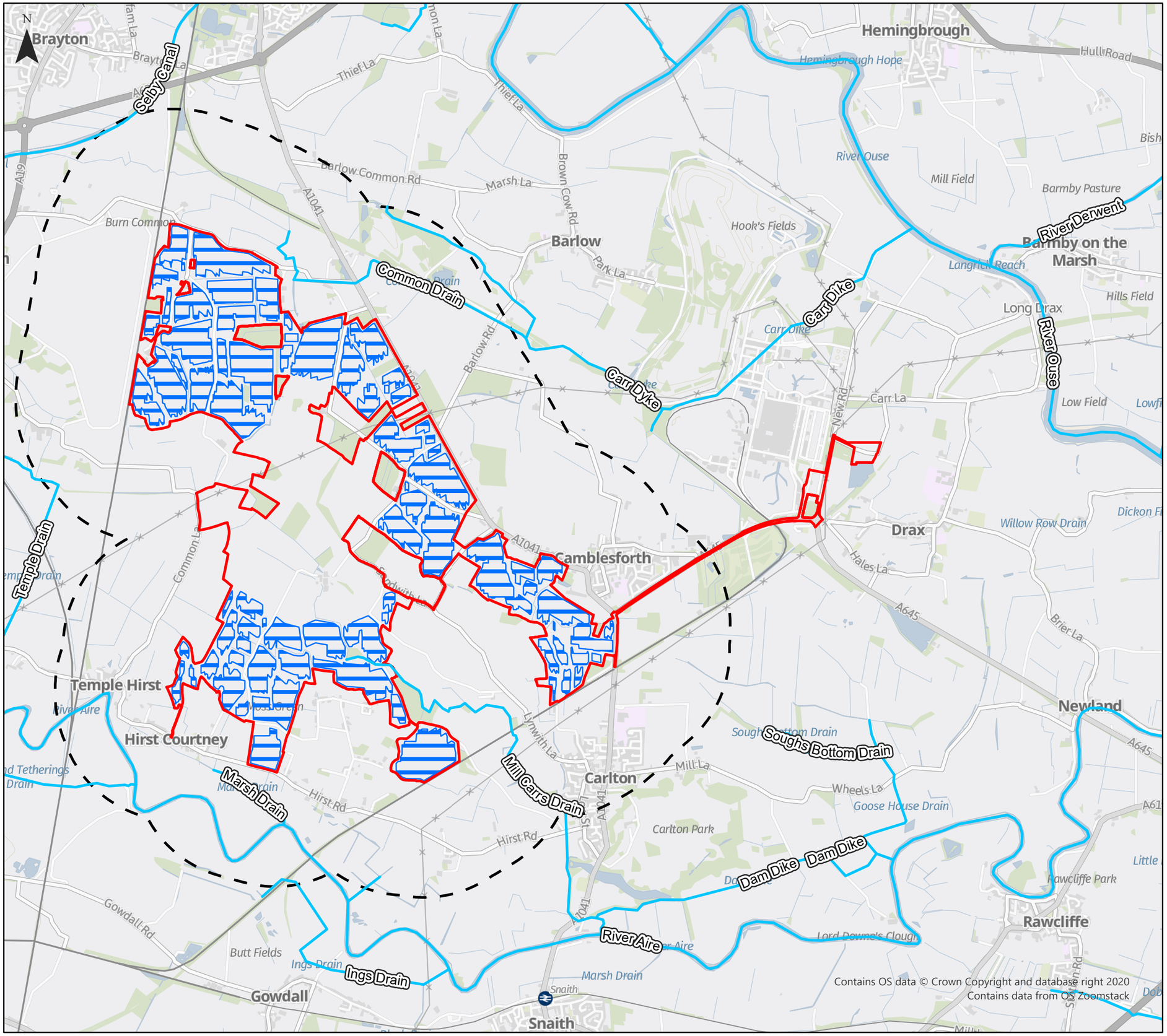
9.1.1. This chapter will relate to the assessment of potentially significant effects resulting from the Proposed Development on surface water bodies (e.g. rivers, streams, ditches, reservoirs, lakes and ponds, etc), including water quality and hydromorphology, as well as flood risk and drainage. It will consider the potential for likely significant effects of the Proposed Development on the surface water environment, the scope for mitigation, and how it is proposed to assess the significance of these potential effects.

## 9.2. Study Area

9.2.1. A study area of approximately 1km from the Proposed Development has been considered in order to identify surface water bodies that could reasonably be affected. However, the baseline assessment has also considered a wider study area downstream of the site boundary, where watercourse flow impacts may propagate downstream (in terms of water quality and flood risk), as shown on Figure 9.1 Hydrology Study Area.

## Figure 9.1 Hydrology Study Area

# Helios Renewable Energy Project
# Hydrology Study Area
# Figure 9.1




## Key

- 1km Study Area
- Panel Boundary
- Watercourse
- Site Boundary


Neo Office Address:
Wright Business Centre, 1 Lonmay Road, Glasgow, G33 4EL



Date: 05/05/2022
Drawn By: Scott Griffin
Scale (A3): 1:32,500
Drawing No: NEO00980/001I/A

neo ENVIRONMENTAL

## 9.3. Baseline Environment

9.3.1. This section presents the information gathered on the existing topographical, geological, hydrological and hydrogeological conditions of the site and its immediate surroundings.

9.3.2. A site walkover survey was undertaken on the 3rd and 4th March 2022 to identify hydrological, geological, flood risk and drainage features within the site. The site walkover survey did not include the part of the site identified as 'underground cable connection' area on Figure 1.1 Site Location Plan and this 'Baseline Environment' section does not describe the baseline conditions in this area. However, the baseline conditions in this part of the site are anticipated to be similar to the adjacent parts of the site, which have been surveyed. To inform the ES chapter, the baseline conditions for the underground cable connection that will comprise part of the Proposed Development will be established.

9.3.3. Summarised data has been recorded and will be provided within a Flood Risk Assessment ('FRA') and will be used to inform the Drainage Strategy ('DS') for the Proposed Development. The FRA and DS will form a Technical Appendix to the ES chapter.

9.3.4. In addition, further information and data will be obtained from the Environment Agency to inform the impact assessment and will be presented in the ES chapter. This will include a summary of water quality of the identified waterbodies and watercourses, water resources (including pollution incidents, abstraction licences and discharge consents), local fisheries, and detailed flood risk data of the site boundary.

**Topography**

9.3.5. A topographical survey is being undertaken at present. Based on existing Ordnance Survey ('OS') height data, the site is relatively flat with ground heights of between approximately 3m and 11m AOD. The northern fields within the southern part of the site have a slightly higher gradient which will divert any surface waters to the watercourse that runs through that part of the site. However, the southern fields here are again relatively flat.

### Geology & Soils

9.3.6. The geological conditions of the site were identified utilising the British Geological Society ('BGS') Spatial Resources online geological mapping system[43]. The bedrock geology of the site and surrounding area is Sherwood Sandstone Group (Sandstone). This sedimentary bedrock formed approximately 237 to 272 million years ago in the Triassic and Permian periods. The local environment was previously dominated by rivers. Superficial deposits across the site consist of Breighton Sand Formation and Hemingbrough Glaciolacustrine Format.

9.3.7. There are numerous borehole records in the area which confirm Sherwood Sandstone at an approximate depth of 17m Below Ground Level ('BGL').

9.3.8. Different soil types have different capabilities of soaking up water, the efficiency of which is dependent upon the structure and infiltration capacity. The Soilscapes[44] map has been utilised to obtain soil data. It classes the soil at the site as a mixture of *'naturally wet very acidic sandy and loamy'* and *'loamy soils with naturally high groundwater'* soils, the former being mostly restricted to the northern part of the site and latter mostly restricted to the southern part of the site.

9.3.9. According to the Wallingford Procedure 'Winter Rain Acceptance Potential' ('WRAP') map[45], the soil classification for the site is Class 2. This soil class has a Standard Percentage Runoff ('SPR') of 0.3 and should provide some infiltration opportunity.

### Hydrology

9.3.10. According to the Environment Agency Catchment Data Explorer[46], the site lies within the Humber River Basin District; within this, the site lies within two operational catchments: Ouse Lower Yorkshire and Aire Lower. The site is within the catchment of the River Ouse and River Aire. The River Aire confluences with the River Ouse, approximately 7.5km to the east of the site.

9.3.11. The site itself contains numerous field drains with steep earth banks which collect surface waters from within the site and discharge into these rivers. It was evident during the site visit that the majority of these are man-made and well maintained,

[43] BGS Geology of Britain Map., Available at http://mapapps.bgs.ac.uk/geologyofbritain/home.html Accessed in April 2022
[44] Cranfield Soil and Agrifood Institute, Soilscapes website. Available at http://www.landis.org.uk/soilscapes/
[45] UK Sustainable Drainage and Guidance Tools. Greenfield Runoff Estimation for the sites. Available at: https://www.uksuds.com/tools/members/greenfield-runoff-rate-estimation-members
[46] Environment Agency, Catchment Data Explorer, Available at https://environment.data.gov.uk/catchment-planning/RiverBasinDistrict/4 Accessed in April 2022

with low water levels. Both rivers have an overall classification of "Moderate" under the Water Framework Directive[47] ('WFD'). There are also a number of ponds present within, and adjacent to, the site.

9.3.12. The site is within a Nitrate Vulnerable Zone ('NVZ') for surface waters.

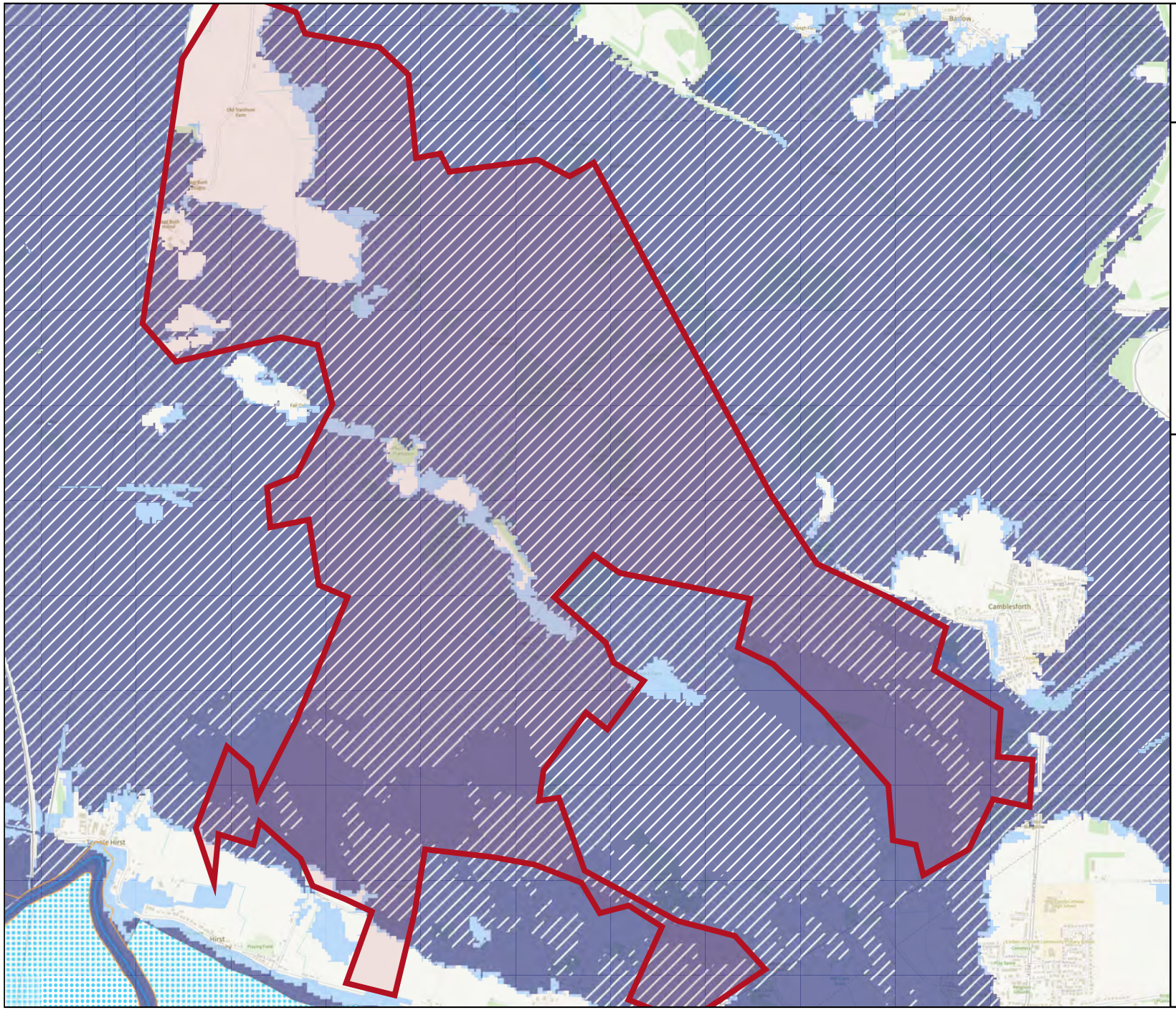
**Flood Zone Classification**

9.3.13. The Environment Agency's online indicative flood map indicates that the site is mostly within an area which benefits from a complex series of flood defences, which include raised embankments and defence walls (defence walls are further to the east of the Humber estuary). However, there are some small areas of Flood Zones 3, 2 and 1, as shown on Figure 9.2.

9.3.14. There are some surface water flood risk records within the site according to the Environment Agency flood maps. Based on data obtained during the site walkover survey, it is considered that any surface water risks would be restricted to areas near watercourses and field drains, with minimal evidence of large depressions in the topography within the fields across the site.

[47] European Parliament (2000). Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ("The Water Framework Directive"). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0060 Accessed in April 2022

## Figure 9.2 Environment Agency Flood Map for Planning



Environment Agency

## Flood map for planning

Your reference
**Figure 9.2**

Location (easting/northing)
**462769/426541**

Scale
**1:25000**

Created
**26 Apr 2022 15:09**

- Selected area
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 200 400 600m

### Historic Flooding

9.3.15. The Environment Agency's historic flood map[48] shows the maximum extent of individual recorded flood outlines from rivers, the sea and groundwater springs that meet a set criterion. It shows areas of land that have previously been subject to flooding in England. The map shows that the whole of the most south eastern field within the southern part of the site has a recorded historic flood event. This is the only recorded flood event within the site.

### Hydrogeology

9.3.16. From an inspection of the Environment Agency's Aquifer Designation Map dataset held on Natural England's MAGIC website[49], the site is underlain by Triassic Rocks and is classed as 'Principal' aquifer.

9.3.17. Most of the site is located within a groundwater Source Protection Zone ('SPZ'). The majority is within Zone 3 (Total Catchment). However, approximately half of the most south eastern field within the southern part of the site is within Zone 2 (Outer Protection Zone). The site is not within any drinking water protected surface water zones.

### Groundwater Vulnerability

9.3.18. 'Groundwater Vulnerability' refers to the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities. The greater the vulnerability of the groundwater, the more easily it can be contaminated by surface water.

9.3.19. According to the Environment Agency Groundwater Vulnerability dataset held on Natural England's MAGIC website, the groundwater vulnerability across the site is a mixture of 'low' and 'medium-high'. The southern area of the site is classed as mostly 'low' vulnerability, whilst the northern area is mostly 'medium-high'.

## 9.4. Project Basis for Scoping Assessment

9.4.1. It is assumed that the grid and energy storage infrastructure will be located outwith

[48] Environment Agency, Historic Flood Outlines, Available at https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/HistoricFloodMap&Mode=spatial Accessed in April 2022
[49] https://magic.defra.gov.uk/MagicMap.aspx Accessed in April 2022

the flood defence breach areas. The solar arrays will be located on piles above the breach zone areas and any site inverter/transformer station will have its Finished Floor Level ('FFL') raised above the flood defence breach level.

9.4.2. All potable and foul water disposal during the construction and decommissioning phase will consist of tanks which will be filled and removed by approved contractors.

## 9.5. Embedded Mitigation

9.5.1. The FFL of the Proposed Development will be guided by the FRA and the flood defense breach depths. The Proposed Development will be designed to remain operational during a breach event and infrastructure which is more at risk from flooding will be located in areas with the least risk. With regards to surface water flood risk, the topographical survey will be investigated thoroughly to determine whether any development can be placed within the areas of potential surface water flood risks. The DS will also be developed during the design stage of the project and should be considered as embedded mitigation.

9.5.2. Buffers of 10m will be applied from any defined watercourse within the site (refer to Figure 9.1) and 5m buffers from any drainage ditch.

## 9.6. Likely Significant Effects

**Construction and Decommissioning Phases**

9.6.1. A number of activities during construction and decommissioning phases are likely to generate impacts, which have the potential to affect the water environment, if unmitigated.

9.6.2. The greatest risks of adverse impacts during construction and decommissioning are in the vicinity of the field drains throughout the site, which may be directly affected by the Proposed Development.

9.6.3. During construction and decommissioning, the following adverse impacts may occur:

- Pollution of surface water due to deposition or spillage of soils, sediment, oils, fuels, or other construction chemicals, or through uncontrolled site run-off;
- Temporary changes in flood risk from changes in surface water runoff, e.g. disruption of stream flows during any potential culvert construction works, and

exacerbation of localised flooding, due to deposition of silt, sediment in drains, ditches; and

- Potential impacts on local water supplies. The potential presence of any known Private Water Supplies ('PWS') will be investigated during the impact assessment by requesting records from SDC's environmental health department.

**Operational Phase**

9.6.4. During the operational phase, the following adverse impacts may occur:

- Impacts on water quality in watercourses from run-off and spillages from new permanent hardstanding and maintenance activities, assuming surface water run-off does ultimately drain to a surface watercourse rather than simply to ground;
- Potential impacts on hydrology as a result of the Proposed Development from potential spills during maintenance visits. This may also have a subsequent effect on aquatic habitats and water-dependent nature conservation sites; and
- Potential impacts on local water supplies from potential spills during maintenance visits.

## 9.7. Impacts Scoped Out of the Assessment

9.7.1. A full soil erosion assessment is not considered appropriate for the Proposed Development, as most of the site lies in relatively low gradient land. The DS will consider soil erosion and propose mitigation, where necessary. However, it is not considered that the impacts of soil erosion on the site resulting from the Proposed Development will be significant.

9.7.2. Although the site is within the catchment of an SPZ, it is not proposed to provide any detailed assessment of the Proposed Development's impacts on this due to the limited potential contamination impacts which are possible from the construction, operation and decommissioning of the Proposed Development, due to its nature. This will likely be the same with any PWSs. However, these will be investigated further once the locations of them are retrieved from the Local Authority. Careful consideration will be given to the positioning of the energy storage and grid infrastructure during the design process and a CEMP will be submitted as part of the

ES.

9.7.3. Due to the limited potential contamination impacts which are possible from the construction, operation and decommissioning of the Proposed Development, due to its nature, it is not considered necessary for a WFD assessment to be carried out and therefore it is also proposed to be scoped out of the ES.

## 9.8. Proposed Approach to the ES

9.8.1. Due to the area that the Proposed Development covers and the flood zone it falls within, a site specific FRA will be undertaken to assess the potential risks of flooding and any mitigation methods that will be required.

9.8.2. In addition, as there will be some increase in impermeable areas throughout the site, a DS will also be developed in order to maintain greenfield run off rates as well as mitigate any risks of soil erosion and the impacts downstream.

9.8.3. Although the construction of the Proposed Development, given its nature is relatively low risk with regards to potential for contamination of the water environment during the operational stage, as with any development, the construction stage will contain increased risk. Therefore, a CEMP (subject to a DCO requirement) will be implemented during construction, to be agreed with both NYCC and SDC, in order to mitigate potential effects during construction.

9.8.4. Along with these assessments, the following steps will be undertaken as part of the EIA process:

- Identification of geological, hydrological and hydrogeological sensitivities;
- Consultation with the Local Lead Flood Authority, Environment Agency, etc;
- Input into the design and embedded mitigation finalised;
- Identification of potential impacts once a design has been fixed;
- Evaluation of the significance of the potential impacts; and
- ES Chapter completed along with the technical appendices described previously.

**Table 9.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Watercourses (potential impacts from soil erosion).<br><br>Soils being carried into watercourses by overland flow and increasing flood risk downstream during construction, operational, and decommissioning phases | Negligible to Low | Low to High | Negligible to Moderate – Minor Adverse | Scoped Out (will be considered within the DS) |
| Groundwater Supply (potential impacts from contamination)<br><br>During construction and decommissioning phases, contamination from site construction activities polluting groundwater and therefore groundwater abstraction. (operational phase activities also not expected to result in contamination) | Negligible to Low | Low to High | Negligible to Moderate – Minor Adverse | Scoped Out (Will be considered within the CEMP and design stage) |
| Surface Water Runoff (potential impacts from the Proposed Development's access tracks and structures)<br><br>Increased surface water run off increasing flood risk in | Negligible to Low | Low to High | Negligible to Moderate – Minor Adverse | Scoped In |

**Table 9.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| the area during construction, operational and decommissioning phases | | | | |
| Flood Risk to the Proposed Development.<br><br>Existing flood risk at the site causing a risk to the Proposed Development during construction, operational and decommissioning phases | Negligible to Low | Low to High | Negligible to Moderate – Minor Adverse | Scoped In |
| Watercourses (potential impacts from water-related works such as culvert construction)<br><br>Impacts on watercourses during culvert construction with potential for contamination during the construction and decommissioning phases (operational phase scoped out) | Negligible to Low | Low to High | Negligible to Moderate – Minor Adverse | Scoped In (construction and decommissioning only) |
| Groundwater (potential impacts from wastewater disposal) | Negligible to Low | Low to High | Negligible to Moderate – Minor | Scoped In |

**Table 9.1: Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Potential contamination impacts from foul storage leaks during the construction, operational and decommissioning phases | | | Adverse | |

# 10. Transport and Access

## 10.1. Introduction

10.1.1. The Transport and Access ES Chapter will consider the likely significant effects of the Proposed Development on the local highway network.

## 10.2. Study Area

10.2.1. The study area for the assessment of the likely significant effects of the Proposed Development on transport and access will consist of all roads that comprise the construction vehicle route from Junction 36 of the M62. This will include the A645 and A1041. If Hirst Road is used as part of the construction vehicle route, this will be included in the study area, as will any unclassified roads that may be used within the site.

10.2.2. Based on the above, the indicative Transport and Access Study Area is shown in Figure 10.1.

## Figure 10.1 Transport and Access Study Area

**A3**
ORIGINAL
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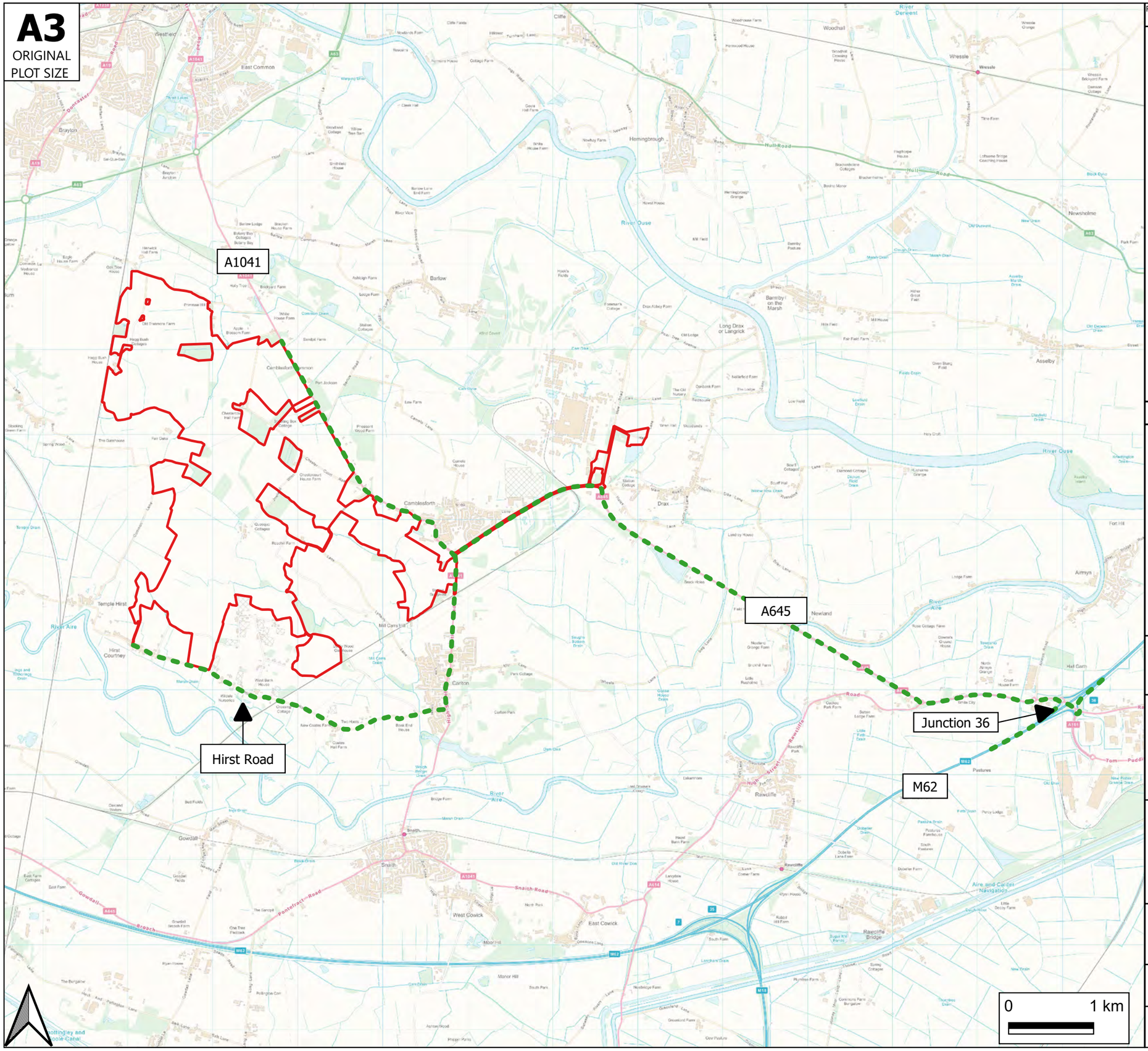


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## Key

- Study Area
- Site Boundary

| Rev | Date | Details | Drawn by | Checked by | Approved by |
|---|---|---|---|---|---|


Bristol
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Oxford
Welwyn Garden City

25 King Street
Bristol
BS1 4PB

0117 925 9400
www.tpa.uk.com

Transport Planning Associates


CLIENT:
Enso Green Holdings D Limited

PROJECT:
Helios Renewable Energy Project

TITLE:
Study Area

STATUS:
**FOR INFORMATION**

| SCALE: | DATE: | DRAWN: | CHECKED: | APPROVED: |
|---|---|---|---|---|
| NTS | 25/04/22 | AC | RR | JD |

| JOB NO: | DRAWING NO: | REVISION: |
|---|---|---|
| 2104-025 | Figure 10.1 | - |

## 10.3. Baseline Environment

### The Site and Local Context

10.3.1. The northern part of the site is situated immediately west of the A1041, whilst the southern part of the site is situated to the north of Hirst Road. These parts of the site are connected via a series of unclassified rural roads and private lanes, which are likely to be predominantly used by cars and agricultural vehicles, connecting the site to the wider highway network.

### Local Highway Network

10.3.2. The A1041 is a two-way single carriageway road subject to a 60 miles per hour (mph) speed limit. The road connects the village of Snaith, to the south of the site, to Selby, to the north of the site. On-site observations and traffic surveys indicate that the A1041 within the vicinity of the site is already well used by HGVs.

10.3.3. The A1041 forms 'Station Road' and 'High Street' within the village of Carlton, to the south of the site. On these parts of the A1401, the speed limit reduces to 30mph. There are a number of side junctions into local residential streets, and footways on both sides of the road.

10.3.4. Hirst Road runs along the southern boundary of the site, connecting the A1041 at Carlton to the village of Temple Hirst. This road has a speed limit of 60mph, which reduces to 30mph within Temple Hirst. There are no footways along Hirst Road outside of Temple Hirst.

10.3.5. A number of unclassified rural roads and private lanes are located within the site. These have low existing traffic flows, and are largely used for access to the surrounding agricultural fields, including within the site.

### National Cycle Network Route 62

10.3.6. Hirst Road, to the south of the site, forms part of National Cycle Network ('NCN') Route 62, which connects Lancashire to Selby and forms part of the Trans Pennine Trail. Users of the NCN comprise sensitive receptors to be considered in the assessment.

### Public Rights of Way

10.3.7. There are several PRoWs which run through the site. The PRoWs, as shown in the North Yorkshire Public Rights of Way Map[50], comprise:

- PRoW 35.14 – Runs through several fields in the northern part of the site and crosses over Hagg Bush Lane;
- PRoW 35.17 – Within close proximity to PROW 35.14, runs along the boundary of a northern part of the site, accessible via Chestercourt Lane;
- PRoW 35.18 – Begins at the northern boundary of the site in fields within the vicinity of Brick Lands Lane and continues north towards Jowland Winn Lane. A section also runs from Carlton, over the railway line and into the site;
- PRoW 35.38 – originates along Old Lane and extends northwards through a southern part of the site onto Brick Lands Lane; and
- PRoW 35.18 – travels along the western boundary of the part of the site located between Sandwith Lane and Race Lane.

10.3.8. The locations of the PRoWs are shown in Figure 10.2. Users of the PRoWs comprise sensitive receptors to be considered in the assessment.

[50] North Yorkshire Public Rights of Way Map Available at: https://maps.northyorks.gov.uk/connect/analyst/mobile/#/main?mapcfg=Out_and_About Accessed in April 2022

## Figure 10.2 Public Rights of Way

**A3**
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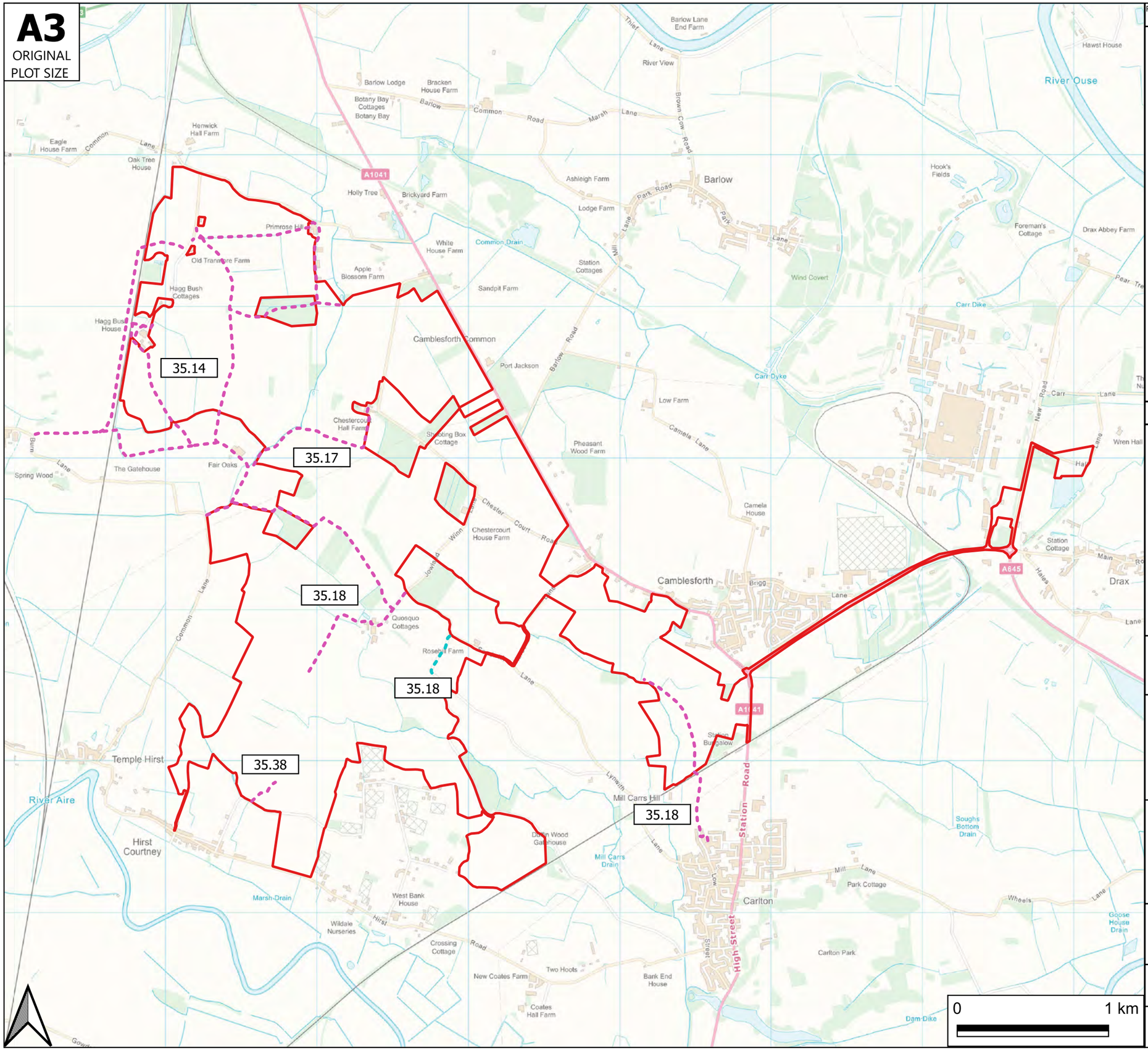


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## Key

- Site Boundary
- Bridleway
- Footpath

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TITLE:
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| 2104-025 | Figure 10.2 | - |

### Baseline Surveys

10.3.9. Automatic Traffic Count ('ATC') surveys have been undertaken for all roads within the vicinity of the site and potential access junctions. These were undertaken between 4th March 2022 and 10th March 2022. In addition, Department for Transport data[51] has been reviewed for the strategic road network, including the A1041 and Station Road. The average weekday two-way traffic count for the ATC survey locations within the vicinity of the site are set out in Table 10.1. The ATC survey locations are shown on Figure 10.3.

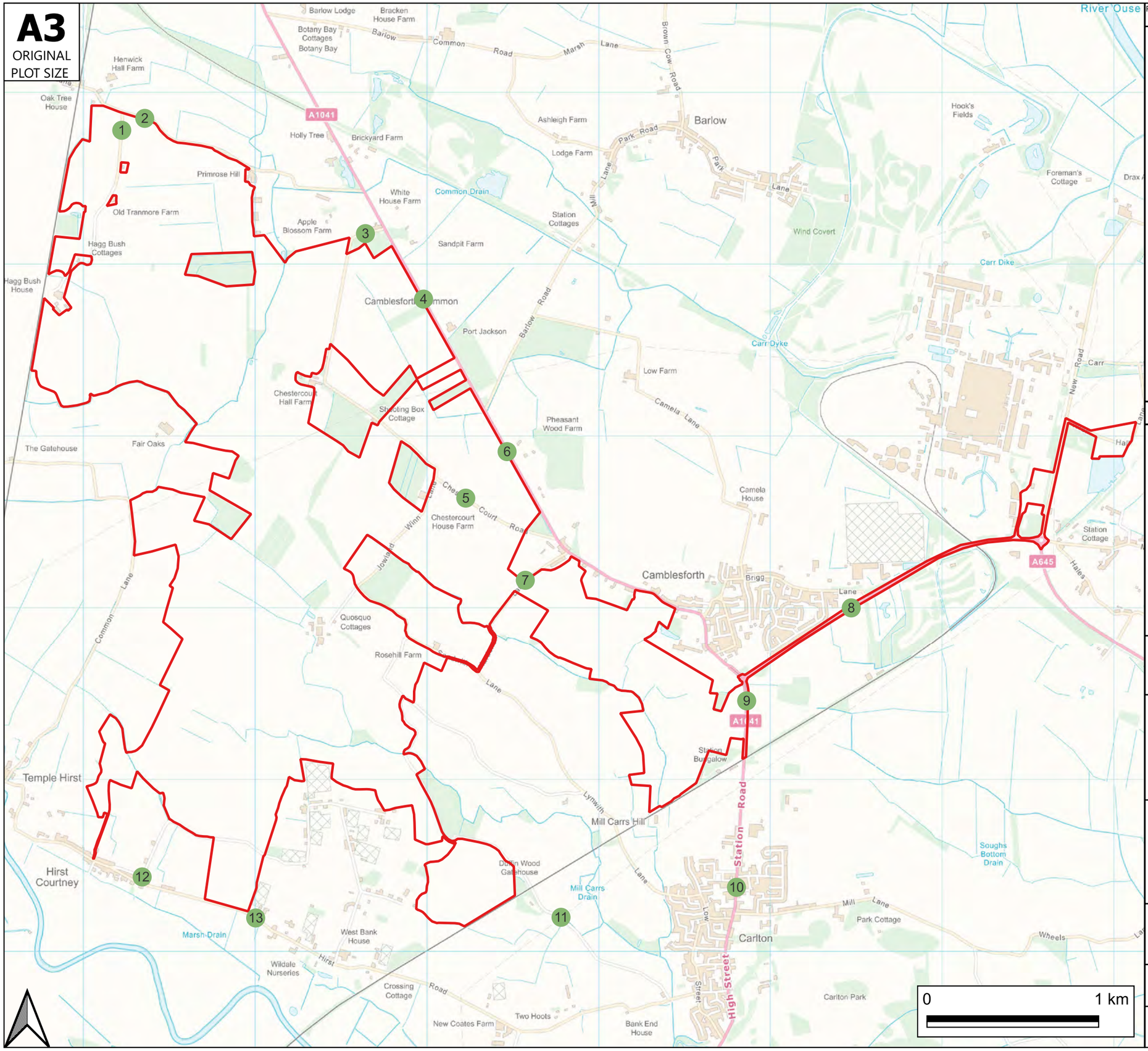
**Table 10.1: Baseline Traffic Flows – Average Weekday (24 hr), Two-Way**

| ATC Survey Location | Link | Total Vehicles | %HGV |
|---|---|---|---|
| **1** | Hagg Bush Lane | 515 | 5% |
| **2** | Common Lane | 2,224 | 12% |
| **3** | Chestercourt Lane (East/West) | 235 | 4% |
| **4** | A1041 (Bawtry Road) | 65,841 | 6% |
| **5** | Chestercourt Lane (N/S) | 257 | 7% |
| **6** | A1041 | 67,085 | 6% |
| **7** | Hardenshaw Lane | 459 | 2% |
| **8** | A645 | 40,996 | 9% |
| **9** | Station Road | 42,828 | 4% |
| **10** | High Street | 39,864 | 4% |
| **11** | Hanger Lane | 58 | 2% |
| **12** | Old Lane | 289 | 3% |
| **13** | Hirst Road | 2,865 | 5% |

[51] Department for Transport Road Traffic Statistics Available at: https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints Accessed in April 2022

## Figure 10.3 ATC Survey Locations

**A3**
ORIGINAL
PLOT SIZE

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NOTES

## Key

- Site Boundary
- ATC Locations (see Table 10.1)

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Enso Green Holdings D Limited

PROJECT:
Helios Renewable Energy Project

TITLE:
ATC Survey Locations

STATUS:
**FOR INFORMATION**

| SCALE: | DATE: | DRAWN: | CHECKED: | APPROVED: |
|---|---|---|---|---|
| NTS | 10/05/22 | AG | RR | JD |

| JOB NO: | DRAWING NO: | REVISION: |
|---|---|---|
| 2104-025 | Figure 10.3 | - |

### Other Baseline Data Sources

10.3.10. Other baseline data sources that will inform the Transport and Access ES Chapter comprise:

- Personal injury accident data;
- Highway boundary information;
- OS Mapping; and
- Topographical surveys.

## 10.4. Project Basis for Scoping Assessment

10.4.1. Transport and access impacts resulting from the Proposed Development will be restricted to the local highway network within the study area, as shown in Figure 10.1. The receptors will be users of the local highway network, including pedestrians, cyclists, equestrians and drivers.

## 10.5. Embedded Mitigation

10.5.1. Construction vehicle access points will be designed to accord with best practice guidance, as set out in the Design Manual for Roads and Bridges ('DMRB') published by National Highways.

## 10.6. Likely Significant Effects

### Construction Phase

10.6.1. The ES Chapter will assess the likely significant effects of the Proposed Development's construction phase, which will be short-term and temporary.

10.6.2. An outline CTMP will form a technical appendix to the ES Chapter. The outline CTMP will provide a framework for the management of construction vehicle movements to and from the site. The outline CTMP will set out construction access arrangements, construction vehicle routing, construction vehicle trip generation, and the management/mitigation measures. The final detailed CTMP will be subject to approval by the relevant Local Highway Authority via a DCO requirement.

10.6.3. Construction vehicle access is likely to be taken from the A1041, with connections via the unclassified rural roads. There may also be a requirement for access from

Hirst Road. The construction vehicle route, which forms the study area, is shown in Figure 10.1. The construction access strategy will be set out in the ES Chapter and outline CTMP.

10.6.4. In addition to the HGV movements, there will also be a number of construction movements associated with smaller vehicles (e.g. cars, vans and minibuses) for the transportation of construction workers and sub-contractors.

10.6.5. The construction vehicle route will be agreed with the Local Highway Authority. At this stage, it is expected that vehicles will route to the site via Junction 36 of the M62, the A645 and the A1041. There may be a requirement to also route vehicles via Hirst Road, to access the southern part of the site.

**Decommissioning Phase**

10.6.6. The Proposed Development has an anticipated operational lifespan of up to 40 years. At the end of this period, the Proposed Development will be decommissioned. The number of vehicles associated with the decommissioning phase is not anticipated to exceed that set out for the construction phase.

**Likely Significant Effects**

10.6.7. The transport and access effects resulting from the construction and decommissioning phases of the Proposed Development that will be assessed within the ES chapter comprise:

- Accidents and Safety;
- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity (including Fear and Intimidation); and
- Hazardous Loads.

10.6.8. The assessment methodology to be used to assess the likely significant effects from the construction and decommissioning phases of the Proposed Development on the environmental impact criteria above is set out below.

### Accidents and Safety

10.6.9. The IEMA Guidelines[52] do not include any definition in relation to the assessment of effects on accidents and safety, advising that professional judgement should be used to assess the implications of local circumstance, or factors which may increase or decrease the risk of accidents.

### Severance

10.6.10. The IEMA Guidelines define severance as *'the perceived division that can occur within a community when it becomes separated by a major traffic artery'* (paragraph 4.27) that *'separates people from places'*, for example, difficulties crossing existing roads or the physical barrier of the road itself.

10.6.11. There are no predictive formulae which give simple relationships between traffic factors and the significance of effects. Nevertheless, there are a range of indicators for determining the significance of effects resulting from changes in severance. The IEMA Guidelines suggest that *'changes in traffic flow of 30%, 60% and 90% are regarding as producing slight, moderate and substantial changes in severance respectively'* (paragraph 4.31). The guidance also suggests that *'marginal changes in traffic flows are, by themselves, unlikely to create or remove severance'*.

### Driver Delay

10.6.12. The IEMA Guidelines state that *'delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system'* (paragraph 4.34). As such, the impact of a proposed development on driver delay is typically considered in relation to background traffic. Junction assessment modelling can be used to estimate increased vehicle delays at junctions, if necessary, although this is not expected in the ES Chapter as construction traffic flows are likely to be outside of the network peak hours, when capacity constraints are more likely to exist.

### Pedestrian Delay

10.6.13. The IEMA Guidelines state that *'changes in the volume, composition or speed of*

[52] Institute of Environmental Management and Assessment (1993), *Guidelines for the Environmental Assessment of Road Traffic*

*traffic may affect the ability of people to cross roads. In general, increases in traffic levels are likely to lead to increases in delay'* (paragraph 4.35). There are a range of local factors that affect pedestrian delay, including the level of pedestrian activity, visibility and general physical conditions of the site. However, the IEMA Guidelines do not set out thresholds for judging the significance of changes in levels of delay, and suggest that the assessor uses their professional judgement to determine whether pedestrian delay is a significant impact.

**Pedestrian Amenity (Including Fear and Intimidation)**

10.6.14. Pedestrian amenity is broadly described in the IEMA Guidelines as *'the relative pleasantness of a journey'* (paragraph 4.39) and can be affected by traffic flow, composition and footway widths. This definition includes pedestrian fear and intimidation and can be considered a much broader category when considering the overall relationship between pedestrians and traffic. The IEMA Guidelines suggest that a threshold for judging this would be *'where the traffic flows (or its lorry component) is halved or doubled'* (paragraph 4.39).

**Hazardous Loads**

10.6.15. The IEMA Guidelines state that some developments include hazardous loads, and that this should be recognised by the assessment. Whilst not hazardous, there will be limited abnormal loads to transport the transformers for the substations. An abnormal load is one where the vehicle exceeds 44 tonnes, the width is over 2.9m or the length is more than 18.65m. An assessment of likely significant effects on hazardous loads will be set out in the ES Chapter and any necessary mitigation will be incorporated into the outline CTMP.

**Prediction of Impact Magnitude**

10.6.16. The methodology for determining the scale or magnitude of impact will follow that set out in

10.6.17. Table 3.2, Table 3.3 and Table 3.4 of Section 3 (EIA Methodology) of this Scoping Report.

10.6.18. The IEMA Guidelines set out two rules which have been used as threshold impacts to define the scale and extent of this assessment, as follows:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or where the number of HGVs will increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where traffic flows have increased by 10% or more.

10.6.19. The IEMA Guidelines identify general thresholds for traffic flow increases of 10% and 30%. Where the predicted increase in traffic / HGV flow is lower than these thresholds, then the significance of the effects should be considered to be low or not significant and further detailed assessment is not required.

10.6.20. It is notable that, on roads where baseline traffic flows are low, any increase in traffic flow may result in a predicted increase that would be higher than the two rules set out in the IEMA Guidelines. Therefore, it is important to consider any overall increase in road traffic in relation to the capacity of the road.

**Mitigation**

10.6.21. In addition to the embedded mitigation set out in paragraph 10.5.1 above, further mitigation in line with best practice will be provided for the Proposed Development. An outline CTMP will be prepared and will form a technical appendix to the ES Chapter. The outline CTMP will provide a framework for the management of construction vehicle movements to and from the site. At decommissioning, a Decommissioning Traffic Management Plan ('DTMP') will be prepared, that will follow the principles of the outline CTMP. Both the CTMP and DTMP will be secured via suitably worded DCO requirements.

10.6.22. A number of mitigation measures will be set out within the outline CTMP and ES Chapter. These will include, but will not be limited to the following:

- A commitment to avoid network peak hours for deliveries;
- Signage to direct construction vehicles;
- The provision of Banksmen at the site access junctions to assist the safe movement of HGVs;
- Site Compounds will be set up within the site. These will include an appropriate number of parking spaces. No vehicles used in the Proposed Development's construction and decommissioning phases will park on the local highway network;

- A booking system will be set up to manage arrivals and departures to the site. A log will be kept as part of the booking system;
- A requirement for engines to be switched off on-site when not in use;
- The provision of a wheel washing facilities;
- Spraying of areas with water as and when conditions dictate to prevent the spread of dust;
- Vehicles carrying waste material off-site to be sheeted;
- The contact details of the site manager to be provided on notice boards for the local communities; and
- The commitment to undertake a pre- and post- construction highway condition survey at agreed locations around key junctions.

## 10.7. Impacts Scoped Out of the Assessment

**Operational Phase**

10.7.1. During the Proposed Development's operational phase, there are anticipated to be a limited number of visits to the site per month for maintenance (up to five visits per month consisting of 10 two-way vehicular trips per month). These would typically be made by light van or 4x4 type vehicles. Whilst the site compound will have been removed during the construction phase, space will remain within the site on the access tracks for such a vehicle to turn around to ensure that reversing will not occur onto the highway.

10.7.2. Whilst the characteristics of the operational phase will be set out in the Transport and Access ES Chapter, a full assessment of effects is scoped out.

## 10.8. Proposed Approach to the ES

10.8.1. The following steps will be undertaken for the ES Chapter:

- Identify baseline conditions;
- Consult with stakeholders;
- Set out the policy and legislative context;
- Define the assessment methodology;

- Set out the likely significant effects;
- Describe the proposed mitigation measures;
- Set out the likely residual effects; and
- Set out the likely cumulative effects.

**Table 10.2 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Construction Phase<br><br>(Receptors – PRoW, Road and NCN Users)<br><br>Potential effects on the following to be assessed: Accidents and Safety, Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity (Including Fear and Intimidation) and Hazardous Loads | Negligible/ Minor Adverse | Low | Negligible/ Minor Adverse | Scoped In |
| Operational Phase<br><br>(Receptors – PRoW, Road and NCN Users) | No Impact/ Negligible | Low | No Impact/ Negligible | Scoped Out |
| Decommissioning Phase | Negligible/ Minor | Low | Negligible/ Minor Adverse | Scoped In |

**Table 10.2 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| (Receptors – PRoW, Road and NCN Users)<br><br>Potential effects on the following to be assessed: Accidents and Safety, Severance, Driver Delay, Pedestrian Delay, Pedestrian Amenity (Including Fear and Intimidation) and Hazardous Loads | Adverse | | | |

# 11. Noise

## 11.1. Introduction

11.1.1. An assessment of the likely significant effects of the Proposed Development with respect to noise will be undertaken. This will include construction and decommissioning phase (short-term) and operational phase (long-term) effects.

## 11.2. Study Area

11.2.1. There is no best practice guidance to specify the study area for noise effects from a proposed development. Therefore, for the Proposed Development's study area, professional judgement has been used, based on experience of similar developments. The assessment considers receptors within Temple Hirst, Hirst Courtney, Camblesforth, Drax and surrounding areas. The study area for construction, operational and decommissioning phase assessments incorporates the area within, and up to, approximately 400m from the site boundary, where residential properties have been identified to be potentially sensitive receptors. The extent of the study area is shown by the yellow line in Figure 11.1.

## Figure 11.1 Site Boundary and Study Area

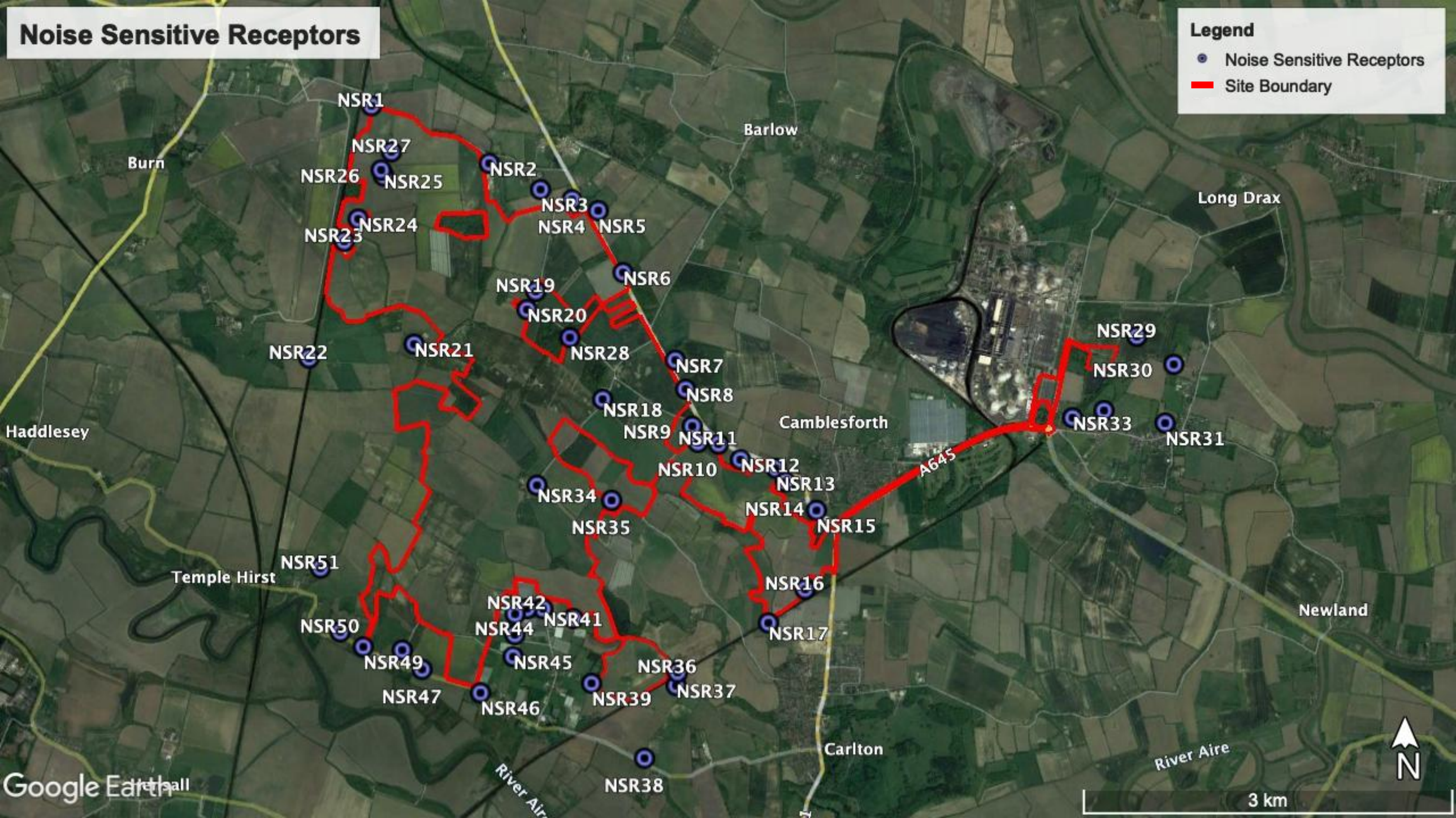

Study Area
Legend
Site Boundary
Barlow
Burn
Long Drax
A1041
Haddlesey
Camblesforth
Drax
A645
Temple Hirst
Station Rd
Newland
Hirst Courtney
Carlton
River Aire
Google Earth
3 km
N

## 11.3. Baseline Environment

11.3.1. A baseline sound measurement exercise has been undertaken at key receptor locations in and around the site, between the 3rd and 8th March 2022. The approach to baseline monitoring has been agreed with a representative of SDC's Environmental Health Department (correspondence provided in Appendix 11.1).

11.3.2. Measurements have been undertaken at nine locations (see Figure 11.3), representative of the closest potentially affected sensitive receptor locations to the Proposed Development. These are residential receptors and are shown on Figure 11.2, relative to the site boundary.

## Figure 11.2 Site Boundary and Noise Sensitive Receptors


Noise Sensitive Receptors
Legend
Noise Sensitive Receptors
Site Boundary
NSR1
NSR27
NSR26
NSR25
NSR2
NSR3
NSR4
NSR5
NSR24
NSR23
NSR6
NSR19
NSR20
NSR28
NSR22
NSR21
NSR7
NSR8
NSR18
NSR9
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NSR42
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NSR44
NSR50
NSR17
NSR49
NSR45
NSR36
NSR47
NSR46
NSR39
NSR37
NSR38
NSR29
NSR30
NSR33
NSR31
Barlow
Burn
Long Drax
Haddlesey
Camblesforth
A645
Temple Hirst
Newland
Carlton
River Aire
Google Earth
3 km
N

## Figure 11.3 Site Boundary and Noise Survey Measurement Positions


Noise Survey Measurement Positions
Legend
Measurement Positions
Site Boundary
MP1
MP2
MP3
MP4
MP5
MP6
MP7
MP8
MP9
Burn
Barlow
Long Drax
Haddlesey
Camblesforth
Drax
Temple Hirst
Hirst Courtney
Newland
Carlton
River Aire
A1041
A645
N
3 km
Google Earth

11.3.3. The background sound environment across the site and surrounding area was varied, with those positions closest to roads measuring higher levels of road traffic noise and a general decrease in noise levels during night-time periods. The nine positions selected to measure the background sound levels within the area represent all identified noise sensitive receptors and are viewed as highly robust.

11.3.4. The sound environment comprised mostly road traffic, rail, and aircraft noise. The underlying noise level was largely sustained by busier A roads, which could be heard from distance. Traffic flow on smaller, local roads reduced at night, thus, reducing noise levels. Peak noise events were produced by large HGV or busses passing on nearby roads, as well as motorbikes and sirens. Other potential contributing factors include noise from birds and wind induced vegetation. Appendix 11.2 contains the results of the noise monitoring.

11.3.5. The list below states each Measurement Position and a brief description of its location:

- MP1 – Northernmost part of the site within the settlement of Burn;
- MP2 – Positioned immediately west of the A1041;
- MP3 – Within the settlement of Camblesforth, within the vicinity of the A1014;
- MP4 – Approximately 280m west of Station Road;
- MP5 – Approximately 650m north of Hirst Road;
- MP6 – Approximately 170m north of Hirst Road;
- MP7 – Located in the centre of the site, approximately 125m south of Sanwith Lane;
- MP8 – Within the vicinity of Hirst Courtney; and
- MP9 – Eastern most part of the site, within the vicinity of the village of Drax.

## 11.4. Project Basis for Scoping Assessment

11.4.1. It has been assumed that the noise-generating plant associated with the Proposed Development will be typical for this type of development, consisting of inverters, energy storage, transformers and substation that will be of a typical specification as utilised at other, similar developments. Maintenance activities during operational phase and associated traffic movements are not considered significant with regards

to noise

## 11.5. Embedded Mitigation

11.5.1. Mitigation measures will be recommended where necessary, to achieve the guideline criteria set out in BS4142:2014. This best practice guidance document contains the method rating for assessing industrial and commercial noise, which is relevant to the assessment of the Proposed Development.

## 11.6. Likely Significant Effects

11.6.1. The key considerations in relation to the noise assessment are as follows:

- The transient noise and vibration effects arising from on-site construction and decommissioning activities;
- The transient noise effects of off-site construction and decommissioning traffic; and
- The potential operational noise effects arising from static plant installations within the Proposed Development, primarily associated with cooling fans serving the inverter stations and energy storage containers.

## 11.7. Impacts Scoped Out of the Assessment

11.7.1. Given the nature of the Proposed Development and its generation of up to 10 (two-way) vehicular traffic movements per month during its operational phase, traffic noise effects during its operational phase are not considered to be significant. Therefore, an assessment of road traffic noise effects resulting from the operational phase of the Proposed Development is proposed to be scoped out of the ES chapter.

11.7.2. Given the nature of solar farm developments, there will be no vibration effects generated by the Proposed Development and is not considered likely to result in significant effects on the environment (see Section 4.5 for more detail). Therefore, it is proposed to be scoped out of the assessment.

## 11.8. Proposed Approach to ES

11.8.1. The likely significant effects of noise generated during the Proposed Development's construction and decommissioning phases will be assessed in accordance with the British Standard 5228-1:2009+A1:2014 *'Code of Practice for Noise and Vibration*

*Control on Construction and Open Sites – Part 1: Noise'*[53]. The focus will be on mitigation measures to be included in the CEMP.

11.8.2. The change in noise levels resulting from additional traffic flows associated with the construction and decommissioning of the Proposed Development will be assessed in accordance with guidance contained in DMRB Volume 11 Section 3 Part 7 – HD213/11 Noise and Vibration[54] for the key stages of construction and decommissioning.

11.8.3. The effects of noise during the operation of the Proposed Development will be assessed in accordance with British Standard 4142: 2014 +A1: 2019 *'Method for rating industrial and commercial noise'*[55]. This standard requires an assessment of operational noise against the prevailing background sound environment for both daytime and night-time periods and will inform the acoustic specifications and locations of the noise-generating plant items to be included, such that the amenity of existing receptors in the area will not be adversely affected.

[53] *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise*
[54] *Design Manual for Roads and Bridges Volume 11 Section 3 Part 7 – HD213/11 Noise and Vibration*
[55] British Standard 4142: 2014+A1:2019 *Method for rating and assessing commercial sound*. BSI

**Table 11.1 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Existing residential receptors and community uses.<br><br>Temporary noise effects during construction and decommissioning, and need for control/mitigation measures. | Very Low | High | Minor | Scoped In |
| Existing residential receptors and community uses.<br><br>Noise change due to operational noise generated by the Proposed Development | Very Low | High | Minor | Scoped In |
| Existing residential receptors and community uses.<br><br>Noise change due to operational traffic generated by the Proposed Development | Very Low | High | Minor | Scoped Out |

# 12. Climate Change

## 12.1. Introduction

12.1.1. An assessment of the likely significant effects of the Proposed Development with regards to climate change will be undertaken.

## 12.2. Study Area

12.2.1. The data available to allow an assessment of greenhouse gas ('GHG') emissions from vehicle movements associated with the Proposed Development will be consistent with the study area set out in Section 10 (Transport and Access) of this Scoping Report.

12.2.2. Given that climate change is a global issue, a qualitative assessment of the Proposed Development's effects is also made at the 'global' scale, in line with IEMA Guidance on assessing GHG emissions[56]. Furthermore, reference will be made to the Proposed Development's effects at the 'local' level (through the use of Local Authority carbon dioxide equivalent ('CO2e') emission estimates within its administrative boundary) and at the 'National' level (through assessing the significance of effects in the context of the appropriate UK Carbon Budget).

## 12.3. Baseline Environment

12.3.1. The Climate Change Act 2008[57] sets a legally binding target for reducing GHG emissions, in particular carbon dioxide ('$CO_2$'), by at least 80% (on 1990 levels) by the year 2050 in the UK, and a requirement that domestic emissions are reduced by no less than 3% each year. This was updated in May 2019, where a 100% reduction in GHG emissions ('net-zero') is now to be achieved by 2050.

12.3.2. In October 2017, the UK Government published its Clean Growth Strategy ('CGS') setting out ambitious policies and proposals, to 2050, to reduce emissions across the economy and promote clean growth. The Clean Growth Strategy provides an 'ambitious' blueprint for Britain's low carbon future, outlining how investment in green energy goes hand-in-hand with economic growth and industrial, commercial and

[56] Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions Accessed in April 2022
[57] Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents (as amended) Accessed in April 2022

residential strategies. Core to the strategy are actions that will cut emissions, increase efficiency and lower the amount consumers and businesses spend on energy.

12.3.3. In October 2021, the UK committed to decarbonise the electricity system by 2035 and secure a home-grown clean electricity supply. These commitments brought forward the government's original target of a fully decarbonised power system by 2050, as set out in the Energy White Paper and emphasised the role of green technologies to deliver cleaner, cheaper power and create thousands of new high-skilled jobs in new industries across the UK.

12.3.4. The EIA Regulations include a requirement for the assessment of development on the environment with relation to climate change (Schedule 4, paragraph 5(f)):

> *'A description of the likely significant effects of the development on the environment resulting from, inter alia …(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.'*

## 12.4. Project Basis for Scoping Assessment

12.4.1. Given the Proposed Development will be a generator of renewable electricity, it is possible that it could give rise to both adverse and beneficial likely significant effects.

12.4.2. Following IEMA Guidance[58], there are two main approaches which may be taken to determine a project's climate change impact, which involve identifying:

- The vulnerability of the Proposed Development to climate change (adaptation/ resilience); and
- The direct and indirect influence of the Proposed Development on climate change (mitigation).

12.4.3. The vulnerability of the Proposed Development to climate change considers likely significant effects on the Proposed Development as a receptor (this is referred to in IEMA Guidance as Climate Change Resilience and Adaptation (2020)[59]).

[58] Available at: https://www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions Accessed in April 2022
[59] Available at: IEMA: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 Accessed in April 2022

## 12.5. Likely Significant Effects

12.5.1. A climate change risk and resilience assessment will be undertaken before the PEIR is produced to identify the potential risks of climate change to the Proposed Development and to set out design measures that will be incorporated into the Proposed Development to provide resilience and adaptation to climate hazards, such as extreme hot and cold weather, intense rainfall, high winds and storm events. An iterative approach will be taken to the assessment, whilst drawing upon and informing other reports prepared to support the DCO application, such as the FRA. The assessment will also draw upon the UK Climate Projections (UKCP 18) as the most comprehensive data set across the Proposed Development's operational phase (an operational lifespan of up to 40 years will be assumed for the purposes of the ES) to highlight key changes in weather conditions.

12.5.2. A quantitative, assumptions-based assessment of the direct effects of vehicular GHG emissions, in particular $CO_2$, will be undertaken. This will be done using the trip generation forecast from the traffic model and DEFRA's Emission Factors Toolkit ('EFT') v11. Given that the Proposed Development will principally create vehicle movements during its construction, rather than its operational phase, the assessment will focus on this phase.

12.5.3. The assessment will provide the modelling of carbon emissions for vehicles during construction and operation on an illustrative basis, as real-time carbon emissions associated with the Proposed Development are not available.

12.5.4. Owing to the nature of the Proposed Development as a renewable energy scheme, there will be carbon savings realised in terms of a reduction in $CO_2$ (and CO2e) than if the electricity was generated using fossil fuels through the UK's current energy mix. This carbon offset will be calculated using the carbon intensity of energy generation within the UK, with the significance of effect compared at both the 'Local' level and at the 'National' level.

12.5.5. Accordingly, the Climate Change ES chapter will assess the effects of climate change on the Proposed Development and the effects of the Proposed Development on climate change by:

- Establishing the existing baseline conditions (2022);
- Determining future baseline conditions by reviewing climatic projections;

- Identifying any mitigation measures to be embedded as part of the Proposed Development;
- Assessing the likely significant effects of the Proposed Development (alone and cumulatively) on the established baseline and future conditions. The judgement of significance will be based on professional judgment and in line with IEMA Guidance, in order to ascertain and distinguish different levels of significance, a project's attribution of significance should *consider 'whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050'*; and
- Identification of mitigation measures and following that the identification of residual effects.

## 12.6. Impacts Scoped Out of the Assessment

12.6.1. The assessment will not undertake an assessment of the decommissioning phase of the Proposed Development, owing to uncertainties surrounding this phase, such as the negative externalities associated with the loss of renewable energy and the subsequent impact on the climate in terms of potential additional emissions for replacement energy on the grid (should this not come from renewable sources).

12.6.2. On the basis of professional judgement, and experience from other similar projects, likely significant effects on climate change resulting from the traffic movements generated during the Proposed Development's decommissioning phase are likely to be, at worst, no greater than the construction phase effects and considered to be too far in the future to be able to accurately predict traffic flows and related emissions. On this basis, an assessment of the Proposed Development's effects resulting from decommissioning phase traffic movements is proposed to be scoped out of the ES chapter.

12.6.3. The construction phase impact of the provision of renewable energy is scoped out of the assessment. This is because it is assumed that during the construction period, renewable energy is unlikely to be distributed to the national grid.

12.6.4. The construction phase impacts with regards to the vulnerability of the Proposed Development to climate change are also scoped out of the assessment. This is because it is assumed that climatic conditions are unlikely to change over the construction period and therefore an assessment is provided for when the Proposed

Development is deemed operational.

## 12.7. Proposed Approach to ES

12.7.1. The assessment will be undertaken using the following steps:

- Determination of the study area and likely sensitive receptors;
- Baseline assessment of current climatic conditions and the appropriate local and national carbon data sets (2022);
- Consideration of any mitigation, if needed, to form part of the Proposed Development (embedded mitigation);
- Assessment of impacts for both climate change mitigation and climate change adaptation and resilience;
- Determination of significant effects;
- Implementation of any mitigation, if needed; and
- Assessment of residual significant effects

**Table 12.1 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Global Climate – Impact of carbon emissions associated with transport movements<br>Construction and operational phase only. Decommissioning phase scoped out. | Minor | High | Moderate Adverse | Scoped In (Construction and operational phase only) |
| Global Climate – Impact of provision of renewable electricity<br>Operational phase only. Construction and decommissioning phases scoped out. | High | High | Major Beneficial | Scoped In (Operational phase only) |
| Vulnerability of the Proposed Development to climate change (Adaptation)<br>Operational phase only. Construction and decommissioning phases scoped out. | High | Low | Moderate Adverse | Scoped In (Operational phase only) |

# 13. Socio-Economics

## 13.1. Introduction

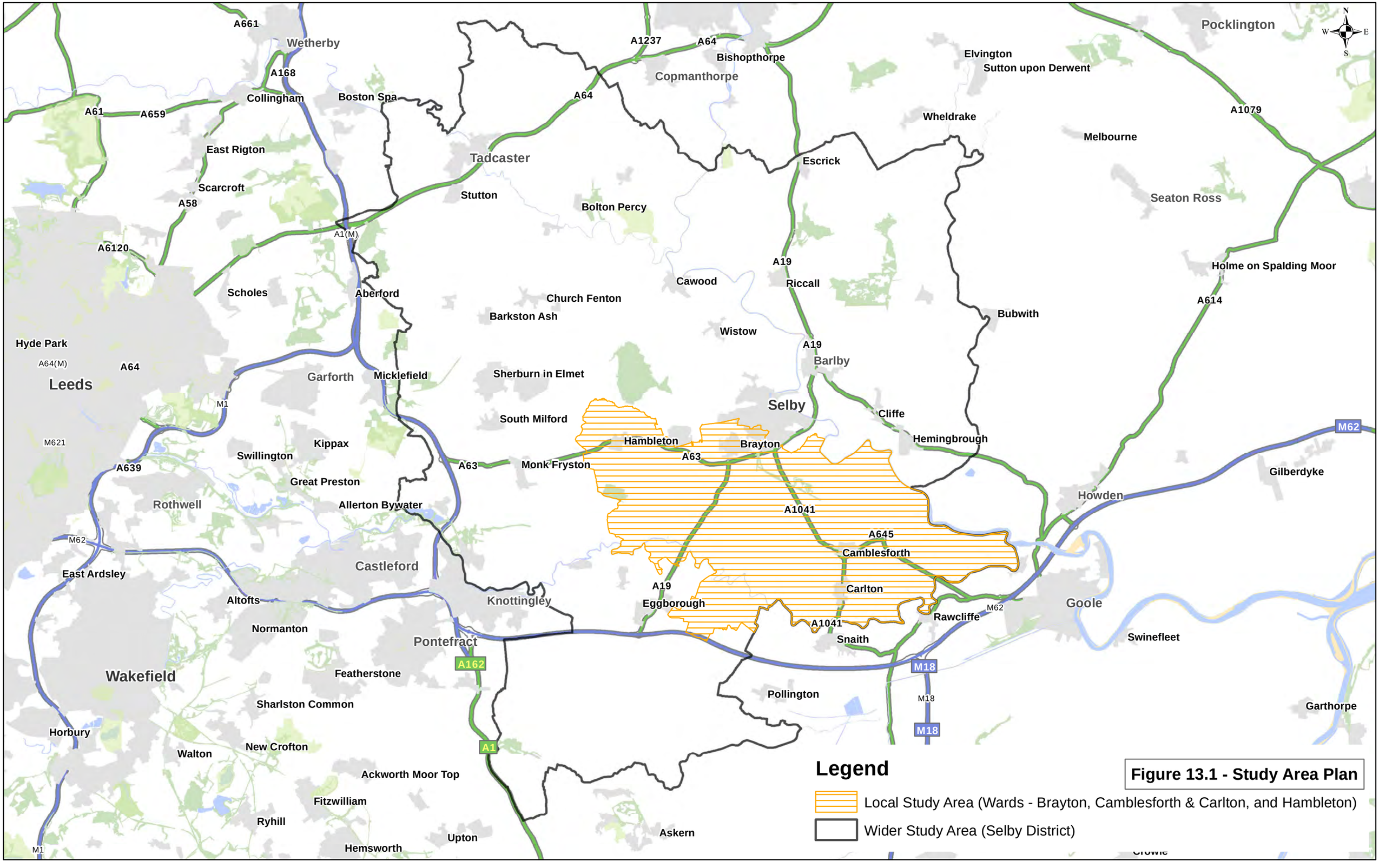
13.1.1. This section of the Scoping Report identifies the socio-economic characteristics of relevance to the Proposed Development and identifies those activities with the potential for likely significant effects during the construction, operational and decommissioning phases. Activities include the procurement of employment, goods and services and the contribution to the economy (measured through the creation of Gross Value Added ('GVA') and energy generation, expenditure, and the effect of the Proposed Development on existing residential, community, tourism and recreation uses, including PRoWs.

## 13.2. Study Area

13.2.1. A Local and Wider Study Area have been defined for the assessment of socio-economic effects. Effects of the Proposed Development on: residential; community uses; expenditure; and tourism and recreation (including PRoWs) will be felt more closely in the area immediately surrounding the site. The site is adjacent to the village of Camblesforth, with the villages of Drax, Carlton, Hirst Courtney, Temple Hirst and Barlow also within close proximity, along with a number of smaller hamlets. Therefore, a Local Study Area which covers these settlements has been defined as comprising Hambleton and the three electoral wards of Camblesforth and Carlton, Brayton. Figure 13.1 illustrates the socio-economic Local Study Area.

13.2.2. Economic effects of the Proposed Development (namely employment and contribution to energy generation) have the potential to be felt more widely than the Local Study Area, for example, across SDC's administrative area and the Yorkshire and The Humber ('YTH') region. For this reason, the SDC area and YTH region represent the socio-economic Wider Study Area (refer to Figure 13.1).

## Figure 13.1 Local and Wider Study Area




## Legend

Local Study Area (Wards - Brayton, Camblesforth & Carlton, and Hambleton)

Wider Study Area (Selby District)

**Figure 13.1 - Study Area Plan**

JOB: Helios Renewable Project DRAWING: Study Area Plan REVISION: 1

Data collated for constraints and analysis mapping is based on publicly available sources at the time of preparation, inserted using the British National Grid and may itself not be accurate. Barton Willmore now Stantec shall not be liable for the accuracy of data derived from external sources.



0 2.75 5.5 11 16.5 Kilometers

## 13.3. Baseline Environment

13.3.1. A high-level desk study has been undertaken to provide a preliminary baseline of the main demographic, economic and employment characteristics of both the Local and Wider Study Areas.

**Population**

13.3.2. According to the Office for National Statistics ('ONS') Mid-Year Population Estimates for the year 2020[60] (the latest data available at the time of writing), circa 5.6 million people live within the YTH region, of which, 91,700 (2% of the YTH region) live within the SDC area and 15,200 (17% of SDC area) live within the Local Study Area.

13.3.3. The Local Study Area has an older age profile than the SDC area and the YTH region. Only 59% of the Local Study Area's population is aged 16 to 64 years (circa 9,000 people), which represents a lower proportion than the average for the SDC area (61%) and the YTH region (62%). 24% of the Local Study Area's population is aged 65+ years (circa 3,700 people), higher than the average for the SDC area and the YTH region (19%).

**Employment and Businesses**

13.3.4. There are approximately 2.8m residents aged 16 to 74 years in the YTH region who are classified as economically active (this includes all people in employment or available to work, for example, the unemployed). Of those, circa 50,500 live within the SDC area and circa 8,400 within the Local Study Area[61]. This is equivalent to an economic activity rate of 74% in the Local Study Area, which is marginally lower than the average for the SDC area (75%) but higher than the average for the YTH region (69%).

13.3.5. Circa 250 residents of the Local Study Area are currently unemployed, which is equivalent to 2.2% of all 16 to 74 year olds; a marginally lower unemployment rate in comparison to the SDC area (2.5%) but considerably lower than the YTH region (3.5%)[61].

13.3.6. Circa 7,900 residents of the Local Study Area are currently in employment, which is

[60] ONS, 2020 Mid-Year Population Estimates [downloaded from NOMIS on 21 April 2022 https://www.nomisweb.co.uk/]
[61] Experian, 2021 Current Year Estimate [Available at https://www.experian.co.uk/economics/index.html]

equivalent to 69% of all 16 to 74 year olds; a marginally lower proportion than the district average (70%) but higher than the regional average (62%)[61].

13.3.7. Residents of the Local Study Area in employment predominantly work in wholesale and retail, education, human health and social work and manufacturing (circa 36% of all resident employment).[61] However, industries of relevance to the Proposed Development are: construction; accommodation and food services; and electricity, gas, steam and air conditioning supply. 7% of residents in the Local Study Area (circa 570 people) are employed within construction jobs, which is comparable to the SDC area and the YTH region. 5% of residents in the Local Study Area (circa 375 people) are employed within accommodation and food services activities, which compares to 6% across the SDC area and 7% for the YTH region. 5% of residents in the Local Study Area (circa 360 people) are employed within the electricity, gas, steam and air conditioning industry. This industry represents a significantly higher proportion of employment in the Local Study Area than in comparison to the SDC area (2%) and the YTH region (0.1%).

13.3.8. Approximately 40% of SDC residents in employment, work within the SDC area, with Leeds, York and Wakefield being other main employment destinations for SDC area residents (equivalent data is not available for the Local Study Area)[62]. The SDC area is a net exporter labour, meaning there are fewer jobs than there are residents of working age[63].

13.3.9. There are circa 2.4 million jobs in the YTH region, of which circa 38,000 are in the SDC area and circa 5,900 in the Local Study Area[64]. Table 13.1 provides a breakdown of these jobs by broad industrial sector.

[62] ONS, 2011 Census Table WU01UK
[63] ONS, Jobs Density 2020 ratio of 0.75 meaning there is 0.75 of a job for every working age resident aged 16 to 64 years [downloaded from NOMIS on 21 April 2022 https://www.nomisweb.co.uk/]
[64] ONS, Business Register and Employment Survey 2020 [downloaded from NOMIS on 21 April 2022 https://www.nomisweb.co.uk/]

**Table 13.1: Broad Industrial Sector Breakdown**

| Industry | Number of Jobs | | | Percentage of Total | | |
|---|---|---|---|---|---|---|
| | Local Impact Area | SDC Area | YTH Region | Local Impact Area | SDC Area | YTH Region |
| Agriculture, forestry & fishing | 5 | 2,000 | 38,000 | 0% | 5% | 2% |
| Mining, quarrying & utilities | 1,520 | 2,000 | 30,000 | 26% | 5% | 1% |
| Manufacturing | 800 | 8,000 | 269,000 | 14% | 21% | 11% |
| Construction | 520 | 2,250 | 128,000 | 9% | 6% | 5% |
| Motor trades | 80 | 600 | 49,000 | 1% | 2% | 2% |
| Wholesale | 85 | 1,250 | 97,000 | 1% | 3% | 4% |
| Retail | 185 | 2,000 | 212,000 | 3% | 5% | 9% |
| Transport & storage | 285 | 4,000 | 129,000 | 5% | 11% | 5% |
| Accommodation & food services | 235 | 1,750 | 153,000 | 4% | 5% | 6% |
| Information & communication | 40 | 350 | 64,000 | 1% | 1% | 3% |
| Financial & insurance | 0 | 150 | 68,000 | 0% | 0% | 3% |
| Property | 25 | 450 | 51,000 | 0% | 1% | 2% |
| Professional, scientific & technical | 375 | 2,500 | 166,000 | 6% | 7% | 7% |
| Business administration & support services | 675 | 4,000 | 230,000 | 11% | 11% | 9% |
| Public administration & defence | 40 | 900 | 108,000 | 1% | 2% | 4% |
| Education | 675 | 2,500 | 224,000 | 11% | 7% | 9% |
| Health | 240 | 2,000 | 323,000 | 4% | 5% | 13% |
| Arts, entertainment, recreation & other services | 70 | 1,250 | 98,000 | 1% | 3% | 4% |

13.3.10. Mining, quarrying and utilities accounts for 26% of all employment (circa 1,520 jobs) in the Local Study Area; a significantly higher proportion than this industry represents in the SDC area (5%) and YTH region (1%). These jobs are all accounted for within the production, transmission, trade and distribution of electricity roles and therefore relevant to the Proposed Development.

13.3.11. Other relevant industries include the construction industry, which supports circa 520 jobs in the Local Study Area and is equivalent to 9% of all jobs; again, a higher proportion than the SDC area (6%) and the YTH region (5%). Also, the accommodation and food services sector, which supports circa 235 jobs in the Local Study Area, representing 4% of total employment. This is a lower proportion than the SDC area (5%) and the YTH region (6%).

**Tourism**

13.3.12. In 2021, there were circa 18,900 tourism related enterprises in the YTH region, of which 300 (2%) are located within the SDC area[65]. Data is not available for the Local Study Area.

13.3.13. 75% of tourism enterprises in the SDC area are related to accommodation and food services, with the majority being related to food and drink services (67% of total tourism enterprises), comparable to the YTH region (70%). Accommodation services account for 8% of all tourism enterprises in the SDC area; a higher proportion than the YTH region (6%).

13.3.14. The remaining 25% of tourism enterprises in the SDC area are in cultural, sports, recreational and conference activities.

13.3.15. In 2021, accommodation and food services generated £32.3m in GVA across the SDC area, equating to 1.5% of the total area's GVA[66]. In comparison, accommodation and food tourism across the YTH region equate to 2.4% of the total GVA.

**Community Uses**

13.3.16. Across the Local Study Area, there are a number of community facilities, including primary and secondary schools, village halls, leisure facilities (playing fields, play space, golf course), Post Office/ village shops, public houses and places of worship.

[65] ONS, UK Business Counts 2021 [downloaded from NOMIS on 21 April 2022 https://www.nomisweb.co.uk/]
[66] Oxford Economics, 2021 (26 January 2022 release)

**Recreational Use / PRoW**

13.3.17. As shown on Figure 10.2, there are a number of public footpaths that run through the site, including:

- PRoW 35.14 – Runs through several fields in the northern part of the site and crosses over Hagg Bush Lane;
- PRoW 35.17 – Within close proximity to PROW 35.14, runs along the boundary of a northern part of the site, accessible via Chestercourt Lane;
- PRoW 35.18 – Begins at the northern boundary of the site in fields within the vicinity of Brick Lands Lane and continues north towards Jowland Winn Lane. A section also runs from Carlton, over the railway line and into the site;
- PRoW 35.38 – originates along Old Lane and extends northwards through a southern part of the site onto Brick Lands Lane; and
- PRoW 35.18 – travels along the western boundary of the part of the site located between Sandwith Lane and Race Lane.

13.3.18. In addition, there are a number of further PRoWs on land adjacent to the site, and the Trans Pennine Trail.

## 13.4. Project Basis for Scoping Assessment

13.4.1. The Proposed Development is an NSIP that has the potential to create a number of economic benefits, including creating employment opportunities and contributing to the local economy through associated workforce expenditure, the creation of GVA and energy generation. However, there is the potential for the Proposed Development to have adverse effects on existing residential, community, tourism and recreation uses, including PRoWs.

## 13.5. Embedded Mitigation

13.5.1. Relevant measures described in other sections of the Scoping Report (for example, Landscape and Views and Noise assessments) will also reduce the potential for adverse effects on socio-economic aspects and are not repeated here.

## 13.6. Likely Significant Effects

13.6.1. Having regard to the preliminary baseline conditions presented above, the Proposed

Development has the potential to have likely significant socio-economic effects during the construction, operational and decommissioning phases.

**Construction Phase**

13.6.2. Construction of the Proposed Development is likely to result in both direct and indirect socio-economic effects, including:

- generation of employment directly associated with construction works of the Proposed Development;
- generation of employment from construction supply chain effects (indirect);
- economic contribution (measured in GVA of both direct and indirect construction employment);
- expenditure from construction workforce; and
- noise and visual effects on nearby residential properties, community uses, tourism, recreation (including PRoWs) and local business. This part of the assessment will be informed by the Landscape and Views and Noise assessments.

13.6.3. The effects on residential properties, community uses, tourism and recreation (including PRoWs) will be localised to the site. The scale and spatial distribution of direct and indirect employment effects will depend on the locations of the companies carrying out the activities and from where they source their labour. However, it is considered that the main impact areas for the economic effects (expenditure and GVA creation) will be the Wider Study Area, as established through assessment of the preliminary baseline conditions.

13.6.4. Effects during the construction phase will be temporary in nature.

**Operational Phase**

13.6.5. The operational phase of the Proposed Development has the potential to result in the following socio-economic effects:

- distribution and energy system effects, including the contribution that the Proposed Development will make to energy generation; and
- noise and visual effects on nearby residential properties, community uses, tourism, recreation (including PRoWs) and local business. This part of the

assessment will be informed by the Landscape and Views and Noise assessments.

13.6.6. The main impact area of the energy effects will be national as the renewable energy produced will feed into the national grid. The impact area for the effects on residential properties, community uses, tourism and recreation will be localised to the site.

**Decommissioning Phase**

13.6.7. Decommissioning of the Proposed Development will generate further direct and indirect socio-economic effects similar to those during the construction phase. However, the scale of these impacts is not possible to assess quantitatively due to the uncertainty over the nature and costs of this activity, particularly as the energy sector and associated engineering technologies are expected to evolve over the lifetime of the Proposed Development. A qualitative assessment will therefore be included.

## 13.7. Impacts Scoped Out of the Assessment

13.7.1. During the construction and decommissioning phases, there will be no effects on energy generation, as the Proposed Development will not be generating any energy during these phases. For this reason, effects on energy generation have been scoped out of the assessment during the construction and decommissioning phases.

13.7.2. The operational phase of the Proposed Development will result in on-site employment and associated workforce expenditure. However, this employment will be limited to only a small number of maintenance jobs and therefore operational employment and expenditure and economic output effects are not expected to be significant and for this reason are proposed to be scoped out of the assessment.

13.7.3. No existing PRoWs will be closed or diverted as a result of the Proposed Development and therefore access to the existing PRoW network will not be affected. On this basis, effects on access to PRoWs is proposed to be scoped out of the assessment. However, the amenity value associated with PRoWs will still be considered during all three phases (construction, operational and decommissioning) in respect of visual impacts, which will be informed by the Landscape and Views assessment.

## 13.8. Proposed Approach to ES

13.8.1. The socio-economic assessment will be predominantly informed by a desk-based study (to determine the national and local policy context and baseline conditions). However, a site-based survey of the PRoWs will be undertaken by Transport Planning Associates, the project Transport consultants, who are preparing the Transport and Access ES chapter.

13.8.2. Preliminary socio-economic baseline conditions have been presented earlier in this Section. However, the ES chapter will present an enhanced and updated baseline reporting on the latest data available at the time of writing, drawing on a combination of data sources including published statistics from the ONS such as Mid-Year Population Estimates, BRES and Census data, Experian, Oxford Economics and data provided by the Applicant.

13.8.3. The assessment of likely significant economic effects will follow guidance including the Homes and Communities Agency Additionality Guide[67] and Her Majesty's Treasury's *'Green Book for Economic Appraisal and Evaluation'*[68].

13.8.4. There is no best practice guidance available for assessing the significance of impacts from a development on socio-economic effects. The methodology for assessing the magnitude, sensitivity and significance of socio-economic effects will therefore be based on professional experience and judgement, having regard to the existing baseline position and using the criteria detailed in Section 3 (EIA Methodology) of this Scoping Report.

13.8.5. Those effects which have a moderate or major beneficial or adverse effect will be considered as significant and where effects are established as significant adverse, appropriate mitigation measures will be identified to inform the assessment of residual effects. Any employment and associated spending effects and community benefits are likely to be beneficial and therefore, no mitigation will be required for these receptors.

13.8.6. When assessing whether the Proposed Development will have a significant effect on residential populations, community uses, tourism and recreation, other technical chapters will be relied upon (such as Landscape and Views and Noise).

13.8.7. Cumulative socio-economic effects of the Proposed Development combined with

[67] HCA, Additionality Guide, 4th Edition, 2014
[68] HM Treasury, The Green Book: Central Government Guidance on Appraisal and Evaluation, 2020

those schemes detailed in Section 15 (Cumulative Effects) of this Scoping Report will be assessed. The cumulative assessment of economic receptors will consider the impact of the Proposed Development cumulatively with other developments in the supply chain and labour market capacity in the identified impact areas. Cumulative effects on residential populations, community uses, tourism and recreation receptors will be assessed using other technical chapters (such as Landscape and Views and Noise).

**Table 13.2 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Direct and indirect employment creation (Construction and Decommissioning phases only. Operational phase scoped out) | Medium | Low to Medium | Minor/ Moderate Beneficial | Scoped In (Operational phase scoped out) |
| Creation of workforce expenditure (Construction and Decommissioning phases only. Operational phase scoped out) | Low | Low to Medium | Negligible/ Minor Beneficial | Scoped In (Operational phase scoped out) |
| Creation of GVA (all three phases scoped in) | Medium | Low to Medium | Minor/ Moderate Beneficial | Scoped In |
| Noise and visual effects on residential properties, community uses, tourism and recreation (all three phases) | Low | Low to Medium | Negligible/ Minor Adverse | Scoped In |
| Change to PRoW access and amenity (all three phases) | Low to Medium | Low to Medium | Negligible | Scoped Out |
| Contribution towards energy generation (Operational phase only. Construction and Decommissioning phases scoped out) | Medium to High | Low to Medium | Minor/ Major Beneficial | Scoped In (Operational phase only) |

# 14. Soils and Agricultural Land

## 14.1. Introduction

14.1.1. An assessment of the likely significant effects of the Proposed Development on Agricultural Land and Soils will be undertaken.

14.1.2. This section provides a summary of baseline information collected to date and further baseline data collection to be undertaken to inform the assessment of the likely significant effects of the Proposed Development on agricultural land and soils and provides an overview of likely significant effects proposed to be assessed within the ES chapter.

## 14.2. Study Area

14.2.1. The study area is limited to the site, as shown at Figure 1.1 Site Location Plan. The field survey of the baseline study that has been undertaken is limited to the 'Development Area' part of the site shown on Figure 1.1. This is due to the very limited nature of any impact on soils and agriculture in the 'Underground Cable Connection' area shown on Figure 1.1 and the expectation, based on the initial desk study, that the baseline conditions in this area will be similar to the adjacent land within the site that has been surveyed. This will be confirmed as part of the baseline assessment for the ES.

## 14.3. Baseline Environment

14.3.1. A detailed agricultural land classification study has been undertaken on the 'Development Area' part of the site shown on Figure 1.1 Site Location Plan, which includes an initial desk study and subsequent fieldwork and assessment.

14.3.2. The study has been carried out by suitably trained surveyors in line with industry standards, as set out in the Soil Survey Field Handbook[69], Agricultural Land Classification of England and Wales[70] and TIN049[71].

[69] Hodgson J (1975), Soil Survey Field Handbook
[70] MAFF (1988), Agricultural Land Classification of England and Wales
[71] Natural England (2012), TIN049

### Initial Desk Study

14.3.3. The bedrock geology of the study area is recorded as comprising 'Sherwood Sandstone Group – Sandstone'. The superficial geology is recorded as variously comprising 'Breighton Sand Formation – Sand' and 'Hemingborough Glaciolacustrine Formation – Clay'.

14.3.4. The national soils map identifies five soil associations likely to be found on the site:

- Everingham Association – deep stoneless permeable fine sandy soils, some with bleached horizons;
- Newport 1 Association – deep well-drained sandy and course loamy soils;
- Sessay Association – fine and course loamy, often stoneless, soils affected by groundwater;
- Wick 1 Association – deep well-drained course loamy and sandy soils locally over gravel; and
- Foggathorpe 2 Association – slowly permeable seasonally waterlogged stoneless clayey and fine loamy over clayey soils.

14.3.5. The 1:250,000 Series Agricultural Land Classification map[72] identifies the majority of the site as comprising grade 2 agricultural land, with some areas of undifferentiated grade 3 agricultural land.

### Field Survey

14.3.6. The site was surveyed at a detailed level on a 100m by 100m grid, i.e. a density of one sample per hectare, with either a trial pit (dug with a spade) or augur sample (taken using a 50mm Dutch (Edleman) soil augur) reported at each sample location to a depth of 1.2m. The depth, colour, texture, stoniness, mottling and structure for each horizon[73] was recorded.

### Findings

14.3.7. The full findings of the field survey (refer to Appendix 14.1) will be included in the ES chapter.

[72] Available at: http://publications.naturalengland.org.uk/category/5954148537204736 Accessed in May 2022
[73] A soil horizon is a layer parallel to the soil surface whose physical, chemical and biological characteristics differ from the layers above and beneath.

14.3.8. In summary, the field survey identified soils largely consistent with those that would be expected based upon the geological and soils data identified in the initial desk study. The topsoil textures were as follows:

- Heavy textured topsoil: 1%;
- Medium textured topsoil: 10%; and
- Light textured topsoil: 89%.

14.3.9. The field survey identified the following land grades within the 550.93ha of the 'Development Area' part of the site (shown on Figures 14.1a and 14.1b). These are largely consistent with the 1:250,000 Series Agricultural Land Classification Map, as follows:

- Grade 1: 46.8ha (8.8%);
- Grade 2: 191.8ha (36.0%);
- Grade 3a: 262.5ha (49.3%);
- Grade 3b: 31.1ha (5.8%);
- Total Agricultural Land surveyed: 532.2ha; and
- Non-Agricultural land: 5.1ha

14.3.10. The area of land in the field survey covered 537.3ha of the 550.93ha Development Area. The remaining 13.63ha of land within the Development Area was not included in the survey, as this comprises woodland or uses such as farm buildings and roads.

14.3.11. As context, the latest agricultural land statistics[74] (DEFRA, 2021) state that in 2021, there was just over 8.8 million hectares of utilised agricultural land in England – this includes arable and horticultural crops, uncropped arable land, land used for outdoor pigs, temporary and permanent grassland and common rough grazing. Just under 4.9 million hectares of this is defined as croppable land (consisting of cereals, oilseeds, potatoes, other arable crops, horticultural crops, uncropped arable land and temporary grassland). It is estimated that if the Government's aspirations in the British Energy Security Strategy (2022) are realised (to deliver 70GW of solar capacity by 2035), and assuming 0.75ha is required for each MW generated, less than 2% of England's croppable land would be required (or 1% of 8.8 million hectares

[74] Available at: https://www.gov.uk/government/statistics/farming-statistics-land-use-livestock-populations-and-agricultural-workforce-as-at-1-june-2021-england Accessed in May 2022.

of utilised agricultural land in England).

## Figure 14.1a Map of ALC Grades

# Figure 14.1 - Map of ALC Grades

Grade 1

Grade 2

Grade 3a

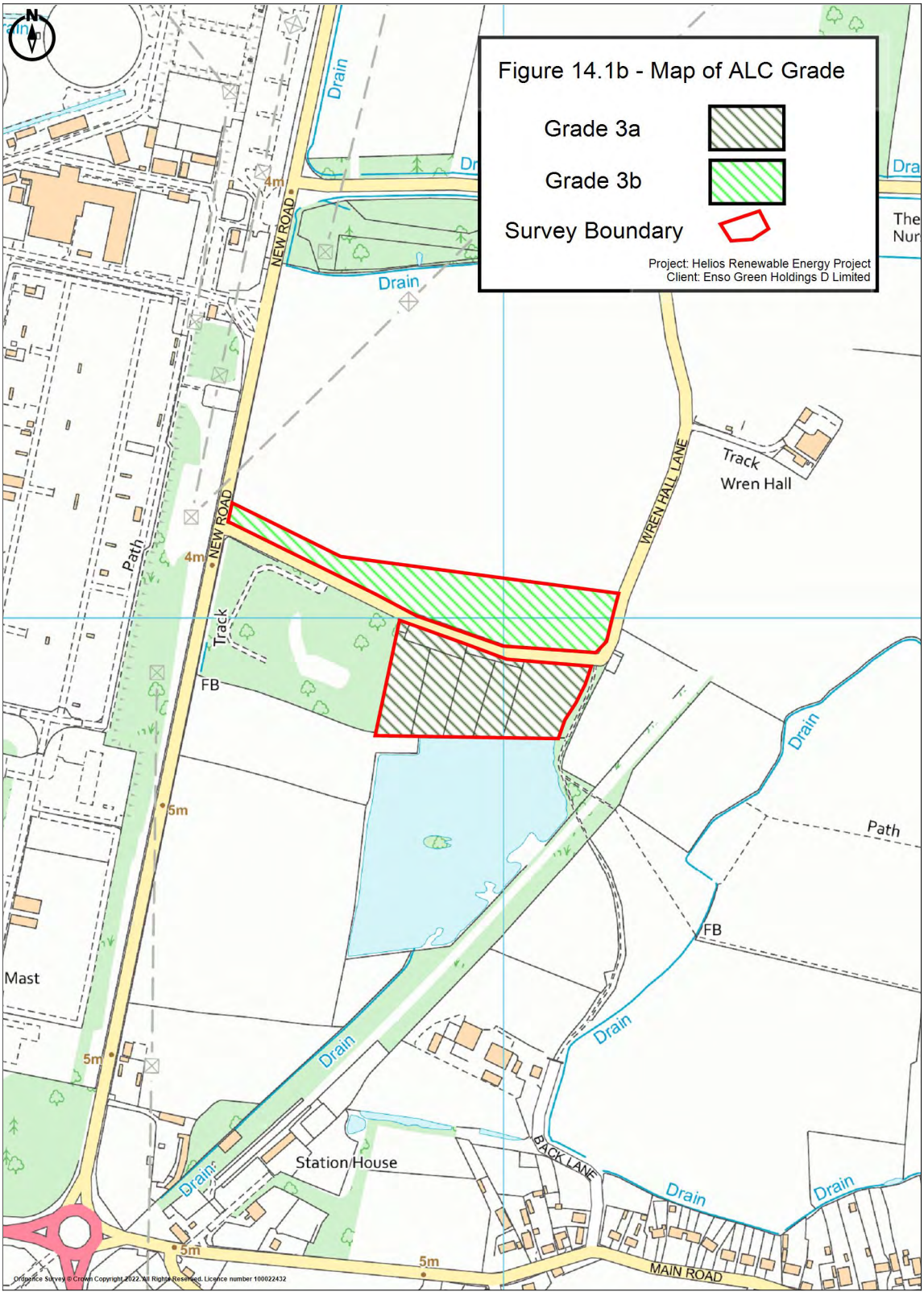
Grade 3b

Non-Agricultural

Survey Boundary

Project: Helios Renewable Energy Project
Client: Enso Green Holdings D Limited

## Figure 14.1b Map of ALC Grades



### Policy Context

14.3.12. Paragraph 5.11.8 of the Draft NPS EN-1 (2021) advises that a Soil Management Plan ('SMP') should be prepared and implemented to minimise any potential land contamination from a proposed development.

14.3.13. Paragraph 2.48.13 of Draft NPS EN-3 (2021) states that the use of BMV agricultural land should be avoided by solar projects, where possible, but that *'land type should not be a predominating factor in determining the suitability of the site location'*. Paragraph 2.48.15 states that solar projects are *'not prohibited on sites of agricultural land classified 1, 2 and 3a'* and that *'at this scale, it is likely that applicants' developments may use some agricultural land, however applicants should explain their choice of site, noting the preference for development to be on brownfield and non-agricultural land.'*

## 14.4. Project Basis for Scoping Assessment

14.4.1. The scoping assessment is based on the description of the Proposed Development set out in Section 2 (The Proposed Development) of this Scoping Report, along with a number of assumptions. The solar panels will be fixed to the ground on fully removeable piled frames which will be removed in the decommissioning phase.

14.4.2. Temporary compounds used during the construction and decommissioning phases will be fully removed and the land can be restored once construction and decommissioning have been completed. The only areas where any permanent structures will be located will be areas of access tracks and the bases for inverters and energy storage infrastructure that is likely to make up less than 3% of the total 'Development Area' part of the site, which is likely to be less than 20ha in total.

14.4.3. The whole site will be unavailable for agriculture during construction and decommissioning but will be available for grazing during the operational phase of the project.

14.4.4. The baseline assessment will present an overview of the agricultural land resource within the site and the wider region within which it sits.

## 14.5. Embedded Mitigation

14.5.1. It is assumed that during the operation of the Proposed Development, the areas

between and beneath solar panels will be planted with a suitable grazing mix that will allow the continued use of the land in agriculture, for grazing of sheep.

## 14.6. Likely Significant Effects

14.6.1. In the ES chapter, the assessment of the Proposed Development's likely significant effects will be separated into an assessment of the effects of the Proposed Development on the agricultural land resource and an assessment of effects of the Proposed Development on the soil resource.

**Agricultural Land Resource**

14.6.2. An 'Agricultural Impact Questionnaire' will be undertaken to identify the uses and land ownerships on the site. This will account for factors such as current agricultural management practices, agricultural yields and the end-use of any crop production. Potential impacts on severance will also be considered.

14.6.3. BMV agricultural land is present at the site. There are areas within the site where fixed equipment is proposed which will, for the purpose of EIA, be considered to comprise permanent development. These make up less than 3% of the Development Area. The ALC grading and quantum of these areas will be considered, and the significance of the loss assessed against the methodology in the IEMA's *'A New Perspective on Land and Soil in Environmental Impact Assessment'* (2022)[75].

14.6.4. The areas panels will not adversely affect the agricultural land classification.

**Soil Resource and Soil Function**

14.6.5. The assessment of the Proposed Development's likely significant effects on soil resource and function will be based on the IEMA's '*A New Perspective on Land and Soil in Environmental Impact Assessment'* (2022). Appendix 14.2 sets out its guidance on identifying the magnitude of impact and significance of effect on soil resource and function. This guidance will be applied to the assessment of the Proposed Development.

14.6.6. The IEMA Guidance sets out at Annex D (Table 1) the circumstances where development is likely to affect soil health. These include where changes of use could

[75] Institute for Environmental Management and Assessment (IEMA) (2022) *A New Perspective on Land and Soil In Environmental Impact Assessment.* Accessed May 2022.

have adverse effects on soil health, effects from construction activities, and temporary or permanent displacement of soils. A Soil Resource Plan, as necessary tied in with a Soil Management Plan (secured by DCO requirement), can be used to avoid or reduce these effects.

14.6.7. The assessment will also consider the change of use of land management at the site from arable agriculture to grassland, including reduction or removal of fertilizer and pesticide usage and management to increase soil organic matter, and whether these will have beneficial or adverse effects on soil health.

## 14.7. Impacts Scoped Out of the Assessment

14.7.1. Temporary displacement of soil in the areas where the Proposed Development's cables are to be buried is not considered to result in any significant effects and so is proposed to be scoped out of the assessment but will be included in a Soil Management Plan secured by DCO requirement.

14.7.2. Temporary loss of agricultural land during the Proposed Development's construction and decommissioning phases is so short term that it is not considered significant. Therefore, it is proposed to be scoped out of the assessment, although best practice measures to be implemented will be included in a Soil Management Plan.

14.7.3. The Proposed Development's effects on agricultural employment will be assessed in the Socio-economics ES chapter and scoped out of this chapter.

## 14.8. Proposed Approach to the ES

14.8.1. The baseline assessment in the ES chapter will include baseline data on soil texture and structure relevant to soil health. Testing to ascertain soil organic matter and soil macro and micronutrients at the site will be undertaken.

14.8.2. The effects of the Proposed Development on the agricultural land resource and on the soil resource and soil function will be assessed in terms of the construction phase, the operational phase and the decommissioning phase, where these are likely to be significant, in line with best practice and the IEMA Guidance.

14.8.3. In summary, the ES Chapter will:

- Identify baseline conditions;

- Consult with stakeholders;
- Set out the policy and legislative context;
- Define the assessment methodology;
- Set out the likely significant effects;
- Describe the proposed mitigation measures;
- Set out the likely residual effects; and
- Set out the likely cumulative effects.

**Table 14.1 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| Temporary loss of agricultural land resource during the construction and decommissioning phases (e.g. construction compounds) | Negligible | Negligible | Neutral | Scoped Out |
| Agricultural land affected by fixed infrastructure for the duration of the operational phase | Moderate | High to Very High | Large to Very Large | Scoped In |
| Agricultural land temporarily affected or displaced by construction activities | Minor | High | Slight | Scoped In |
| Soils temporarily affected or trafficked by construction | Minor | Medium to High | Slight to Moderate | Scoped In |
| Agricultural land around and under the solar arrays for the duration of the operational phase | Negligible/ Minor | High to Very High | Slight | Scoped In |
| Temporary displacement of soil in areas only affected by cable runs during the construction | Negligible | Negligible | Neutral | Scoped Out |

**Table 14.1 - Summary of Effects & Impacts**

| Receptor, Project Activity & Potential Impact | Anticipated Magnitude | Anticipated importance / sensitivity | Likely Significance of effect at Scoping Stage (Pre-Mitigation) | Proposed Approach – Scoped In / Scoped Out |
|---|---|---|---|---|
| phase | | | | |
| Change of use of land management from arable agriculture to grassland including removal of fertilizer and pesticide usage and management to increase soil organic matter | Major | High | Large to Very Large | Scoped In |

# 15. Cumulative Effects

## 15.1. Introduction

15.1.1. The ES will consider the potential for likely significant cumulative effects on the environment. This will include:

- intra-project effects, which are also known as interactive effects (those resulting from multiple impacts/aspects of the Proposed Development affecting a single receptor); and
- inter-project effects (those resulting from the Proposed Development combined with other schemes in the area).

15.1.2. Intra-project effects require consideration of all completed technical assessments and therefore will be reported in the concluding chapter of the ES. Assessment will be qualitative, based on professional judgment following review of the conclusions of the technical assessments.

15.1.3. Cumulative effects (inter-project) are defined in paragraph 5(e) of Schedule 4 to the EIA Regulations as:

> *'the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.'*

15.1.4. The best practice approach to cumulative schemes requires inclusion of proportionate information relating to projects that are not yet consented, dependent on the level of certainty of them coming forward. In this regard, the Planning Inspectorate's *Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects*[76], is relevant to this Scoping Report.

## 15.2. Cumulative Schemes

15.2.1. Table 15.1 below details projects that have been identified for the assessment of likely significant cumulative effects on the environment for the purposes of the ES.

[76] Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ Accessed in April 2022

The information contained within **Error! Reference source not found.**Table 15.1 is based upon information available on SDC's website[77] and it is acknowledged that this may change as the scheme progresses. The final list of cumulative schemes will be agreed with SDC and NYCC prior to completion of the ES.

[77] Selby District Council website (www.selby.gov.uk) [Online]. Accessed on 24 February 2022.

**Table 15.1 Cumulative Schemes**

| Project Reference | Description | Status | Distance |
|---|---|---|---|
| Drax Bioenergy with Carbon Capture and Storage Project NSIP | • Carbon capture infrastructure at the Drax Power Station;<br>• Compression and treatment of carbon dioxide at the Drax Power Station to allow connection to a National Grid carbon dioxide transport system;<br>• Potential Upgraded Drax Jetty and Road Improvements to facilitate the transport of abnormal indivisible loads; and<br>• Potential Environmental Mitigation Area to the north of the Drax Power Station. | EIA Scoping stage<br><br>DCO application expected to be submitted to the Inspectorate in Q2 2022 | Adjacent to the eastern part of the site boundary |
| Land Off New Road, Drax (Ref: 2020/1357/FULM | Development of an energy storage facility including battery storage containers; substations; power conversion systems; transformers and associated switchgear; HVAC equipment; communications and grid compliance equipment; temporary construction compound; CCTV; fencing; infrared lighting; access, drainage and landscaping works and associated development | Consented in May 2021<br><br>Not yet under construction | Adjacent to the eastern part of the site boundary |
| Land Off Hales Lane, Drax (Ref: 2021/1089/FULM) | Development of a battery storage facility, associated infrastructure, access and grid connection | Consented in May 2022<br><br>Not yet under construction | Adjacent to the eastern part of the site boundary |

**Table 15.1 Cumulative Schemes**

| Project Reference | Description | Status | Distance |
|---|---|---|---|
| Land North and South of Camela Lane, Camblesforth | Development of a ground mounted solar farm including associated infrastructure | Pending consideration | Adjacent to the eastern part of the site boundary |
| Drax Power Station, Drax (Ref: 2022/0107/NYSCO) | Barlow Ash Mound, North West of Drax Power Station | Request for EIA Scoping Opinion<br><br>Planning application not yet submitted | Adjacent to the eastern part of the site boundary |
| Home Farm, Barlow Road (Ref: 2021/1154/FUL) | Erection of 50MW battery energy storage system and associated external works | Pending consideration | Approximately 800m east of the site boundary |
| Eggborough Power Station, Selby Road, Eggborough (Ref: 2019/1343/EIA) | Hybrid application for demolition of part of the former power station and ancillary buildings and its redevelopment: (i) access into the site, internal roads, employment units, car parking, drainage infrastructure and landscaping and (ii) outline for the scale of redevelopment of the remainder of the site for employment floorspace, proposed buildings with ridge being between 9.5 metres and 24.5 metres, car parking, drainage infrastructure and strategic landscaping | Consented in October 2020<br><br>Not yet under construction | Approximately 2.9km to the west of the site boundary |

**Table 15.1 Cumulative Schemes**

| Project Reference | Description | Status | Distance |
|---|---|---|---|
| Rusholme Grange, Rusholme Lane, Newland, Selby (Ref: 2021/0601/FUL) | Construction of battery energy storage system to provide energy balancing services to the National Grid, including bund and landscaping | Consented in September 2021 | Approximately 2.9km to the east of the site boundary |
| Former Mushroom Farm, Gateforth, New Road, Brayton, Selby (Ref: 2018/0743/FULM | Demolition of buildings and removal of concrete hard standing and redevelopment of site to create a retirement village comprising a change of use of land to site 168 residential park home caravans, temporary reception lodge, shop and sales home, community centre with meeting hall, kitchen, toilets, office, shop, outdoor terrace, village green, and provision of lakes, ponds, public and private amenity spaces, estate roads, car parking, bus laybys, refuse stores, maintenance building and yard | Consented in January 2021<br><br>Under construction | Approximately 3.6km to the west of the site boundary |
| N S D S Centre, Field Lane, Thorpe Willoughby, Selby (Ref: 2018/0134/REMM) | Reserved matters application relating to access, appearance, landscaping, layout and scale for 70 dwellings following outline approval ref. 2013/1041/OUT | Consented in July 2020<br><br>Not yet under construction | Approximately 4km to the north west of the site boundary |
| Brownfield Site, Olympia Park, Barlby | Proposed site preparation and construction of an access road to facilitate the wider Olympia Park development site with | Pending consideration | Approximately 4km to the north east of |

**Table 15.1 Cumulative Schemes**

| Project Reference | Description | Status | Distance |
|---|---|---|---|
| Road, Barlby, Selby (Ref. 2019/1027/EIA) | associated development and infrastructure | | the site boundary |
| Land near Osgodby Grange, South Duffield Road, Osgodby, Selby (Ref: 2021/0978/FULM) | Installation of renewable energy generating station comprising ground mounted PV solar arrays together with substation, transformer stations, site accesses, internal access tracks, security measures, access gates, other ancillary infrastructure and landscaping and biodiversity enhancements | Pending consideration | Approximately 7km to the north east of the site boundary |
| Former Kellingley Colliery, Turvers Lane, Kellingley, Knottingley (Ref: 2016/1343/OUTM) | Outline application including means of access (all other matters reserved) for the construction of an employment park up to 1.45 million square feet ('sq ft') (135,500sqm) gross floor space gross internal area ('GIA') comprising of B2, B8 and ancillary B1 uses, ancillary non-residential institution (Use Class D1) and retail uses (Use Classes A1 – A5) and related ancillary infrastructure | Consented in February 2019 | Approximately 10km to the west of the site boundary |
| Bradholme Farm, High Levels Bank, Thorne, Doncaster<br><br>(Ref: 21/00500/OUTA) | Outline planning application for the demolition of an existing bungalow and associated buildings/ structures and all hardstanding and erection of up to 2,900,000 (sq ft') of employment space (Class E(g), B2 and B8 uses) with all matters reserved apart from access. | Pending consideration | Approximately 10km south east of the site boundary |

# 16. Conclusions

16.1.1. This Scoping Report has been produced in accordance with the EIA Regulations and is submitted in support of a request pursuant to Regulation 10 of the EIA Regulations for a Scoping Opinion from the SoS on the scope, and level of detail, of the information to be provided in the ES. It includes the information required by Regulation 10(3) as follows:

- a plan sufficient to identify the land;
- a description of the proposed development, including its location and technical capacity;
- an explanation of the likely significant effects of the development on the environment; and
- Such other information or representations as the person making the request may wish to provide or make.

16.1.2. A discussion of the technical topics proposed to be scoped out of the ES, informed by professional judgement, surveys and desk-based research, has been provided. The topics proposed to be scoped out comprise:

- Air Quality;
- Land Contamination;
- Human Health (in part);
- Major Accidents and Disasters (in part);
- Electric, Magnetic and Electromagnetic Fields;
- Telecommunications, Television Reception and Utilities;
- Wind Microclimate;
- Daylight, Sunlight and Overshadowing;
- Glint and Glare;
- Lighting;
- Minerals; and
- Waste.

16.1.3. The topics that are proposed to be scoped in to the ES are set out in Table 16.1 below.

**Table 16.1: Proposed Scope of the ES**

| Topics | Proposed ES Approach |
|---|---|
| Cultural Heritage | Chapter to be prepared (see Section 6 for scope) |
| Landscape and Views | Chapter to be prepared (see Section 7 for scope) |
| Biodiversity | Chapter to be prepared (see Section 8 for scope) |
| Water Environment | Chapter to be prepared (see Section 9 for scope) |
| Transport and Access | Chapter to be prepared (see Section 10 for scope) |
| Noise | Chapter to be prepared (see Section 11 for scope) |
| Climate Change | Chapter to be prepared (see Section 12 for scope) |
| Socio-economics | Chapter to be prepared (see Section 13 for scope) |
| Soils and Agricultural Land | Chapter to be prepared (see Section 14 for scope) |
| Human Health | Separate topic chapter scoped out of the ES (topic considered in Traffic and Access and Noise ES chapters) |
| Major Accidents and Disasters | Separate topic chapter scoped out of the ES (topic considered in Water Environment, Transport and Access, Landscape and Views and Climate Change ES chapters) |

16.1.4. The application for a DCO for Helios Renewable Energy Project will be made to the Inspectorate on behalf of the SoS for determination in accordance with the PA2008. The ES to be submitted in support of the application will be prepared in accordance with the SoS's Scoping Opinion.

# Appendix 4.1: Glint and Glare Initial Assessment

## Results Tables

# Appendix 4.1A: Tables

# Appendix 4.1A: Tables

Table 1 – Residential Based Receptors

| Receptor | Easting | Northing | Glint and Glare Possible |
|---|---|---|---|
| 1 | 460284 | 428974 | Yes |
| 2 | 460463 | 428950 | Yes |
| 3 | 460501 | 428988 | Yes |
| 4 | 461230 | 428567 | Yes |
| 5 | 461149 | 428419 | Yes |
| 6 | 461174 | 428364 | Yes |
| 7 | 460969 | 428017 | Yes |
| 8 | 460867 | 427824 | Yes |
| 9 | 459745 | 427393 | Yes |
| 10 | 459800 | 427265 | Yes |
| 11 | 459820 | 427248 | Yes |
| 12 | 459846 | 427219 | Yes |
| 13 | 459867 | 427152 | Yes |
| 14 | 460282 | 426909 | Yes |
| 15 | 460321 | 426894 | Yes |
| 16 | 460578 | 426866 | Yes |
| 17 | 461424 | 427002 | Yes |
| 18 | 462463 | 425919 | Yes |
| 19 | 462428 | 425844 | Yes |
| 20 | 463044 | 425770 | Yes |
| 21 | 460693 | 425194 | Yes |
| 22 | 460661 | 425109 | Yes |
| 23 | 460596 | 425008 | Yes |
| 24 | 460577 | 425079 | Yes |
| 25 | 460390 | 425029 | Yes |
| 26 | 460348 | 425087 | Yes |
| 27 | 460071 | 425088 | Yes |

| | | | |
|---|---|---|---|
| 28 | 460672 | 424904 | Yes |
| 29 | 460639 | 424823 | Yes |
| 30 | 460590 | 424785 | Yes |
| 31 | 460882 | 424791 | Yes |
| 32 | 460758 | 424682 | Yes |
| 33 | 460897 | 424643 | Yes |
| 34 | 460995 | 424600 | Yes |
| 35 | 461089 | 424544 | Yes |
| 36 | 461175 | 424508 | Yes |
| 37 | 461217 | 424476 | Yes |
| 38 | 461268 | 424446 | Yes |
| 39 | 461321 | 424465 | Yes |
| 40 | 461353 | 424523 | Yes |
| 41 | 461376 | 424401 | Yes |
| 42 | 461462 | 424379 | Yes |
| 43 | 461527 | 424363 | Yes |
| 44 | 462074 | 424242 | Yes |
| 45 | 462110 | 424142 | Yes |
| 46 | 462182 | 424171 | Yes |
| 47 | 462255 | 424063 | Yes |
| 48 | 462341 | 424014 | Yes |
| 49 | 462460 | 423990 | Yes |
| 50 | 462652 | 423881 | Yes |
| 51 | 462783 | 423855 | Yes |
| 52 | 462688 | 423923 | Yes |
| 53 | 462602 | 424262 | Yes |
| 54 | 462570 | 424264 | Yes |
| 55 | 462574 | 424276 | Yes |
| 56 | 462843 | 424299 | Yes |

| | | | |
|---|---|---|---|
| 57 | 462654 | 424357 | Yes |
| 58 | 462287 | 424494 | Yes |
| 59 | 462290 | 424667 | Yes |
| 60 | 462292 | 424677 | Yes |
| 61 | 462552 | 424658 | Yes |
| 62 | 462555 | 424666 | Yes |
| 63 | 462292 | 424847 | Yes |
| 64 | 462405 | 424835 | Yes |
| 65 | 462417 | 424836 | Yes |
| 66 | 462503 | 424880 | Yes |
| 67 | 462746 | 424806 | Yes |
| 68 | 462757 | 424805 | Yes |
| 69 | 462723 | 424780 | Yes |
| 70 | 462730 | 424779 | Yes |
| 71 | 462700 | 424753 | Yes |
| 72 | 463711 | 424892 | Yes |
| 73 | 463765 | 424897 | Yes |
| 74 | 463714 | 424858 | Yes |
| 75 | 463768 | 424862 | Yes |
| 76 | 464337 | 424796 | Yes |
| 77 | 464165 | 423643 | Yes |
| 78 | 464410 | 424037 | Yes |
| 79 | 464444 | 424180 | Yes |
| 80 | 464424 | 424277 | Yes |
| 81 | 464397 | 424354 | Yes |
| 82 | 464507 | 424526 | Yes |
| 83 | 464691 | 424522 | Yes |
| 84 | 464838 | 424571 | Yes |
| 85 | 464965 | 424604 | Yes |

| | | | |
|---|---|---|---|
| 86 | 465098 | 424606 | Yes |
| 87 | 464881 | 424673 | Yes |
| 88 | 464951 | 424759 | Yes |
| 89 | 465116 | 424827 | Yes |
| 90 | 464789 | 425066 | Yes |
| 91 | 464825 | 425087 | Yes |
| 92 | 465253 | 426217 | Yes |
| 93 | 465321 | 425933 | Yes |
| 94 | 465241 | 425883 | Yes |
| 95 | 465143 | 425827 | Yes |
| 96 | 465030 | 425745 | Yes |
| 97 | 464803 | 425733 | Yes |
| 98 | 464713 | 425727 | Yes |
| 99 | 464580 | 425808 | Yes |
| 100 | 464653 | 425917 | Yes |
| 101 | 464586 | 425981 | Yes |
| 102 | 464482 | 425938 | Yes |
| 103 | 464416 | 426046 | Yes |
| 104 | 464356 | 426091 | Yes |
| 105 | 464263 | 426144 | Yes |
| 106 | 464176 | 426102 | Yes |
| 107 | 464042 | 426163 | Yes |
| 108 | 463916 | 426249 | Yes |
| 109 | 463802 | 426285 | Yes |
| 110 | 463722 | 426255 | Yes |
| 111 | 463739 | 426351 | Yes |
| 112 | 463709 | 426379 | Yes |
| 113 | 464909 | 426535 | Yes |
| 114 | 464862 | 426585 | Yes |

| | | | |
|---|---|---|---|
| 115 | 463655 | 426694 | Yes |
| 116 | 463621 | 426907 | Yes |
| 117 | 463529 | 426954 | Yes |
| 118 | 462967 | 426587 | Yes |
| 119 | 462698 | 427088 | Yes |
| 120 | 462340 | 427300 | Yes |
| 121 | 462411 | 427453 | Yes |
| 122 | 463121 | 427618 | Yes |
| 123 | 464154 | 427314 | Yes |
| 124 | 463949 | 427482 | Yes |
| 125 | 464068 | 427669 | Yes |
| 126 | 463887 | 428085 | Yes |
| 127 | 462913 | 428116 | Yes |
| 128 | 462708 | 428213 | Yes |
| 129 | 462440 | 428281 | Yes |
| 130 | 461996 | 428478 | Yes |
| 131 | 462027 | 428486 | Yes |
| 132 | 462563 | 428653 | Yes |
| 133 | 462550 | 428688 | Yes |
| 134 | 462426 | 428731 | Yes |
| 135 | 462202 | 429147 | Yes |
| 136 | 462192 | 429190 | Yes |
| 137 | 462346 | 429402 | No |
| 138 | 462281 | 429465 | No |
| 139 | 461164 | 429041 | No |
| 140 | 461093 | 429007 | No |
| 141 | 461058 | 428943 | No |
| 142 | 460995 | 429051 | No |
| 143 | 460938 | 429017 | No |

| | | | |
|---|---|---|---|
| 144 | 460884 | 429050 | No |
| 145 | 463350 | 423682 | No |
| 146 | 463415 | 423570 | No |
| 147 | 463479 | 423531 | No |
| 148 | 463379 | 423393 | No |
| 149 | 463749 | 423618 | No |
| 150 | 463852 | 423684 | No |

Table 2 – Road Based Receptors

| Receptor | Easting | Northing | Glint and Glare Possible |
|---|---|---|---|
| 1 | 460185 | 428988 | Yes |
| 2 | 460373 | 428934 | Yes |
| 3 | 460518 | 429072 | Yes |
| 4 | 461217 | 428888 | Yes |
| 5 | 461409 | 428833 | Yes |
| 6 | 461560 | 428710 | Yes |
| 7 | 461757 | 428679 | Yes |
| 8 | 461931 | 428582 | Yes |
| 9 | 462121 | 428539 | Yes |
| 10 | 462276 | 428441 | Yes |
| 11 | 462475 | 428430 | Yes |
| 12 | 462170 | 429261 | Yes |
| 13 | 462268 | 429087 | Yes |
| 14 | 462366 | 428912 | Yes |
| 15 | 462461 | 428736 | Yes |
| 16 | 462555 | 428560 | Yes |
| 17 | 462654 | 428386 | Yes |
| 18 | 462751 | 428211 | Yes |
| 19 | 462847 | 428036 | Yes |
| 20 | 462944 | 427860 | Yes |
| 21 | 463041 | 427685 | Yes |
| 22 | 463138 | 427510 | Yes |
| 23 | 463234 | 427335 | Yes |
| 24 | 463331 | 427160 | Yes |
| 25 | 463428 | 426985 | Yes |
| 26 | 463525 | 426810 | Yes |
| 27 | 463623 | 426635 | Yes |

| | | | |
|---|---|---|---|
| 28 | 463721 | 426461 | Yes |
| 29 | 463846 | 426309 | Yes |
| 30 | 464014 | 426200 | Yes |
| 31 | 464196 | 426118 | Yes |
| 32 | 464374 | 426041 | Yes |
| 33 | 464561 | 425975 | Yes |
| 34 | 464626 | 425804 | Yes |
| 35 | 464755 | 425659 | Yes |
| 36 | 464863 | 425503 | Yes |
| 37 | 464858 | 425303 | Yes |
| 38 | 464847 | 425103 | Yes |
| 39 | 464835 | 424903 | Yes |
| 40 | 464822 | 424703 | Yes |
| 41 | 464810 | 424504 | Yes |
| 42 | 464798 | 424304 | Yes |
| 43 | 464757 | 424109 | Yes |
| 44 | 464639 | 424144 | Yes |
| 45 | 464587 | 424327 | Yes |
| 46 | 464389 | 424333 | Yes |
| 47 | 464236 | 424454 | Yes |
| 48 | 464130 | 424622 | Yes |
| 49 | 464045 | 424795 | Yes |
| 50 | 463904 | 424934 | Yes |
| 51 | 463779 | 425087 | Yes |
| 52 | 463705 | 425269 | Yes |
| 53 | 463564 | 425411 | Yes |
| 54 | 463407 | 425530 | Yes |
| 55 | 463258 | 425658 | Yes |
| 56 | 463379 | 425776 | Yes |

| | | | |
|---|---|---|---|
| 57 | 463399 | 425949 | Yes |
| 58 | 463523 | 426106 | Yes |
| 59 | 463677 | 426233 | Yes |
| 60 | 463074 | 425735 | Yes |
| 61 | 462896 | 425825 | Yes |
| 62 | 462804 | 425980 | Yes |
| 63 | 462632 | 426078 | Yes |
| 64 | 462704 | 426210 | Yes |
| 65 | 462803 | 426382 | Yes |
| 66 | 462946 | 426522 | Yes |
| 67 | 463031 | 426699 | Yes |
| 68 | 463514 | 426464 | Yes |
| 69 | 463339 | 426559 | Yes |
| 70 | 463173 | 426671 | Yes |
| 71 | 462990 | 426859 | Yes |
| 72 | 462843 | 426993 | Yes |
| 73 | 462684 | 427115 | Yes |
| 74 | 462518 | 427227 | Yes |
| 75 | 462416 | 427366 | Yes |
| 76 | 462452 | 427563 | Yes |
| 77 | 462488 | 427760 | Yes |
| 78 | 462524 | 427957 | Yes |
| 79 | 462564 | 428152 | Yes |
| 80 | 463796 | 428019 | Yes |
| 81 | 463695 | 427846 | Yes |
| 82 | 463597 | 427672 | Yes |
| 83 | 463501 | 427496 | Yes |
| 84 | 463418 | 427314 | Yes |
| 85 | 464702 | 426060 | Yes |

| | | | |
|---|---|---|---|
| 86 | 464831 | 426171 | Yes |
| 87 | 465030 | 426178 | Yes |
| 88 | 465213 | 426104 | Yes |
| 89 | 465412 | 426099 | Yes |
| 90 | 465617 | 426089 | Yes |
| 91 | 465447 | 425983 | Yes |
| 92 | 465278 | 425876 | Yes |
| 93 | 465111 | 425766 | Yes |
| 94 | 464945 | 425654 | Yes |
| 95 | 462761 | 423876 | Yes |
| 96 | 462566 | 423905 | Yes |
| 97 | 462381 | 423966 | Yes |
| 98 | 462207 | 424065 | Yes |
| 99 | 462036 | 424167 | Yes |
| 100 | 461858 | 424252 | Yes |
| 101 | 461664 | 424304 | Yes |
| 102 | 461472 | 424356 | Yes |
| 103 | 461282 | 424417 | Yes |
| 104 | 461104 | 424506 | Yes |
| 105 | 460931 | 424604 | Yes |
| 106 | 460737 | 424643 | Yes |
| 107 | 460604 | 424760 | Yes |
| 108 | 460650 | 424951 | Yes |
| 109 | 460462 | 425002 | Yes |
| 110 | 460264 | 425021 | Yes |
| 111 | 460067 | 425059 | Yes |
| 112 | 460619 | 425072 | Yes |
| 113 | 460733 | 425236 | Yes |
| 114 | 460870 | 425376 | Yes |

| | | | |
|---|---|---|---|
| 115 | 460946 | 425559 | Yes |
| 116 | 461045 | 425731 | Yes |
| 117 | 461137 | 425909 | Yes |
| 118 | 461219 | 426091 | Yes |
| 119 | 461289 | 426276 | Yes |
| 120 | 461285 | 426474 | Yes |
| 121 | 461222 | 426642 | Yes |
| 122 | 461070 | 426692 | Yes |
| 123 | 460988 | 426839 | Yes |
| 124 | 460789 | 426836 | Yes |
| 125 | 460589 | 426851 | Yes |
| 126 | 460403 | 426890 | Yes |
| 127 | 460236 | 426995 | Yes |
| 128 | 460123 | 427109 | Yes |
| 129 | 459968 | 427195 | Yes |
| 130 | 459799 | 427291 | Yes |
| 131 | 459740 | 427479 | Yes |
| 132 | 460690 | 429130 | No |
| 133 | 460880 | 429069 | No |
| 134 | 461070 | 429007 | No |
| 135 | 462011 | 429626 | No |
| 136 | 462073 | 429437 | No |
| 137 | 464057 | 423677 | No |
| 138 | 463866 | 423623 | No |
| 139 | 463686 | 423537 | No |
| 140 | 463491 | 423559 | No |
| 141 | 463316 | 423655 | No |
| 142 | 463138 | 423747 | No |
| 143 | 462955 | 423824 | No |

Table 3 – Rail Based Receptors

| Receptor | Easting | Northing | Glint and Glare Possible |
|---|---|---|---|
| 1 | 460955 | 428919 | Yes |
| 2 | 460921 | 428722 | Yes |
| 3 | 460886 | 428525 | Yes |
| 4 | 460853 | 428328 | Yes |
| 5 | 460818 | 428130 | Yes |
| 6 | 460783 | 427934 | Yes |
| 7 | 460749 | 427736 | Yes |
| 8 | 460714 | 427539 | Yes |
| 9 | 460680 | 427342 | Yes |
| 10 | 460646 | 427145 | Yes |
| 11 | 460611 | 426948 | Yes |
| 12 | 460577 | 426751 | Yes |
| 13 | 460542 | 426554 | Yes |
| 14 | 460508 | 426357 | Yes |
| 15 | 460439 | 425962 | Yes |
| 16 | 460405 | 425765 | Yes |
| 17 | 460370 | 425568 | Yes |
| 18 | 460336 | 425371 | Yes |
| 19 | 460300 | 425174 | Yes |
| 20 | 460266 | 424977 | Yes |
| 21 | 460233 | 424780 | Yes |
| 22 | 460201 | 424582 | Yes |
| 23 | 460169 | 424429 | Yes |
| 24 | 460196 | 424627 | Yes |
| 25 | 460210 | 424827 | Yes |
| 26 | 460211 | 425027 | Yes |
| 27 | 460199 | 425227 | Yes |

| | | | |
|---|---|---|---|
| 28 | 460175 | 425425 | Yes |
| 29 | 462762 | 423857 | Yes |
| 30 | 462934 | 423960 | Yes |
| 31 | 463105 | 424063 | Yes |
| 32 | 463276 | 424167 | Yes |
| 33 | 463448 | 424269 | Yes |
| 34 | 463618 | 424374 | Yes |
| 35 | 463790 | 424478 | Yes |
| 36 | 463961 | 424581 | Yes |
| 37 | 464132 | 424685 | Yes |
| 38 | 464303 | 424788 | Yes |
| 39 | 464475 | 424891 | Yes |
| 40 | 464645 | 424995 | Yes |
| 41 | 464817 | 425098 | Yes |
| 42 | 464988 | 425202 | Yes |
| 43 | 465160 | 425305 | Yes |
| 44 | 465331 | 425409 | Yes |
| 45 | 465502 | 425512 | Yes |
| 46 | 465673 | 425616 | Yes |
| 47 | 461129 | 429904 | No |
| 48 | 461094 | 429707 | No |
| 49 | 461060 | 429510 | No |
| 50 | 461025 | 429313 | No |
| 51 | 460990 | 429116 | No |
| 52 | 461967 | 423254 | No |
| 53 | 462118 | 423385 | No |
| 54 | 462270 | 423516 | No |
| 55 | 462425 | 423641 | No |
| 56 | 462591 | 423753 | No |

Table 4 – Potential for Glint and Glare impact on Residential Receptors

| Receptor | Glint Possible from Site | | Potential Glare Impact (per year) | | Magnitude of Impact |
|---|---|---|---|---|---|
| | AM | PM | Minutes | Hours | |
| 1 | No | No | 0 | 0 | **None** |
| 2 | No | No | 0 | 0 | **None** |
| 3 | No | No | 0 | 0 | **None** |
| 4 | No | No | 0 | 0 | **None** |
| 5 | No | No | 0 | 0 | **None** |
| 6 | No | No | 0 | 0 | **None** |
| 7 | No | No | 0 | 0 | **None** |
| 8 | No | No | 0 | 0 | **None** |
| 9 | No | No | 0 | 0 | **None** |
| 10 | No | No | 0 | 0 | **None** |
| 11 | No | No | 0 | 0 | **None** |
| 12 | No | No | 0 | 0 | **None** |
| 13 | No | No | 0 | 0 | **None** |
| 14 | No | No | 0 | 0 | **None** |
| 15 | No | No | 0 | 0 | **None** |
| 16 | No | No | 0 | 0 | **None** |
| 17 | No | No | 0 | 0 | **None** |
| 18 | No | No | 0 | 0 | **None** |
| 19 | No | No | 0 | 0 | **None** |
| 20 | No | No | 0 | 0 | **None** |
| 21 | No | No | 0 | 0 | **None** |
| 22 | No | No | 0 | 0 | **None** |
| 23 | No | No | 0 | 0 | **None** |
| 24 | No | No | 0 | 0 | **None** |
| 25 | No | No | 0 | 0 | **None** |
| 26 | No | No | 0 | 0 | **None** |

| | | | | | |
|---|---|---|---|---|---|
| 27 | No | No | 0 | 0 | **None** |
| 28 | No | No | 0 | 0 | **None** |
| 29 | No | No | 0 | 0 | **None** |
| 30 | No | No | 0 | 0 | **None** |
| 31 | No | No | 0 | 0 | **None** |
| 32 | No | No | 0 | 0 | **None** |
| 33 | No | No | 0 | 0 | **None** |
| 34 | No | No | 0 | 0 | **None** |
| 35 | No | No | 0 | 0 | **None** |
| 36 | No | No | 0 | 0 | **None** |
| 37 | No | No | 0 | 0 | **None** |
| 38 | No | No | 0 | 0 | **None** |
| 39 | No | No | 0 | 0 | **None** |
| 40 | No | No | 0 | 0 | **None** |
| 41 | No | No | 0 | 0 | **None** |
| 42 | No | No | 0 | 0 | **None** |
| 43 | No | No | 0 | 0 | **None** |
| 44 | No | No | 0 | 0 | **None** |
| 45 | No | No | 0 | 0 | **None** |
| 46 | No | No | 0 | 0 | **None** |
| 47 | No | No | 0 | 0 | **None** |
| 48 | No | No | 0 | 0 | **None** |
| 49 | No | No | 0 | 0 | **None** |
| 50 | No | No | 0 | 0 | **None** |
| 51 | No | No | 0 | 0 | **None** |
| 52 | No | No | 0 | 0 | **None** |
| 53 | No | No | 0 | 0 | **None** |
| 54 | No | No | 0 | 0 | **None** |
| 55 | No | No | 0 | 0 | **None** |
| 56 | No | No | 0 | 0 | **None** |

| | | | | | |
|---|---|---|---|---|---|
| 57 | No | No | 0 | 0 | **None** |
| 58 | No | No | 0 | 0 | **None** |
| 59 | No | No | 0 | 0 | **None** |
| 60 | No | No | 0 | 0 | **None** |
| 61 | No | No | 0 | 0 | **None** |
| 62 | No | No | 0 | 0 | **None** |
| 63 | No | No | 0 | 0 | **None** |
| 64 | No | No | 0 | 0 | **None** |
| 65 | No | No | 0 | 0 | **None** |
| 66 | No | No | 0 | 0 | **None** |
| 67 | No | No | 0 | 0 | **None** |
| 68 | No | No | 0 | 0 | **None** |
| 69 | No | No | 0 | 0 | **None** |
| 70 | No | No | 0 | 0 | **None** |
| 71 | No | No | 0 | 0 | **None** |
| 72 | No | No | 0 | 0 | **None** |
| 73 | No | No | 0 | 0 | **None** |
| 74 | No | No | 0 | 0 | **None** |
| 75 | No | No | 0 | 0 | **None** |
| 76 | No | No | 0 | 0 | **None** |
| 77 | No | No | 0 | 0 | **None** |
| 78 | No | No | 0 | 0 | **None** |
| 79 | No | No | 0 | 0 | **None** |
| 80 | No | No | 0 | 0 | **None** |
| 81 | No | No | 0 | 0 | **None** |
| 82 | No | No | 0 | 0 | **None** |
| 83 | No | No | 0 | 0 | **None** |
| 84 | No | No | 0 | 0 | **None** |
| 85 | No | No | 0 | 0 | **None** |
| 86 | No | No | 0 | 0 | **None** |

| | | | | | |
|---|---|---|---|---|---|
| 87 | No | No | 0 | 0 | **None** |
| 88 | No | No | 0 | 0 | **None** |
| 89 | No | No | 0 | 0 | **None** |
| 90 | No | No | 0 | 0 | **None** |
| 91 | No | No | 0 | 0 | **None** |
| 92 | No | No | 0 | 0 | **None** |
| 93 | No | No | 0 | 0 | **None** |
| 94 | No | No | 0 | 0 | **None** |
| 95 | No | No | 0 | 0 | **None** |
| 96 | No | No | 0 | 0 | **None** |
| 97 | No | No | 0 | 0 | **None** |
| 98 | No | No | 0 | 0 | **None** |
| 99 | No | No | 0 | 0 | **None** |
| 100 | No | No | 0 | 0 | **None** |
| 101 | No | No | 0 | 0 | **None** |
| 102 | No | No | 0 | 0 | **None** |
| 103 | No | No | 0 | 0 | **None** |
| 104 | No | No | 0 | 0 | **None** |
| 105 | No | No | 0 | 0 | **None** |
| 106 | No | No | 0 | 0 | **None** |
| 107 | No | No | 0 | 0 | **None** |
| 108 | No | No | 0 | 0 | **None** |
| 109 | No | No | 0 | 0 | **None** |
| 110 | No | No | 0 | 0 | **None** |
| 111 | No | No | 0 | 0 | **None** |
| 112 | No | No | 0 | 0 | **None** |
| 113 | No | No | 0 | 0 | **None** |
| 114 | No | No | 0 | 0 | **None** |
| 115 | No | No | 0 | 0 | **None** |
| 116 | No | No | 0 | 0 | **None** |

| | | | | | |
|---|---|---|---|---|---|
| 117 | No | No | 0 | 0 | **None** |
| 118 | No | No | 0 | 0 | **None** |
| 119 | No | No | 0 | 0 | **None** |
| 120 | No | No | 0 | 0 | **None** |
| 121 | No | No | 0 | 0 | **None** |
| 122 | No | No | 0 | 0 | **None** |
| 123 | No | No | 0 | 0 | **None** |
| 124 | No | No | 0 | 0 | **None** |
| 125 | No | No | 0 | 0 | **None** |
| 126 | No | No | 0 | 0 | **None** |
| 127 | No | No | 0 | 0 | **None** |
| 128 | No | No | 0 | 0 | **None** |
| 129 | No | No | 0 | 0 | **None** |
| 130 | No | No | 0 | 0 | **None** |
| 131 | No | No | 0 | 0 | **None** |
| 132 | No | No | 0 | 0 | **None** |
| 133 | No | No | 0 | 0 | **None** |
| 134 | No | No | 0 | 0 | **None** |
| 135 | No | No | 0 | 0 | **None** |
| 136 | No | No | 0 | 0 | **None** |

Table 5 – Potential Glint and Glare impact on Road Receptors

| Receptor | Green Glare (mins) | Yellow Glare (mins) | Red Glare (mins) | Magnitude of Impact |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | **None** |
| 2 | 0 | 0 | 0 | **None** |
| 3 | 0 | 0 | 0 | **None** |
| 4 | 0 | 0 | 0 | **None** |
| 5 | 0 | 0 | 0 | **None** |
| 6 | 0 | 0 | 0 | **None** |
| 7 | 0 | 0 | 0 | **None** |
| 8 | 0 | 0 | 0 | **None** |
| 9 | 0 | 0 | 0 | **None** |
| 10 | 0 | 0 | 0 | **None** |
| 11 | 0 | 0 | 0 | **None** |
| 12 | 0 | 0 | 0 | **None** |
| 13 | 0 | 0 | 0 | **None** |
| 14 | 0 | 0 | 0 | **None** |
| 15 | 0 | 0 | 0 | **None** |
| 16 | 0 | 0 | 0 | **None** |
| 17 | 0 | 0 | 0 | **None** |
| 18 | 0 | 0 | 0 | **None** |
| 19 | 0 | 0 | 0 | **None** |
| 20 | 0 | 0 | 0 | **None** |
| 21 | 0 | 0 | 0 | **None** |
| 22 | 0 | 0 | 0 | **None** |
| 23 | 0 | 0 | 0 | **None** |
| 24 | 0 | 0 | 0 | **None** |
| 25 | 0 | 0 | 0 | **None** |
| 26 | 0 | 0 | 0 | **None** |
| 27 | 0 | 0 | 0 | **None** |
| 28 | 0 | 0 | 0 | **None** |
| 29 | 0 | 0 | 0 | **None** |

| | | | | |
|---|---|---|---|---|
| 30 | 0 | 0 | 0 | **None** |
| 31 | 0 | 0 | 0 | **None** |
| 32 | 0 | 0 | 0 | **None** |
| 33 | 0 | 0 | 0 | **None** |
| 34 | 0 | 0 | 0 | **None** |
| 35 | 0 | 0 | 0 | **None** |
| 36 | 0 | 0 | 0 | **None** |
| 37 | 0 | 0 | 0 | **None** |
| 38 | 0 | 0 | 0 | **None** |
| 39 | 0 | 0 | 0 | **None** |
| 40 | 0 | 0 | 0 | **None** |
| 41 | 0 | 0 | 0 | **None** |
| 42 | 0 | 0 | 0 | **None** |
| 43 | 0 | 0 | 0 | **None** |
| 44 | 0 | 0 | 0 | **None** |
| 45 | 0 | 0 | 0 | **None** |
| 46 | 0 | 0 | 0 | **None** |
| 47 | 0 | 0 | 0 | **None** |
| 48 | 0 | 0 | 0 | **None** |
| 49 | 0 | 0 | 0 | **None** |
| 50 | 0 | 0 | 0 | **None** |
| 51 | 0 | 0 | 0 | **None** |
| 52 | 0 | 0 | 0 | **None** |
| 53 | 0 | 0 | 0 | **None** |
| 54 | 0 | 0 | 0 | **None** |
| 55 | 0 | 0 | 0 | **None** |
| 56 | 0 | 0 | 0 | **None** |
| 57 | 0 | 0 | 0 | **None** |
| 58 | 0 | 0 | 0 | **None** |

| | | | | |
|---|---|---|---|---|
| 59 | 0 | 0 | 0 | **None** |
| 60 | 0 | 0 | 0 | **None** |
| 61 | 0 | 0 | 0 | **None** |
| 62 | 0 | 0 | 0 | **None** |
| 63 | 0 | 0 | 0 | **None** |
| 64 | 0 | 0 | 0 | **None** |
| 65 | 0 | 0 | 0 | **None** |
| 66 | 0 | 0 | 0 | **None** |
| 67 | 0 | 0 | 0 | **None** |
| 68 | 0 | 0 | 0 | **None** |
| 69 | 0 | 0 | 0 | **None** |
| 70 | 0 | 0 | 0 | **None** |
| 71 | 0 | 0 | 0 | **None** |
| 72 | 0 | 0 | 0 | **None** |
| 73 | 0 | 0 | 0 | **None** |
| 74 | 0 | 0 | 0 | **None** |
| 75 | 0 | 0 | 0 | **None** |
| 76 | 0 | 0 | 0 | **None** |
| 77 | 0 | 0 | 0 | **None** |
| 78 | 0 | 0 | 0 | **None** |
| 79 | 0 | 0 | 0 | **None** |
| 80 | 0 | 0 | 0 | **None** |
| 81 | 0 | 0 | 0 | **None** |
| 82 | 0 | 0 | 0 | **None** |
| 83 | 0 | 0 | 0 | **None** |
| 84 | 0 | 0 | 0 | **None** |
| 85 | 0 | 0 | 0 | **None** |
| 86 | 0 | 0 | 0 | **None** |
| 87 | 0 | 0 | 0 | **None** |

| | | | | |
|---|---|---|---|---|
| 88 | 0 | 0 | 0 | **None** |
| 89 | 0 | 0 | 0 | **None** |
| 90 | 0 | 0 | 0 | **None** |
| 91 | 0 | 0 | 0 | **None** |
| 92 | 0 | 0 | 0 | **None** |
| 93 | 0 | 0 | 0 | **None** |
| 94 | 0 | 0 | 0 | **None** |
| 95 | 0 | 0 | 0 | **None** |
| 96 | 0 | 0 | 0 | **None** |
| 97 | 0 | 0 | 0 | **None** |
| 98 | 0 | 0 | 0 | **None** |
| 99 | 0 | 0 | 0 | **None** |
| 100 | 0 | 0 | 0 | **None** |
| 101 | 0 | 0 | 0 | **None** |
| 102 | 0 | 0 | 0 | **None** |
| 103 | 0 | 0 | 0 | **None** |
| 104 | 0 | 0 | 0 | **None** |
| 105 | 0 | 0 | 0 | **None** |
| 106 | 0 | 0 | 0 | **None** |
| 107 | 0 | 0 | 0 | **None** |
| 108 | 0 | 0 | 0 | **None** |
| 109 | 0 | 0 | 0 | **None** |
| 110 | 0 | 0 | 0 | **None** |
| 111 | 0 | 0 | 0 | **None** |
| 112 | 0 | 0 | 0 | **None** |
| 113 | 0 | 0 | 0 | **None** |
| 114 | 0 | 0 | 0 | **None** |
| 115 | 0 | 0 | 0 | **None** |
| 116 | 0 | 0 | 0 | **None** |

| | | | | |
|---|---|---|---|---|
| 117 | 0 | 0 | 0 | **None** |
| 118 | 0 | 0 | 0 | **None** |
| 119 | 0 | 0 | 0 | **None** |
| 120 | 0 | 0 | 0 | **None** |
| 121 | 0 | 0 | 0 | **None** |
| 122 | 0 | 0 | 0 | **None** |
| 123 | 0 | 0 | 0 | **None** |
| 124 | 0 | 0 | 0 | **None** |
| 125 | 0 | 0 | 0 | **None** |
| 126 | 0 | 0 | 0 | **None** |
| 127 | 0 | 0 | 0 | **None** |
| 128 | 0 | 0 | 0 | **None** |
| 129 | 0 | 0 | 0 | **None** |
| 130 | 0 | 0 | 0 | **None** |
| 131 | 0 | 0 | 0 | **None** |

Table 6 – Potential for Glint and Glare impact on Rail Receptors

| Receptor | Green Glare (mins) | Yellow Glare (mins) | Red Glare (mins) | Magnitude of Impact |
|---|---|---|---|---|
| 1 | 0 | 0 | 0 | **None** |
| 2 | 0 | 0 | 0 | **None** |
| 3 | 0 | 0 | 0 | **None** |
| 4 | 0 | 0 | 0 | **None** |
| 5 | 0 | 0 | 0 | **None** |
| 6 | 0 | 0 | 0 | **None** |
| 7 | 0 | 0 | 0 | **None** |
| 8 | 0 | 0 | 0 | **None** |
| 9 | 0 | 0 | 0 | **None** |
| 10 | 0 | 0 | 0 | **None** |
| 11 | 0 | 0 | 0 | **None** |
| 12 | 0 | 0 | 0 | **None** |
| 13 | 0 | 0 | 0 | **None** |
| 14 | 0 | 0 | 0 | **None** |
| 15 | 0 | 0 | 0 | **None** |
| 16 | 0 | 0 | 0 | **None** |
| 17 | 0 | 0 | 0 | **None** |
| 18 | 0 | 0 | 0 | **None** |
| 19 | 0 | 0 | 0 | **None** |
| 20 | 0 | 0 | 0 | **None** |
| 21 | 0 | 0 | 0 | **None** |
| 22 | 0 | 0 | 0 | **None** |
| 23 | 0 | 0 | 0 | **None** |
| 24 | 0 | 0 | 0 | **None** |
| 25 | 0 | 0 | 0 | **None** |
| 26 | 0 | 0 | 0 | **None** |

| | | | | |
|---|---|---|---|---|
| 27 | 0 | 0 | 0 | **None** |
| 28 | 0 | 0 | 0 | **None** |
| 29 | 0 | 0 | 0 | **None** |
| 30 | 0 | 0 | 0 | **None** |
| 31 | 0 | 0 | 0 | **None** |
| 32 | 0 | 0 | 0 | **None** |
| 33 | 0 | 0 | 0 | **None** |
| 34 | 0 | 0 | 0 | **None** |
| 35 | 0 | 0 | 0 | **None** |
| 36 | 0 | 0 | 0 | **None** |
| 37 | 0 | 0 | 0 | **None** |
| 38 | 0 | 0 | 0 | **None** |
| 39 | 0 | 0 | 0 | **None** |
| 40 | 0 | 0 | 0 | **None** |
| 41 | 0 | 0 | 0 | **None** |
| 42 | 0 | 0 | 0 | **None** |
| 43 | 0 | 0 | 0 | **None** |
| 44 | 0 | 0 | 0 | **None** |
| 45 | 0 | 0 | 0 | **None** |
| 46 | 0 | 0 | 0 | **None** |

# Appendix 4.1B: Residential Glare Results

# (Receptors 1 – 80)

ForgeSolar

# Helios Renewable Energy Project

## Residential Receptors 1 - 80

**Created** April 14, 2022
**Updated** April 14, 2022
**Time-step** 1 minute
**Timezone offset** UTC0
**Site ID** 67601.11927

**Project type** Advanced
**Project status:** active
**Category** 100 MW to 1 GW

### Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

## Summary of Results No glare predicted!

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced |
|---|---|---|---|---|---|
| | deg | deg | min | min | kWh |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - |

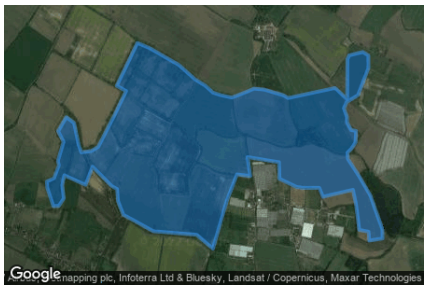
## Component Data

## PV Array(s)

**Total PV footprint area:** 4,863,335 m^2

**Name**: PV array 1
**Footprint area**: 1,213,127 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716640 | -1.074980 | 6.42 | 3.00 | 9.42 |
| 2 | 53.716234 | -1.075431 | 5.31 | 3.00 | 8.31 |
| 3 | 53.716221 | -1.075946 | 5.99 | 3.00 | 8.99 |
| 4 | 53.717224 | -1.076504 | 6.90 | 3.00 | 9.90 |
| 5 | 53.717555 | -1.076546 | 6.07 | 3.00 | 9.07 |
| 6 | 53.717732 | -1.075881 | 5.11 | 3.00 | 8.11 |
| 7 | 53.718431 | -1.075431 | 5.15 | 3.00 | 8.15 |
| 8 | 53.718685 | -1.075517 | 5.36 | 3.00 | 8.36 |
| 9 | 53.719713 | -1.075002 | 5.04 | 3.00 | 8.04 |
| 10 | 53.720297 | -1.075495 | 4.84 | 3.00 | 7.84 |
| 11 | 53.721059 | -1.074744 | 4.49 | 3.00 | 7.49 |
| 12 | 53.720742 | -1.074036 | 4.42 | 3.00 | 7.42 |
| 13 | 53.719548 | -1.073607 | 4.57 | 3.00 | 7.57 |
| 14 | 53.719142 | -1.073371 | 4.15 | 3.00 | 7.15 |
| 15 | 53.719218 | -1.072448 | 4.65 | 3.00 | 7.65 |
| 16 | 53.719434 | -1.071826 | 4.48 | 3.00 | 7.48 |
| 17 | 53.721135 | -1.070345 | 4.67 | 3.00 | 7.67 |
| 18 | 53.722481 | -1.069251 | 5.19 | 3.00 | 8.19 |
| 19 | 53.722760 | -1.070109 | 5.29 | 3.00 | 8.29 |
| 20 | 53.725096 | -1.068211 | 5.06 | 3.00 | 8.06 |
| 21 | 53.724816 | -1.067095 | 4.10 | 3.00 | 7.10 |
| 22 | 53.724232 | -1.065378 | 5.02 | 3.00 | 8.02 |
| 23 | 53.723902 | -1.064413 | 5.31 | 3.00 | 8.31 |
| 24 | 53.723102 | -1.062889 | 4.97 | 3.00 | 7.97 |
| 25 | 53.722772 | -1.061967 | 4.94 | 3.00 | 7.94 |
| 26 | 53.722391 | -1.061259 | 4.76 | 3.00 | 7.76 |
| 27 | 53.722239 | -1.060443 | 4.97 | 3.00 | 7.97 |
| 28 | 53.722125 | -1.059520 | 4.52 | 3.00 | 7.52 |
| 29 | 53.722468 | -1.058040 | 4.09 | 3.00 | 7.09 |
| 30 | 53.722607 | -1.057503 | 4.44 | 3.00 | 7.44 |
| 31 | 53.722556 | -1.056538 | 4.15 | 3.00 | 7.15 |
| 32 | 53.722239 | -1.054757 | 4.51 | 3.00 | 7.51 |
| 33 | 53.722099 | -1.054349 | 4.89 | 3.00 | 7.89 |
| 34 | 53.722645 | -1.050036 | 5.26 | 3.00 | 8.26 |
| 35 | 53.722036 | -1.048920 | 5.29 | 3.00 | 8.29 |
| 36 | 53.724207 | -1.048899 | 4.85 | 3.00 | 7.85 |
| 37 | 53.724423 | -1.048727 | 4.81 | 3.00 | 7.81 |
| 38 | 53.724601 | -1.047483 | 5.47 | 3.00 | 8.47 |
| 39 | 53.724410 | -1.046968 | 5.56 | 3.00 | 8.56 |
| 40 | 53.723724 | -1.046968 | 5.11 | 3.00 | 8.11 |
| 41 | 53.722252 | -1.047933 | 4.35 | 3.00 | 7.35 |
| 42 | 53.721884 | -1.048963 | 4.88 | 3.00 | 7.88 |
| 43 | 53.721541 | -1.049221 | 5.66 | 3.00 | 8.66 |
| 44 | 53.721071 | -1.048942 | 5.65 | 3.00 | 8.65 |
| 45 | 53.720766 | -1.048920 | 5.68 | 3.00 | 8.68 |
| 46 | 53.720360 | -1.048556 | 5.47 | 3.00 | 8.47 |
| 47 | 53.720309 | -1.048105 | 5.72 | 3.00 | 8.72 |
| 48 | 53.719687 | -1.048148 | 5.67 | 3.00 | 8.67 |
| 49 | 53.719344 | -1.048534 | 5.99 | 3.00 | 8.99 |
| 50 | 53.719128 | -1.048899 | 5.14 | 3.00 | 8.14 |
| 51 | 53.718785 | -1.048856 | 4.83 | 3.00 | 7.83 |
| 52 | 53.717831 | -1.047809 | 5.63 | 3.00 | 8.63 |
| 53 | 53.716790 | -1.046779 | 5.84 | 3.00 | 8.84 |
| 54 | 53.716155 | -1.046414 | 6.38 | 3.00 | 9.38 |
| 55 | 53.714974 | -1.045685 | 6.65 | 3.00 | 9.65 |
| 56 | 53.714453 | -1.045663 | 4.04 | 3.00 | 7.04 |
| 57 | 53.714339 | -1.046886 | 5.01 | 3.00 | 8.01 |
| 58 | 53.714821 | -1.046951 | 5.05 | 3.00 | 8.05 |
| 59 | 53.714923 | -1.047809 | 5.41 | 3.00 | 8.41 |
| 60 | 53.716320 | -1.048109 | 5.66 | 3.00 | 8.66 |
| 61 | 53.717107 | -1.048388 | 5.46 | 3.00 | 8.46 |
| 62 | 53.716726 | -1.051156 | 6.33 | 3.00 | 9.33 |
| 63 | 53.717209 | -1.051478 | 5.33 | 3.00 | 8.33 |
| 64 | 53.717209 | -1.052959 | 5.34 | 3.00 | 8.34 |
| 65 | 53.717259 | -1.053560 | 5.11 | 3.00 | 8.11 |
| 66 | 53.717704 | -1.055148 | 5.64 | 3.00 | 8.64 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.718605 | -1.055191 | 5.92 | 3.00 | 8.92 |
| 68 | 53.718885 | -1.058087 | 4.67 | 3.00 | 7.67 |
| 69 | 53.717856 | -1.057830 | 4.97 | 3.00 | 7.97 |
| 70 | 53.717945 | -1.059053 | 4.98 | 3.00 | 7.98 |
| 71 | 53.717399 | -1.059396 | 4.17 | 3.00 | 7.17 |
| 72 | 53.716536 | -1.059976 | 4.54 | 3.00 | 7.54 |
| 73 | 53.715850 | -1.060319 | 4.98 | 3.00 | 7.98 |
| 74 | 53.713894 | -1.061263 | 4.46 | 3.00 | 7.46 |
| 75 | 53.714656 | -1.062765 | 5.24 | 3.00 | 8.24 |
| 76 | 53.714847 | -1.066735 | 5.68 | 3.00 | 8.68 |
| 77 | 53.715748 | -1.069503 | 5.81 | 3.00 | 8.81 |
| 78 | 53.716497 | -1.069996 | 6.36 | 3.00 | 9.36 |
| 79 | 53.717145 | -1.070082 | 5.58 | 3.00 | 8.58 |
| 80 | 53.717310 | -1.070576 | 4.86 | 3.00 | 7.86 |
| 81 | 53.718364 | -1.072335 | 4.58 | 3.00 | 7.58 |
| 82 | 53.717374 | -1.072979 | 5.62 | 3.00 | 8.62 |
| 83 | 53.717894 | -1.074932 | 5.00 | 3.00 | 8.00 |
| 84 | 53.717361 | -1.075125 | 5.05 | 3.00 | 8.05 |

**Name**: PV array 2
**Footprint area**: 88,675 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714504 | -1.065662 | 5.86 | 3.00 | 8.86 |
| 2 | 53.711570 | -1.066370 | 6.08 | 3.00 | 9.08 |
| 3 | 53.710923 | -1.063001 | 6.45 | 3.00 | 9.45 |
| 4 | 53.713716 | -1.061521 | 5.54 | 3.00 | 8.54 |
| 5 | 53.714237 | -1.062915 | 5.66 | 3.00 | 8.66 |

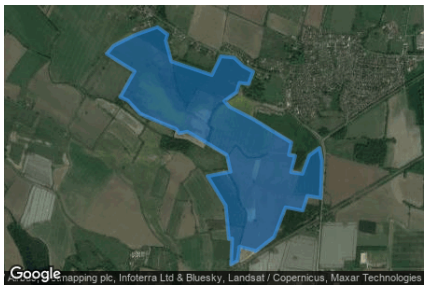
**Name**: PV array 3
**Footprint area**: 175,902 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714377 | -1.044033 | 3.79 | 3.00 | 6.79 |
| 2 | 53.713793 | -1.044419 | 3.21 | 3.00 | 6.21 |
| 3 | 53.713247 | -1.045427 | 4.43 | 3.00 | 7.43 |
| 4 | 53.713069 | -1.046758 | 4.33 | 3.00 | 7.33 |
| 5 | 53.712154 | -1.046522 | 4.37 | 3.00 | 7.37 |
| 6 | 53.711723 | -1.046758 | 4.66 | 3.00 | 7.66 |
| 7 | 53.711494 | -1.047487 | 5.96 | 3.00 | 8.96 |
| 8 | 53.710948 | -1.047723 | 4.12 | 3.00 | 7.12 |
| 9 | 53.710783 | -1.047552 | 4.25 | 3.00 | 7.25 |
| 10 | 53.710503 | -1.046908 | 2.93 | 3.00 | 5.93 |
| 11 | 53.710224 | -1.046371 | 4.40 | 3.00 | 7.40 |
| 12 | 53.710211 | -1.045556 | 4.27 | 3.00 | 7.27 |
| 13 | 53.710161 | -1.044548 | 4.46 | 3.00 | 7.46 |
| 14 | 53.709983 | -1.043668 | 5.07 | 3.00 | 8.07 |
| 15 | 53.711519 | -1.039441 | 4.84 | 3.00 | 7.84 |
| 16 | 53.712828 | -1.039548 | 3.63 | 3.00 | 6.63 |
| 17 | 53.713323 | -1.040363 | 4.24 | 3.00 | 7.24 |
| 18 | 53.713882 | -1.040964 | 4.20 | 3.00 | 7.20 |
| 19 | 53.714148 | -1.042016 | 3.87 | 3.00 | 6.87 |

**Name**: PV array 4
**Footprint area**: 648,018 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716146 | -1.026557 | 4.12 | 3.00 | 7.12 |
| 2 | 53.715942 | -1.027158 | 4.42 | 3.00 | 7.42 |
| 3 | 53.717352 | -1.027050 | 3.85 | 3.00 | 6.85 |
| 4 | 53.717314 | -1.027351 | 3.92 | 3.00 | 6.92 |
| 5 | 53.718215 | -1.027501 | 3.62 | 3.00 | 6.62 |
| 6 | 53.719142 | -1.027651 | 3.50 | 3.00 | 6.50 |
| 7 | 53.720742 | -1.029325 | 3.71 | 3.00 | 6.71 |
| 8 | 53.720983 | -1.027200 | 3.73 | 3.00 | 6.73 |
| 9 | 53.721898 | -1.027544 | 4.19 | 3.00 | 7.19 |
| 10 | 53.722431 | -1.029046 | 4.36 | 3.00 | 7.36 |
| 11 | 53.723167 | -1.031170 | 4.72 | 3.00 | 7.72 |
| 12 | 53.723078 | -1.031921 | 4.38 | 3.00 | 7.38 |
| 13 | 53.723282 | -1.032157 | 4.59 | 3.00 | 7.59 |
| 14 | 53.724031 | -1.035140 | 4.48 | 3.00 | 7.48 |
| 15 | 53.724158 | -1.035547 | 4.50 | 3.00 | 7.50 |
| 16 | 53.724843 | -1.036620 | 4.01 | 3.00 | 7.01 |
| 17 | 53.725046 | -1.037350 | 4.14 | 3.00 | 7.14 |
| 18 | 53.726443 | -1.036020 | 4.31 | 3.00 | 7.31 |
| 19 | 53.727395 | -1.038594 | 4.82 | 3.00 | 7.82 |
| 20 | 53.727839 | -1.037951 | 5.13 | 3.00 | 8.13 |
| 21 | 53.728410 | -1.036041 | 4.43 | 3.00 | 7.43 |
| 22 | 53.728855 | -1.033917 | 4.78 | 3.00 | 7.78 |
| 23 | 53.728449 | -1.032994 | 4.59 | 3.00 | 7.59 |
| 24 | 53.728106 | -1.033166 | 4.57 | 3.00 | 7.57 |
| 25 | 53.726989 | -1.032651 | 4.74 | 3.00 | 7.74 |
| 26 | 53.726240 | -1.028917 | 4.76 | 3.00 | 7.76 |
| 27 | 53.727268 | -1.028080 | 5.30 | 3.00 | 8.30 |
| 28 | 53.727192 | -1.026879 | 5.08 | 3.00 | 8.08 |
| 29 | 53.726722 | -1.026042 | 5.03 | 3.00 | 8.03 |
| 30 | 53.726430 | -1.025119 | 5.24 | 3.00 | 8.24 |
| 31 | 53.725757 | -1.025548 | 4.52 | 3.00 | 7.52 |
| 32 | 53.725821 | -1.026385 | 4.53 | 3.00 | 7.53 |
| 33 | 53.725313 | -1.026643 | 4.37 | 3.00 | 7.37 |
| 34 | 53.724830 | -1.027780 | 4.79 | 3.00 | 7.79 |
| 35 | 53.724500 | -1.027265 | 4.49 | 3.00 | 7.49 |
| 36 | 53.723866 | -1.025183 | 4.55 | 3.00 | 7.55 |
| 37 | 53.722571 | -1.021600 | 4.61 | 3.00 | 7.61 |
| 38 | 53.721898 | -1.021836 | 4.09 | 3.00 | 7.09 |
| 39 | 53.721847 | -1.021257 | 4.71 | 3.00 | 7.71 |
| 40 | 53.720959 | -1.021644 | 3.89 | 3.00 | 6.89 |
| 41 | 53.720870 | -1.020593 | 4.68 | 3.00 | 7.68 |
| 42 | 53.721860 | -1.019971 | 5.06 | 3.00 | 8.06 |
| 43 | 53.722279 | -1.019027 | 4.71 | 3.00 | 7.71 |
| 44 | 53.721568 | -1.018791 | 6.25 | 3.00 | 9.25 |
| 45 | 53.719556 | -1.018903 | 5.25 | 3.00 | 8.25 |
| 46 | 53.719670 | -1.020147 | 4.70 | 3.00 | 7.70 |
| 47 | 53.718871 | -1.020555 | 4.76 | 3.00 | 7.76 |
| 48 | 53.719048 | -1.022143 | 4.25 | 3.00 | 7.25 |
| 49 | 53.717436 | -1.023194 | 4.59 | 3.00 | 7.59 |
| 50 | 53.716674 | -1.024847 | 4.49 | 3.00 | 7.49 |
| 51 | 53.716902 | -1.026370 | 3.42 | 3.00 | 6.42 |

**Name**: PV array 5
**Footprint area**: 330,274 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.725701 | -1.041375 | 3.24 | 3.00 | 6.24 |
| 2 | 53.725917 | -1.042448 | 3.59 | 3.00 | 6.59 |
| 3 | 53.725904 | -1.043413 | 3.92 | 3.00 | 6.92 |
| 4 | 53.726615 | -1.043692 | 5.02 | 3.00 | 8.02 |
| 5 | 53.726996 | -1.043413 | 4.54 | 3.00 | 7.54 |
| 6 | 53.727288 | -1.043971 | 5.41 | 3.00 | 8.41 |
| 7 | 53.727618 | -1.045259 | 4.41 | 3.00 | 7.41 |
| 8 | 53.728570 | -1.047104 | 4.11 | 3.00 | 7.11 |
| 9 | 53.729637 | -1.049679 | 5.34 | 3.00 | 8.34 |
| 10 | 53.730030 | -1.049443 | 5.42 | 3.00 | 8.42 |
| 11 | 53.731490 | -1.046782 | 4.92 | 3.00 | 7.92 |
| 12 | 53.733127 | -1.045645 | 4.92 | 3.00 | 7.92 |
| 13 | 53.731807 | -1.042212 | 4.86 | 3.00 | 7.86 |
| 14 | 53.730792 | -1.039680 | 4.41 | 3.00 | 7.41 |
| 15 | 53.730487 | -1.038049 | 4.37 | 3.00 | 7.37 |
| 16 | 53.728507 | -1.039573 | 3.99 | 3.00 | 6.99 |
| 17 | 53.727961 | -1.038221 | 4.61 | 3.00 | 7.61 |

**Name**: PV array 6
**Footprint area**: 687,716 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.731554 | -1.036804 | 4.77 | 3.00 | 7.77 |
| 2 | 53.730754 | -1.037899 | 4.21 | 3.00 | 7.21 |
| 3 | 53.731148 | -1.039744 | 4.67 | 3.00 | 7.67 |
| 4 | 53.733496 | -1.045409 | 5.35 | 3.00 | 8.35 |
| 5 | 53.734017 | -1.045302 | 5.31 | 3.00 | 8.31 |
| 6 | 53.734309 | -1.046224 | 5.18 | 3.00 | 8.18 |
| 7 | 53.734867 | -1.046997 | 5.52 | 3.00 | 8.52 |
| 8 | 53.736352 | -1.050280 | 5.55 | 3.00 | 8.55 |
| 9 | 53.738345 | -1.047447 | 6.50 | 3.00 | 9.50 |
| 10 | 53.739360 | -1.048005 | 5.49 | 3.00 | 8.49 |
| 11 | 53.736961 | -1.051632 | 5.59 | 3.00 | 8.59 |
| 12 | 53.738472 | -1.055258 | 5.59 | 3.00 | 8.59 |
| 13 | 53.744436 | -1.053241 | 5.19 | 3.00 | 8.19 |
| 14 | 53.745172 | -1.052984 | 5.40 | 3.00 | 8.40 |
| 15 | 53.745464 | -1.051675 | 6.29 | 3.00 | 9.29 |
| 16 | 53.744703 | -1.051009 | 6.74 | 3.00 | 9.74 |
| 17 | 53.745401 | -1.049314 | 6.55 | 3.00 | 9.55 |
| 18 | 53.742647 | -1.046911 | 5.63 | 3.00 | 8.63 |
| 19 | 53.741683 | -1.050087 | 6.11 | 3.00 | 9.11 |
| 20 | 53.740883 | -1.049464 | 5.43 | 3.00 | 8.43 |
| 21 | 53.741886 | -1.046310 | 6.40 | 3.00 | 9.40 |
| 22 | 53.739715 | -1.044229 | 6.14 | 3.00 | 9.14 |
| 23 | 53.738764 | -1.047190 | 6.91 | 3.00 | 9.91 |
| 24 | 53.738256 | -1.047211 | 5.42 | 3.00 | 8.42 |
| 25 | 53.736796 | -1.045945 | 5.17 | 3.00 | 8.17 |
| 26 | 53.737926 | -1.042577 | 6.29 | 3.00 | 9.29 |

**Name**: PV array 7
**Footprint area**: 1,719,622 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.740578 | -1.055129 | 5.66 | 3.00 | 8.66 |
| 2 | 53.741416 | -1.060580 | 4.92 | 3.00 | 7.92 |
| 3 | 53.741492 | -1.062597 | 5.61 | 3.00 | 8.61 |
| 4 | 53.739639 | -1.062554 | 5.97 | 3.00 | 8.97 |
| 5 | 53.737812 | -1.063326 | 6.48 | 3.00 | 9.48 |
| 6 | 53.737532 | -1.064571 | 5.80 | 3.00 | 8.80 |
| 7 | 53.736720 | -1.065987 | 5.39 | 3.00 | 8.39 |
| 8 | 53.736517 | -1.066845 | 6.00 | 3.00 | 9.00 |
| 9 | 53.738218 | -1.069163 | 6.17 | 3.00 | 9.17 |
| 10 | 53.738573 | -1.071308 | 5.50 | 3.00 | 8.50 |
| 11 | 53.738675 | -1.073669 | 5.67 | 3.00 | 8.67 |
| 12 | 53.738091 | -1.076072 | 5.37 | 3.00 | 8.37 |
| 13 | 53.737634 | -1.076458 | 5.08 | 3.00 | 8.08 |
| 14 | 53.737532 | -1.078475 | 5.07 | 3.00 | 8.07 |
| 15 | 53.738192 | -1.078947 | 5.94 | 3.00 | 8.94 |
| 16 | 53.738700 | -1.080321 | 5.80 | 3.00 | 8.80 |
| 17 | 53.739309 | -1.080578 | 6.07 | 3.00 | 9.07 |
| 18 | 53.739462 | -1.081050 | 6.76 | 3.00 | 9.76 |
| 19 | 53.742507 | -1.080020 | 6.72 | 3.00 | 9.72 |
| 20 | 53.741314 | -1.078261 | 6.62 | 3.00 | 9.62 |
| 21 | 53.742000 | -1.078089 | 6.95 | 3.00 | 9.95 |
| 22 | 53.742457 | -1.077531 | 6.81 | 3.00 | 9.81 |
| 23 | 53.743142 | -1.078003 | 6.78 | 3.00 | 9.78 |
| 24 | 53.744462 | -1.077359 | 5.62 | 3.00 | 8.62 |
| 25 | 53.744690 | -1.076802 | 6.29 | 3.00 | 9.29 |
| 26 | 53.744512 | -1.075815 | 6.26 | 3.00 | 9.26 |
| 27 | 53.745451 | -1.075514 | 5.36 | 3.00 | 8.36 |
| 28 | 53.745502 | -1.077531 | 5.13 | 3.00 | 8.13 |
| 29 | 53.744563 | -1.078046 | 5.53 | 3.00 | 8.53 |
| 30 | 53.744665 | -1.079334 | 5.67 | 3.00 | 8.67 |
| 31 | 53.746238 | -1.078733 | 5.48 | 3.00 | 8.48 |
| 32 | 53.746035 | -1.076673 | 4.47 | 3.00 | 7.47 |
| 33 | 53.748192 | -1.076244 | 5.48 | 3.00 | 8.48 |
| 34 | 53.748218 | -1.078261 | 5.39 | 3.00 | 8.39 |
| 35 | 53.750146 | -1.077617 | 5.85 | 3.00 | 8.85 |
| 36 | 53.751161 | -1.076544 | 6.07 | 3.00 | 9.07 |
| 37 | 53.751136 | -1.075857 | 6.11 | 3.00 | 9.11 |
| 38 | 53.752938 | -1.075385 | 5.73 | 3.00 | 8.73 |
| 39 | 53.752735 | -1.073883 | 5.15 | 3.00 | 8.15 |
| 40 | 53.752506 | -1.073368 | 5.53 | 3.00 | 8.53 |
| 41 | 53.749588 | -1.073712 | 5.86 | 3.00 | 8.86 |
| 42 | 53.748395 | -1.074699 | 6.46 | 3.00 | 9.46 |
| 43 | 53.747761 | -1.075428 | 4.95 | 3.00 | 7.95 |
| 44 | 53.747431 | -1.075514 | 5.37 | 3.00 | 8.37 |
| 45 | 53.747659 | -1.072768 | 5.25 | 3.00 | 8.25 |
| 46 | 53.750476 | -1.072424 | 5.67 | 3.00 | 8.67 |
| 47 | 53.750527 | -1.072939 | 6.80 | 3.00 | 9.80 |
| 48 | 53.752481 | -1.072639 | 6.44 | 3.00 | 9.44 |
| 49 | 53.752176 | -1.070364 | 4.74 | 3.00 | 7.74 |
| 50 | 53.751212 | -1.069248 | 4.22 | 3.00 | 7.22 |
| 51 | 53.750933 | -1.067746 | 5.00 | 3.00 | 8.00 |
| 52 | 53.750705 | -1.065129 | 5.26 | 3.00 | 8.26 |
| 53 | 53.749664 | -1.062554 | 5.46 | 3.00 | 8.46 |
| 54 | 53.748827 | -1.062554 | 4.70 | 3.00 | 7.70 |
| 55 | 53.748573 | -1.061867 | 4.83 | 3.00 | 7.83 |
| 56 | 53.745578 | -1.061738 | 4.81 | 3.00 | 7.81 |
| 57 | 53.745299 | -1.067446 | 4.97 | 3.00 | 7.97 |
| 58 | 53.744081 | -1.067918 | 5.26 | 3.00 | 8.26 |
| 59 | 53.744081 | -1.066502 | 6.03 | 3.00 | 9.03 |
| 60 | 53.743446 | -1.064142 | 5.59 | 3.00 | 8.59 |
| 61 | 53.743472 | -1.061180 | 5.64 | 3.00 | 8.64 |
| 62 | 53.746111 | -1.061266 | 5.21 | 3.00 | 8.21 |
| 63 | 53.746162 | -1.060622 | 5.18 | 3.00 | 8.18 |
| 64 | 53.744665 | -1.059249 | 5.34 | 3.00 | 8.34 |
| 65 | 53.744817 | -1.058477 | 2.92 | 3.00 | 5.92 |
| 66 | 53.745248 | -1.057747 | 5.79 | 3.00 | 8.79 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.745781 | -1.054400 | 5.57 | 3.00 | 8.57 |
| 68 | 53.745934 | -1.053284 | 5.21 | 3.00 | 8.21 |

## Discrete Observation Receptors

| Number | Latitude | Longitude | Ground elevation | Height above ground | Total Elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| OP 1 | 53.753632 | -1.087152 | 6.98 | 2.00 | 8.98 |
| OP 2 | 53.753429 | -1.084921 | 6.89 | 2.00 | 8.89 |
| OP 3 | 53.753937 | -1.084041 | 7.34 | 2.00 | 9.34 |
| OP 4 | 53.749896 | -1.072969 | 7.16 | 2.00 | 9.16 |
| OP 5 | 53.748557 | -1.074106 | 6.98 | 2.00 | 8.98 |
| OP 6 | 53.748056 | -1.073763 | 6.43 | 2.00 | 8.43 |
| OP 7 | 53.744985 | -1.077067 | 6.82 | 2.00 | 8.82 |
| OP 8 | 53.743316 | -1.078655 | 8.35 | 2.00 | 10.35 |
| OP 9 | 53.739803 | -1.095913 | 8.10 | 2.00 | 10.10 |
| OP 10 | 53.738401 | -1.094937 | 7.83 | 2.00 | 9.83 |
| OP 11 | 53.738191 | -1.094572 | 7.29 | 2.00 | 9.29 |
| OP 12 | 53.737912 | -1.094111 | 7.69 | 2.00 | 9.69 |
| OP 13 | 53.737309 | -1.093907 | 7.92 | 2.00 | 9.92 |
| OP 14 | 53.735075 | -1.087674 | 8.23 | 2.00 | 10.23 |
| OP 15 | 53.734923 | -1.087116 | 8.00 | 2.00 | 10.00 |
| OP 16 | 53.734688 | -1.083221 | 7.14 | 2.00 | 9.14 |
| OP 17 | 53.735805 | -1.070250 | 6.76 | 2.00 | 8.76 |
| OP 18 | 53.725936 | -1.054747 | 5.33 | 2.00 | 7.33 |
| OP 19 | 53.725288 | -1.055455 | 5.68 | 2.00 | 7.68 |
| OP 20 | 53.724590 | -1.045777 | 5.91 | 2.00 | 7.91 |
| OP 21 | 53.719664 | -1.081751 | 6.56 | 2.00 | 8.56 |
| OP 22 | 53.718857 | -1.082245 | 6.18 | 2.00 | 8.18 |
| OP 23 | 53.717987 | -1.083275 | 7.80 | 2.00 | 9.80 |
| OP 24 | 53.718600 | -1.083527 | 6.55 | 2.00 | 8.55 |
| OP 25 | 53.718235 | -1.086413 | 9.24 | 2.00 | 11.24 |
| OP 26 | 53.718816 | -1.087271 | 8.26 | 2.00 | 10.26 |
| OP 27 | 53.718772 | -1.091225 | 8.21 | 2.00 | 10.21 |
| OP 28 | 53.717022 | -1.082110 | 7.84 | 2.00 | 9.84 |
| OP 29 | 53.716292 | -1.082593 | 7.01 | 2.00 | 9.01 |
| OP 30 | 53.715988 | -1.083483 | 7.85 | 2.00 | 9.85 |
| OP 31 | 53.716045 | -1.078934 | 7.36 | 2.00 | 9.36 |
| OP 32 | 53.714991 | -1.080951 | 7.81 | 2.00 | 9.81 |
| OP 33 | 53.714749 | -1.079074 | 7.83 | 2.00 | 9.83 |
| OP 34 | 53.714178 | -1.077132 | 8.04 | 2.00 | 10.04 |
| OP 35 | 53.713664 | -1.075834 | 8.27 | 2.00 | 10.27 |
| OP 36 | 53.713403 | -1.074675 | 7.95 | 2.00 | 9.95 |
| OP 37 | 53.713149 | -1.074138 | 7.59 | 2.00 | 9.59 |
| OP 38 | 53.712908 | -1.073377 | 8.13 | 2.00 | 10.13 |
| OP 39 | 53.712908 | -1.072239 | 7.81 | 2.00 | 9.81 |
| OP 40 | 53.713626 | -1.071703 | 6.96 | 2.00 | 8.96 |
| OP 41 | 53.712470 | -1.071639 | 7.87 | 2.00 | 9.87 |
| OP 42 | 53.712216 | -1.070212 | 7.50 | 2.00 | 9.50 |
| OP 43 | 53.712076 | -1.069310 | 7.20 | 2.00 | 9.20 |
| OP 44 | 53.710635 | -1.061532 | 7.41 | 2.00 | 9.41 |
| OP 45 | 53.709962 | -1.060459 | 7.27 | 2.00 | 9.27 |
| OP 46 | 53.710273 | -1.059429 | 7.83 | 2.00 | 9.83 |
| OP 47 | 53.709327 | -1.058356 | 7.51 | 2.00 | 9.51 |
| OP 48 | 53.708857 | -1.056972 | 7.61 | 2.00 | 9.61 |
| OP 49 | 53.708571 | -1.055266 | 7.63 | 2.00 | 9.63 |
| OP 50 | 53.707536 | -1.052316 | 6.57 | 2.00 | 8.57 |
| OP 51 | 53.707980 | -1.051747 | 7.74 | 2.00 | 9.74 |
| OP 52 | 53.707333 | -1.050363 | 7.06 | 2.00 | 9.06 |
| OP 53 | 53.710959 | -1.053035 | 6.80 | 2.00 | 8.80 |
| OP 54 | 53.711092 | -1.053561 | 6.58 | 2.00 | 8.58 |
| OP 55 | 53.711263 | -1.053432 | 6.06 | 2.00 | 8.06 |
| OP 56 | 53.711333 | -1.049333 | 6.13 | 2.00 | 8.13 |
| OP 57 | 53.711892 | -1.052252 | 6.31 | 2.00 | 8.31 |
| OP 58 | 53.713162 | -1.057874 | 6.24 | 2.00 | 8.24 |
| OP 59 | 53.714711 | -1.057638 | 6.71 | 2.00 | 8.71 |
| OP 60 | 53.714867 | -1.057627 | 6.45 | 2.00 | 8.45 |
| OP 61 | 53.714594 | -1.053727 | 6.25 | 2.00 | 8.25 |
| OP 62 | 53.714721 | -1.053603 | 6.17 | 2.00 | 8.17 |
| OP 63 | 53.716365 | -1.057616 | 6.53 | 2.00 | 8.53 |
| OP 64 | 53.716594 | -1.056409 | 5.65 | 2.00 | 7.65 |

| | | | | | |
|---|---|---|---|---|---|
| OP 65 | 53.716572 | -1.056119 | 5.55 | 2.00 | 7.55 |
| OP 66 | 53.716645 | -1.054483 | 4.97 | 2.00 | 6.97 |
| OP 67 | 53.715721 | -1.051677 | 4.88 | 2.00 | 6.88 |
| OP 68 | 53.715448 | -1.051468 | 5.47 | 2.00 | 7.47 |
| OP 69 | 53.715715 | -1.051055 | 5.53 | 2.00 | 7.53 |
| OP 70 | 53.715928 | -1.050743 | 5.87 | 2.00 | 7.87 |
| OP 71 | 53.715934 | -1.050529 | 5.75 | 2.00 | 7.75 |
| OP 72 | 53.716578 | -1.036088 | 5.98 | 2.00 | 7.98 |
| OP 73 | 53.716598 | -1.035251 | 5.06 | 2.00 | 7.06 |
| OP 74 | 53.716245 | -1.036099 | 5.64 | 2.00 | 7.64 |
| OP 75 | 53.716280 | -1.035213 | 4.95 | 2.00 | 6.95 |
| OP 76 | 53.715613 | -1.026598 | 5.34 | 2.00 | 7.34 |
| OP 77 | 53.705282 | -1.029441 | 6.30 | 2.00 | 8.30 |
| OP 78 | 53.708699 | -1.025557 | 6.13 | 2.00 | 8.13 |
| OP 79 | 53.709842 | -1.025064 | 5.82 | 2.00 | 7.82 |
| OP 80 | 53.711010 | -1.025407 | 5.76 | 2.00 | 7.76 |

## Summary of PV Glare Analysis

*PV configuration and total predicted glare*

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced | Data File |
|---|---|---|---|---|---|---|
| | deg | deg | min | min | kWh | |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - | |

## PV & Receptor Analysis Results

*Results for each PV array and receptor*

### PV array 1 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 2 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 3 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 4 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 5 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 6 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 7 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.

# Appendix 4.1C: Residential Glare Results

# (Receptors 81 – 136)

ForgeSolar

# Helios Renewable Energy Project

## Residential Receptors 81 - 136

**Created** April 14, 2022
**Updated** April 14, 2022
**Time-step** 1 minute
**Timezone offset** UTC0
**Site ID** 67604.11927

**Project type** Advanced
**Project status:** active
**Category** 100 MW to 1 GW

### Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

## Summary of Results No glare predicted!

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced |
|---|---|---|---|---|---|
| | deg | deg | min | min | kWh |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - |

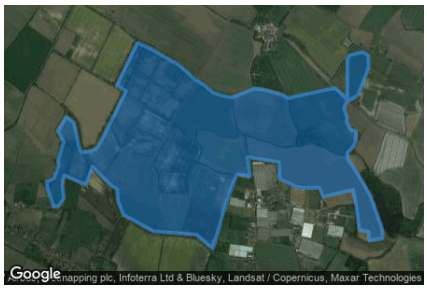
## Component Data

## PV Array(s)

**Total PV footprint area:** 4,863,335 m^2

**Name**: PV array 1
**Footprint area**: 1,213,127 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716640 | -1.074980 | 6.42 | 3.00 | 9.42 |
| 2 | 53.716234 | -1.075431 | 5.31 | 3.00 | 8.31 |
| 3 | 53.716221 | -1.075946 | 5.99 | 3.00 | 8.99 |
| 4 | 53.717224 | -1.076504 | 6.90 | 3.00 | 9.90 |
| 5 | 53.717555 | -1.076546 | 6.07 | 3.00 | 9.07 |
| 6 | 53.717732 | -1.075881 | 5.11 | 3.00 | 8.11 |
| 7 | 53.718431 | -1.075431 | 5.15 | 3.00 | 8.15 |
| 8 | 53.718685 | -1.075517 | 5.36 | 3.00 | 8.36 |
| 9 | 53.719713 | -1.075002 | 5.04 | 3.00 | 8.04 |
| 10 | 53.720297 | -1.075495 | 4.84 | 3.00 | 7.84 |
| 11 | 53.721059 | -1.074744 | 4.49 | 3.00 | 7.49 |
| 12 | 53.720742 | -1.074036 | 4.42 | 3.00 | 7.42 |
| 13 | 53.719548 | -1.073607 | 4.57 | 3.00 | 7.57 |
| 14 | 53.719142 | -1.073371 | 4.15 | 3.00 | 7.15 |
| 15 | 53.719218 | -1.072448 | 4.65 | 3.00 | 7.65 |
| 16 | 53.719434 | -1.071826 | 4.48 | 3.00 | 7.48 |
| 17 | 53.721135 | -1.070345 | 4.67 | 3.00 | 7.67 |
| 18 | 53.722481 | -1.069251 | 5.19 | 3.00 | 8.19 |
| 19 | 53.722760 | -1.070109 | 5.29 | 3.00 | 8.29 |
| 20 | 53.725096 | -1.068211 | 5.06 | 3.00 | 8.06 |
| 21 | 53.724816 | -1.067095 | 4.10 | 3.00 | 7.10 |
| 22 | 53.724232 | -1.065378 | 5.02 | 3.00 | 8.02 |
| 23 | 53.723902 | -1.064413 | 5.31 | 3.00 | 8.31 |
| 24 | 53.723102 | -1.062889 | 4.97 | 3.00 | 7.97 |
| 25 | 53.722772 | -1.061967 | 4.94 | 3.00 | 7.94 |
| 26 | 53.722391 | -1.061259 | 4.76 | 3.00 | 7.76 |
| 27 | 53.722239 | -1.060443 | 4.97 | 3.00 | 7.97 |
| 28 | 53.722125 | -1.059520 | 4.52 | 3.00 | 7.52 |
| 29 | 53.722468 | -1.058040 | 4.09 | 3.00 | 7.09 |
| 30 | 53.722607 | -1.057503 | 4.44 | 3.00 | 7.44 |
| 31 | 53.722556 | -1.056538 | 4.15 | 3.00 | 7.15 |
| 32 | 53.722239 | -1.054757 | 4.51 | 3.00 | 7.51 |
| 33 | 53.722099 | -1.054349 | 4.89 | 3.00 | 7.89 |
| 34 | 53.722645 | -1.050036 | 5.26 | 3.00 | 8.26 |
| 35 | 53.722036 | -1.048920 | 5.29 | 3.00 | 8.29 |
| 36 | 53.724207 | -1.048899 | 4.85 | 3.00 | 7.85 |
| 37 | 53.724423 | -1.048727 | 4.81 | 3.00 | 7.81 |
| 38 | 53.724601 | -1.047483 | 5.47 | 3.00 | 8.47 |
| 39 | 53.724410 | -1.046968 | 5.56 | 3.00 | 8.56 |
| 40 | 53.723724 | -1.046968 | 5.11 | 3.00 | 8.11 |
| 41 | 53.722252 | -1.047933 | 4.35 | 3.00 | 7.35 |
| 42 | 53.721884 | -1.048963 | 4.88 | 3.00 | 7.88 |
| 43 | 53.721541 | -1.049221 | 5.66 | 3.00 | 8.66 |
| 44 | 53.721071 | -1.048942 | 5.65 | 3.00 | 8.65 |
| 45 | 53.720766 | -1.048920 | 5.68 | 3.00 | 8.68 |
| 46 | 53.720360 | -1.048556 | 5.47 | 3.00 | 8.47 |
| 47 | 53.720309 | -1.048105 | 5.72 | 3.00 | 8.72 |
| 48 | 53.719687 | -1.048148 | 5.67 | 3.00 | 8.67 |
| 49 | 53.719344 | -1.048534 | 5.99 | 3.00 | 8.99 |
| 50 | 53.719128 | -1.048899 | 5.14 | 3.00 | 8.14 |
| 51 | 53.718785 | -1.048856 | 4.83 | 3.00 | 7.83 |
| 52 | 53.717831 | -1.047809 | 5.63 | 3.00 | 8.63 |
| 53 | 53.716790 | -1.046779 | 5.84 | 3.00 | 8.84 |
| 54 | 53.716155 | -1.046414 | 6.38 | 3.00 | 9.38 |
| 55 | 53.714974 | -1.045685 | 6.65 | 3.00 | 9.65 |
| 56 | 53.714453 | -1.045663 | 4.04 | 3.00 | 7.04 |
| 57 | 53.714339 | -1.046886 | 5.01 | 3.00 | 8.01 |
| 58 | 53.714821 | -1.046951 | 5.05 | 3.00 | 8.05 |
| 59 | 53.714923 | -1.047809 | 5.41 | 3.00 | 8.41 |
| 60 | 53.716320 | -1.048109 | 5.66 | 3.00 | 8.66 |
| 61 | 53.717107 | -1.048388 | 5.46 | 3.00 | 8.46 |
| 62 | 53.716726 | -1.051156 | 6.33 | 3.00 | 9.33 |
| 63 | 53.717209 | -1.051478 | 5.33 | 3.00 | 8.33 |
| 64 | 53.717209 | -1.052959 | 5.34 | 3.00 | 8.34 |
| 65 | 53.717259 | -1.053560 | 5.11 | 3.00 | 8.11 |
| 66 | 53.717704 | -1.055148 | 5.64 | 3.00 | 8.64 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.718605 | -1.055191 | 5.92 | 3.00 | 8.92 |
| 68 | 53.718885 | -1.058087 | 4.67 | 3.00 | 7.67 |
| 69 | 53.717856 | -1.057830 | 4.97 | 3.00 | 7.97 |
| 70 | 53.717945 | -1.059053 | 4.98 | 3.00 | 7.98 |
| 71 | 53.717399 | -1.059396 | 4.17 | 3.00 | 7.17 |
| 72 | 53.716536 | -1.059976 | 4.54 | 3.00 | 7.54 |
| 73 | 53.715850 | -1.060319 | 4.98 | 3.00 | 7.98 |
| 74 | 53.713894 | -1.061263 | 4.46 | 3.00 | 7.46 |
| 75 | 53.714656 | -1.062765 | 5.24 | 3.00 | 8.24 |
| 76 | 53.714847 | -1.066735 | 5.68 | 3.00 | 8.68 |
| 77 | 53.715748 | -1.069503 | 5.81 | 3.00 | 8.81 |
| 78 | 53.716497 | -1.069996 | 6.36 | 3.00 | 9.36 |
| 79 | 53.717145 | -1.070082 | 5.58 | 3.00 | 8.58 |
| 80 | 53.717310 | -1.070576 | 4.86 | 3.00 | 7.86 |
| 81 | 53.718364 | -1.072335 | 4.58 | 3.00 | 7.58 |
| 82 | 53.717374 | -1.072979 | 5.62 | 3.00 | 8.62 |
| 83 | 53.717894 | -1.074932 | 5.00 | 3.00 | 8.00 |
| 84 | 53.717361 | -1.075125 | 5.05 | 3.00 | 8.05 |

**Name**: PV array 2
**Footprint area**: 88,675 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714504 | -1.065662 | 5.86 | 3.00 | 8.86 |
| 2 | 53.711570 | -1.066370 | 6.08 | 3.00 | 9.08 |
| 3 | 53.710923 | -1.063001 | 6.45 | 3.00 | 9.45 |
| 4 | 53.713716 | -1.061521 | 5.54 | 3.00 | 8.54 |
| 5 | 53.714237 | -1.062915 | 5.66 | 3.00 | 8.66 |

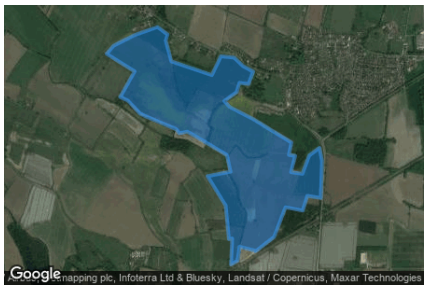
**Name**: PV array 3
**Footprint area**: 175,902 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714377 | -1.044033 | 3.79 | 3.00 | 6.79 |
| 2 | 53.713793 | -1.044419 | 3.21 | 3.00 | 6.21 |
| 3 | 53.713247 | -1.045427 | 4.43 | 3.00 | 7.43 |
| 4 | 53.713069 | -1.046758 | 4.33 | 3.00 | 7.33 |
| 5 | 53.712154 | -1.046522 | 4.37 | 3.00 | 7.37 |
| 6 | 53.711723 | -1.046758 | 4.66 | 3.00 | 7.66 |
| 7 | 53.711494 | -1.047487 | 5.96 | 3.00 | 8.96 |
| 8 | 53.710948 | -1.047723 | 4.12 | 3.00 | 7.12 |
| 9 | 53.710783 | -1.047552 | 4.25 | 3.00 | 7.25 |
| 10 | 53.710503 | -1.046908 | 2.93 | 3.00 | 5.93 |
| 11 | 53.710224 | -1.046371 | 4.40 | 3.00 | 7.40 |
| 12 | 53.710211 | -1.045556 | 4.27 | 3.00 | 7.27 |
| 13 | 53.710161 | -1.044548 | 4.46 | 3.00 | 7.46 |
| 14 | 53.709983 | -1.043668 | 5.07 | 3.00 | 8.07 |
| 15 | 53.711519 | -1.039441 | 4.84 | 3.00 | 7.84 |
| 16 | 53.712828 | -1.039548 | 3.63 | 3.00 | 6.63 |
| 17 | 53.713323 | -1.040363 | 4.24 | 3.00 | 7.24 |
| 18 | 53.713882 | -1.040964 | 4.20 | 3.00 | 7.20 |
| 19 | 53.714148 | -1.042016 | 3.87 | 3.00 | 6.87 |

**Name**: PV array 4
**Footprint area**: 648,018 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716146 | -1.026557 | 4.12 | 3.00 | 7.12 |
| 2 | 53.715942 | -1.027158 | 4.42 | 3.00 | 7.42 |
| 3 | 53.717352 | -1.027050 | 3.85 | 3.00 | 6.85 |
| 4 | 53.717314 | -1.027351 | 3.92 | 3.00 | 6.92 |
| 5 | 53.718215 | -1.027501 | 3.62 | 3.00 | 6.62 |
| 6 | 53.719142 | -1.027651 | 3.50 | 3.00 | 6.50 |
| 7 | 53.720742 | -1.029325 | 3.71 | 3.00 | 6.71 |
| 8 | 53.720983 | -1.027200 | 3.73 | 3.00 | 6.73 |
| 9 | 53.721898 | -1.027544 | 4.19 | 3.00 | 7.19 |
| 10 | 53.722431 | -1.029046 | 4.36 | 3.00 | 7.36 |
| 11 | 53.723167 | -1.031170 | 4.72 | 3.00 | 7.72 |
| 12 | 53.723078 | -1.031921 | 4.38 | 3.00 | 7.38 |
| 13 | 53.723282 | -1.032157 | 4.59 | 3.00 | 7.59 |
| 14 | 53.724031 | -1.035140 | 4.48 | 3.00 | 7.48 |
| 15 | 53.724158 | -1.035547 | 4.50 | 3.00 | 7.50 |
| 16 | 53.724843 | -1.036620 | 4.01 | 3.00 | 7.01 |
| 17 | 53.725046 | -1.037350 | 4.14 | 3.00 | 7.14 |
| 18 | 53.726443 | -1.036020 | 4.31 | 3.00 | 7.31 |
| 19 | 53.727395 | -1.038594 | 4.82 | 3.00 | 7.82 |
| 20 | 53.727839 | -1.037951 | 5.13 | 3.00 | 8.13 |
| 21 | 53.728410 | -1.036041 | 4.43 | 3.00 | 7.43 |
| 22 | 53.728855 | -1.033917 | 4.78 | 3.00 | 7.78 |
| 23 | 53.728449 | -1.032994 | 4.59 | 3.00 | 7.59 |
| 24 | 53.728106 | -1.033166 | 4.57 | 3.00 | 7.57 |
| 25 | 53.726989 | -1.032651 | 4.74 | 3.00 | 7.74 |
| 26 | 53.726240 | -1.028917 | 4.76 | 3.00 | 7.76 |
| 27 | 53.727268 | -1.028080 | 5.30 | 3.00 | 8.30 |
| 28 | 53.727192 | -1.026879 | 5.08 | 3.00 | 8.08 |
| 29 | 53.726722 | -1.026042 | 5.03 | 3.00 | 8.03 |
| 30 | 53.726430 | -1.025119 | 5.24 | 3.00 | 8.24 |
| 31 | 53.725757 | -1.025548 | 4.52 | 3.00 | 7.52 |
| 32 | 53.725821 | -1.026385 | 4.53 | 3.00 | 7.53 |
| 33 | 53.725313 | -1.026643 | 4.37 | 3.00 | 7.37 |
| 34 | 53.724830 | -1.027780 | 4.79 | 3.00 | 7.79 |
| 35 | 53.724500 | -1.027265 | 4.49 | 3.00 | 7.49 |
| 36 | 53.723866 | -1.025183 | 4.55 | 3.00 | 7.55 |
| 37 | 53.722571 | -1.021600 | 4.61 | 3.00 | 7.61 |
| 38 | 53.721898 | -1.021836 | 4.09 | 3.00 | 7.09 |
| 39 | 53.721847 | -1.021257 | 4.71 | 3.00 | 7.71 |
| 40 | 53.720959 | -1.021644 | 3.89 | 3.00 | 6.89 |
| 41 | 53.720870 | -1.020593 | 4.68 | 3.00 | 7.68 |
| 42 | 53.721860 | -1.019971 | 5.06 | 3.00 | 8.06 |
| 43 | 53.722279 | -1.019027 | 4.71 | 3.00 | 7.71 |
| 44 | 53.721568 | -1.018791 | 6.25 | 3.00 | 9.25 |
| 45 | 53.719556 | -1.018903 | 5.25 | 3.00 | 8.25 |
| 46 | 53.719670 | -1.020147 | 4.70 | 3.00 | 7.70 |
| 47 | 53.718871 | -1.020555 | 4.76 | 3.00 | 7.76 |
| 48 | 53.719048 | -1.022143 | 4.25 | 3.00 | 7.25 |
| 49 | 53.717436 | -1.023194 | 4.59 | 3.00 | 7.59 |
| 50 | 53.716674 | -1.024847 | 4.49 | 3.00 | 7.49 |
| 51 | 53.716902 | -1.026370 | 3.42 | 3.00 | 6.42 |

**Name**: PV array 5
**Footprint area**: 330,274 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.725701 | -1.041375 | 3.24 | 3.00 | 6.24 |
| 2 | 53.725917 | -1.042448 | 3.59 | 3.00 | 6.59 |
| 3 | 53.725904 | -1.043413 | 3.92 | 3.00 | 6.92 |
| 4 | 53.726615 | -1.043692 | 5.02 | 3.00 | 8.02 |
| 5 | 53.726996 | -1.043413 | 4.54 | 3.00 | 7.54 |
| 6 | 53.727288 | -1.043971 | 5.41 | 3.00 | 8.41 |
| 7 | 53.727618 | -1.045259 | 4.41 | 3.00 | 7.41 |
| 8 | 53.728570 | -1.047104 | 4.11 | 3.00 | 7.11 |
| 9 | 53.729637 | -1.049679 | 5.34 | 3.00 | 8.34 |
| 10 | 53.730030 | -1.049443 | 5.42 | 3.00 | 8.42 |
| 11 | 53.731490 | -1.046782 | 4.92 | 3.00 | 7.92 |
| 12 | 53.733127 | -1.045645 | 4.92 | 3.00 | 7.92 |
| 13 | 53.731807 | -1.042212 | 4.86 | 3.00 | 7.86 |
| 14 | 53.730792 | -1.039680 | 4.41 | 3.00 | 7.41 |
| 15 | 53.730487 | -1.038049 | 4.37 | 3.00 | 7.37 |
| 16 | 53.728507 | -1.039573 | 3.99 | 3.00 | 6.99 |
| 17 | 53.727961 | -1.038221 | 4.61 | 3.00 | 7.61 |

**Name**: PV array 6
**Footprint area**: 687,716 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.731554 | -1.036804 | 4.77 | 3.00 | 7.77 |
| 2 | 53.730754 | -1.037899 | 4.21 | 3.00 | 7.21 |
| 3 | 53.731148 | -1.039744 | 4.67 | 3.00 | 7.67 |
| 4 | 53.733496 | -1.045409 | 5.35 | 3.00 | 8.35 |
| 5 | 53.734017 | -1.045302 | 5.31 | 3.00 | 8.31 |
| 6 | 53.734309 | -1.046224 | 5.18 | 3.00 | 8.18 |
| 7 | 53.734867 | -1.046997 | 5.52 | 3.00 | 8.52 |
| 8 | 53.736352 | -1.050280 | 5.55 | 3.00 | 8.55 |
| 9 | 53.738345 | -1.047447 | 6.50 | 3.00 | 9.50 |
| 10 | 53.739360 | -1.048005 | 5.49 | 3.00 | 8.49 |
| 11 | 53.736961 | -1.051632 | 5.59 | 3.00 | 8.59 |
| 12 | 53.738472 | -1.055258 | 5.59 | 3.00 | 8.59 |
| 13 | 53.744436 | -1.053241 | 5.19 | 3.00 | 8.19 |
| 14 | 53.745172 | -1.052984 | 5.40 | 3.00 | 8.40 |
| 15 | 53.745464 | -1.051675 | 6.29 | 3.00 | 9.29 |
| 16 | 53.744703 | -1.051009 | 6.74 | 3.00 | 9.74 |
| 17 | 53.745401 | -1.049314 | 6.55 | 3.00 | 9.55 |
| 18 | 53.742647 | -1.046911 | 5.63 | 3.00 | 8.63 |
| 19 | 53.741683 | -1.050087 | 6.11 | 3.00 | 9.11 |
| 20 | 53.740883 | -1.049464 | 5.43 | 3.00 | 8.43 |
| 21 | 53.741886 | -1.046310 | 6.40 | 3.00 | 9.40 |
| 22 | 53.739715 | -1.044229 | 6.14 | 3.00 | 9.14 |
| 23 | 53.738764 | -1.047190 | 6.91 | 3.00 | 9.91 |
| 24 | 53.738256 | -1.047211 | 5.42 | 3.00 | 8.42 |
| 25 | 53.736796 | -1.045945 | 5.17 | 3.00 | 8.17 |
| 26 | 53.737926 | -1.042577 | 6.29 | 3.00 | 9.29 |

**Name**: PV array 7
**Footprint area**: 1,719,622 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.740578 | -1.055129 | 5.66 | 3.00 | 8.66 |
| 2 | 53.741416 | -1.060580 | 4.92 | 3.00 | 7.92 |
| 3 | 53.741492 | -1.062597 | 5.61 | 3.00 | 8.61 |
| 4 | 53.739639 | -1.062554 | 5.97 | 3.00 | 8.97 |
| 5 | 53.737812 | -1.063326 | 6.48 | 3.00 | 9.48 |
| 6 | 53.737532 | -1.064571 | 5.80 | 3.00 | 8.80 |
| 7 | 53.736720 | -1.065987 | 5.39 | 3.00 | 8.39 |
| 8 | 53.736517 | -1.066845 | 6.00 | 3.00 | 9.00 |
| 9 | 53.738218 | -1.069163 | 6.17 | 3.00 | 9.17 |
| 10 | 53.738573 | -1.071308 | 5.50 | 3.00 | 8.50 |
| 11 | 53.738675 | -1.073669 | 5.67 | 3.00 | 8.67 |
| 12 | 53.738091 | -1.076072 | 5.37 | 3.00 | 8.37 |
| 13 | 53.737634 | -1.076458 | 5.08 | 3.00 | 8.08 |
| 14 | 53.737532 | -1.078475 | 5.07 | 3.00 | 8.07 |
| 15 | 53.738192 | -1.078947 | 5.94 | 3.00 | 8.94 |
| 16 | 53.738700 | -1.080321 | 5.80 | 3.00 | 8.80 |
| 17 | 53.739309 | -1.080578 | 6.07 | 3.00 | 9.07 |
| 18 | 53.739462 | -1.081050 | 6.76 | 3.00 | 9.76 |
| 19 | 53.742507 | -1.080020 | 6.72 | 3.00 | 9.72 |
| 20 | 53.741314 | -1.078261 | 6.62 | 3.00 | 9.62 |
| 21 | 53.742000 | -1.078089 | 6.95 | 3.00 | 9.95 |
| 22 | 53.742457 | -1.077531 | 6.81 | 3.00 | 9.81 |
| 23 | 53.743142 | -1.078003 | 6.78 | 3.00 | 9.78 |
| 24 | 53.744462 | -1.077359 | 5.62 | 3.00 | 8.62 |
| 25 | 53.744690 | -1.076802 | 6.29 | 3.00 | 9.29 |
| 26 | 53.744512 | -1.075815 | 6.26 | 3.00 | 9.26 |
| 27 | 53.745451 | -1.075514 | 5.36 | 3.00 | 8.36 |
| 28 | 53.745502 | -1.077531 | 5.13 | 3.00 | 8.13 |
| 29 | 53.744563 | -1.078046 | 5.53 | 3.00 | 8.53 |
| 30 | 53.744665 | -1.079334 | 5.67 | 3.00 | 8.67 |
| 31 | 53.746238 | -1.078733 | 5.48 | 3.00 | 8.48 |
| 32 | 53.746035 | -1.076673 | 4.47 | 3.00 | 7.47 |
| 33 | 53.748192 | -1.076244 | 5.48 | 3.00 | 8.48 |
| 34 | 53.748218 | -1.078261 | 5.39 | 3.00 | 8.39 |
| 35 | 53.750146 | -1.077617 | 5.85 | 3.00 | 8.85 |
| 36 | 53.751161 | -1.076544 | 6.07 | 3.00 | 9.07 |
| 37 | 53.751136 | -1.075857 | 6.11 | 3.00 | 9.11 |
| 38 | 53.752938 | -1.075385 | 5.73 | 3.00 | 8.73 |
| 39 | 53.752735 | -1.073883 | 5.15 | 3.00 | 8.15 |
| 40 | 53.752506 | -1.073368 | 5.53 | 3.00 | 8.53 |
| 41 | 53.749588 | -1.073712 | 5.86 | 3.00 | 8.86 |
| 42 | 53.748395 | -1.074699 | 6.46 | 3.00 | 9.46 |
| 43 | 53.747761 | -1.075428 | 4.95 | 3.00 | 7.95 |
| 44 | 53.747431 | -1.075514 | 5.37 | 3.00 | 8.37 |
| 45 | 53.747659 | -1.072768 | 5.25 | 3.00 | 8.25 |
| 46 | 53.750476 | -1.072424 | 5.67 | 3.00 | 8.67 |
| 47 | 53.750527 | -1.072939 | 6.80 | 3.00 | 9.80 |
| 48 | 53.752481 | -1.072639 | 6.44 | 3.00 | 9.44 |
| 49 | 53.752176 | -1.070364 | 4.74 | 3.00 | 7.74 |
| 50 | 53.751212 | -1.069248 | 4.22 | 3.00 | 7.22 |
| 51 | 53.750933 | -1.067746 | 5.00 | 3.00 | 8.00 |
| 52 | 53.750705 | -1.065129 | 5.26 | 3.00 | 8.26 |
| 53 | 53.749664 | -1.062554 | 5.46 | 3.00 | 8.46 |
| 54 | 53.748827 | -1.062554 | 4.70 | 3.00 | 7.70 |
| 55 | 53.748573 | -1.061867 | 4.83 | 3.00 | 7.83 |
| 56 | 53.745578 | -1.061738 | 4.81 | 3.00 | 7.81 |
| 57 | 53.745299 | -1.067446 | 4.97 | 3.00 | 7.97 |
| 58 | 53.744081 | -1.067918 | 5.26 | 3.00 | 8.26 |
| 59 | 53.744081 | -1.066502 | 6.03 | 3.00 | 9.03 |
| 60 | 53.743446 | -1.064142 | 5.59 | 3.00 | 8.59 |
| 61 | 53.743472 | -1.061180 | 5.64 | 3.00 | 8.64 |
| 62 | 53.746111 | -1.061266 | 5.21 | 3.00 | 8.21 |
| 63 | 53.746162 | -1.060622 | 5.18 | 3.00 | 8.18 |
| 64 | 53.744665 | -1.059249 | 5.34 | 3.00 | 8.34 |
| 65 | 53.744817 | -1.058477 | 2.92 | 3.00 | 5.92 |
| 66 | 53.745248 | -1.057747 | 5.79 | 3.00 | 8.79 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.745781 | -1.054400 | 5.57 | 3.00 | 8.57 |
| 68 | 53.745934 | -1.053284 | 5.21 | 3.00 | 8.21 |

## Discrete Observation Receptors

| Number | Latitude | Longitude | Ground elevation | Height above ground | Total Elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| OP 1 | 53.711754 | -1.025811 | 5.85 | 2.00 | 7.85 |
| OP 2 | 53.713215 | -1.024030 | 5.61 | 2.00 | 7.61 |
| OP 3 | 53.713088 | -1.021348 | 6.29 | 2.00 | 8.29 |
| OP 4 | 53.713532 | -1.018987 | 8.59 | 2.00 | 10.59 |
| OP 5 | 53.713736 | -1.017271 | 8.29 | 2.00 | 10.29 |
| OP 6 | 53.713837 | -1.015297 | 8.46 | 2.00 | 10.46 |
| OP 7 | 53.714459 | -1.018408 | 7.32 | 2.00 | 9.32 |
| OP 8 | 53.715044 | -1.017399 | 6.84 | 2.00 | 8.84 |
| OP 9 | 53.715831 | -1.014846 | 7.14 | 2.00 | 9.14 |
| OP 10 | 53.717990 | -1.019792 | 8.15 | 2.00 | 10.15 |
| OP 11 | 53.718193 | -1.019116 | 7.36 | 2.00 | 9.36 |
| OP 12 | 53.728262 | -1.012366 | 5.36 | 2.00 | 7.36 |
| OP 13 | 53.725710 | -1.011529 | 5.16 | 2.00 | 7.16 |
| OP 14 | 53.725202 | -1.012902 | 5.51 | 2.00 | 7.51 |
| OP 15 | 53.724618 | -1.014554 | 6.29 | 2.00 | 8.29 |
| OP 16 | 53.724022 | -1.016056 | 6.51 | 2.00 | 8.51 |
| OP 17 | 53.723945 | -1.019297 | 7.58 | 2.00 | 9.58 |
| OP 18 | 53.723984 | -1.020799 | 8.14 | 2.00 | 10.14 |
| OP 19 | 53.724682 | -1.022773 | 5.61 | 2.00 | 7.61 |
| OP 20 | 53.725748 | -1.021635 | 7.89 | 2.00 | 9.89 |
| OP 21 | 53.726472 | -1.022708 | 7.07 | 2.00 | 9.07 |
| OP 22 | 53.726028 | -1.024382 | 5.78 | 2.00 | 7.78 |
| OP 23 | 53.726865 | -1.025133 | 7.26 | 2.00 | 9.26 |
| OP 24 | 53.727246 | -1.026056 | 7.34 | 2.00 | 9.34 |
| OP 25 | 53.727691 | -1.027515 | 6.85 | 2.00 | 8.85 |
| OP 26 | 53.727424 | -1.029017 | 6.66 | 2.00 | 8.66 |
| OP 27 | 53.727856 | -1.030755 | 6.82 | 2.00 | 8.82 |
| OP 28 | 53.728490 | -1.032214 | 5.53 | 2.00 | 7.53 |
| OP 29 | 53.728985 | -1.034768 | 6.00 | 2.00 | 8.00 |
| OP 30 | 53.728782 | -1.035755 | 5.56 | 2.00 | 7.56 |
| OP 31 | 53.729684 | -1.035476 | 6.29 | 2.00 | 8.29 |
| OP 32 | 53.729938 | -1.035969 | 4.81 | 2.00 | 6.81 |
| OP 33 | 53.731169 | -1.017580 | 5.84 | 2.00 | 7.84 |
| OP 34 | 53.731651 | -1.018374 | 5.89 | 2.00 | 7.89 |
| OP 35 | 53.732603 | -1.036549 | 6.10 | 2.00 | 8.10 |
| OP 36 | 53.734571 | -1.037149 | 6.00 | 2.00 | 8.00 |
| OP 37 | 53.735154 | -1.038609 | 5.20 | 2.00 | 7.20 |
| OP 38 | 53.731956 | -1.047192 | 5.13 | 2.00 | 7.13 |
| OP 39 | 53.736487 | -1.051011 | 7.55 | 2.00 | 9.55 |
| OP 40 | 53.738404 | -1.056268 | 6.73 | 2.00 | 8.73 |
| OP 41 | 53.739724 | -1.055303 | 6.50 | 2.00 | 8.50 |
| OP 42 | 53.741183 | -1.044230 | 7.19 | 2.00 | 9.19 |
| OP 43 | 53.738404 | -1.028949 | 6.00 | 2.00 | 8.00 |
| OP 44 | 53.739749 | -1.031975 | 5.67 | 2.00 | 7.67 |
| OP 45 | 53.741589 | -1.030344 | 5.73 | 2.00 | 7.73 |
| OP 46 | 53.745269 | -1.032812 | 6.07 | 2.00 | 8.07 |
| OP 47 | 53.745663 | -1.047296 | 6.50 | 2.00 | 8.50 |
| OP 48 | 53.746475 | -1.050665 | 6.88 | 2.00 | 8.88 |
| OP 49 | 53.747173 | -1.054699 | 4.76 | 2.00 | 6.76 |
| OP 50 | 53.748962 | -1.061565 | 6.60 | 2.00 | 8.60 |
| OP 51 | 53.749279 | -1.061179 | 6.21 | 2.00 | 8.21 |
| OP 52 | 53.750269 | -1.052692 | 5.47 | 2.00 | 7.47 |
| OP 53 | 53.750827 | -1.052885 | 6.78 | 2.00 | 8.78 |
| OP 54 | 53.751322 | -1.054752 | 6.15 | 2.00 | 8.15 |
| OP 55 | 53.755026 | -1.058078 | 7.01 | 2.00 | 9.01 |
| OP 56 | 53.755432 | -1.058261 | 7.14 | 2.00 | 9.14 |

## Summary of PV Glare Analysis

*PV configuration and total predicted glare*

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced | Data File |
|---|---|---|---|---|---|---|
| | deg | deg | min | min | kWh | |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - | |

## PV & Receptor Analysis Results

*Results for each PV array and receptor*

### PV array 1 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## PV array 2 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## PV array 3 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## PV array 4 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## PV array 5 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## PV array 6 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## PV array 7 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |

*No glare found*

## Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.

# Appendix 4.1D: Road Glare Results

# (Receptors 1 – 80)

ForgeSolar

# Helios Renewable Energy Project

## Road Receptors 1 - 80

**Created** April 14, 2022
**Updated** April 14, 2022
**Time-step** 1 minute
**Timezone offset** UTC0
**Site ID** 67605.11927

**Project type** Advanced
**Project status:** active
**Category** 100 MW to 1 GW

### Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

## Summary of Results No glare predicted!

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced |
|---|---|---|---|---|---|
| | deg | deg | min | min | kWh |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - |

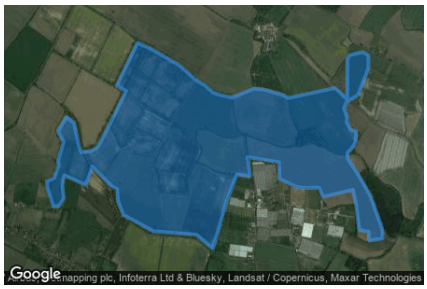
## Component Data

## PV Array(s)

**Total PV footprint area:** 4,863,335 m^2

**Name**: PV array 1
**Footprint area**: 1,213,127 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716640 | -1.074980 | 6.42 | 3.00 | 9.42 |
| 2 | 53.716234 | -1.075431 | 5.31 | 3.00 | 8.31 |
| 3 | 53.716221 | -1.075946 | 5.99 | 3.00 | 8.99 |
| 4 | 53.717224 | -1.076504 | 6.90 | 3.00 | 9.90 |
| 5 | 53.717555 | -1.076546 | 6.07 | 3.00 | 9.07 |
| 6 | 53.717732 | -1.075881 | 5.11 | 3.00 | 8.11 |
| 7 | 53.718431 | -1.075431 | 5.15 | 3.00 | 8.15 |
| 8 | 53.718685 | -1.075517 | 5.36 | 3.00 | 8.36 |
| 9 | 53.719713 | -1.075002 | 5.04 | 3.00 | 8.04 |
| 10 | 53.720297 | -1.075495 | 4.84 | 3.00 | 7.84 |
| 11 | 53.721059 | -1.074744 | 4.49 | 3.00 | 7.49 |
| 12 | 53.720742 | -1.074036 | 4.42 | 3.00 | 7.42 |
| 13 | 53.719548 | -1.073607 | 4.57 | 3.00 | 7.57 |
| 14 | 53.719142 | -1.073371 | 4.15 | 3.00 | 7.15 |
| 15 | 53.719218 | -1.072448 | 4.65 | 3.00 | 7.65 |
| 16 | 53.719434 | -1.071826 | 4.48 | 3.00 | 7.48 |
| 17 | 53.721135 | -1.070345 | 4.67 | 3.00 | 7.67 |
| 18 | 53.722481 | -1.069251 | 5.19 | 3.00 | 8.19 |
| 19 | 53.722760 | -1.070109 | 5.29 | 3.00 | 8.29 |
| 20 | 53.725096 | -1.068211 | 5.06 | 3.00 | 8.06 |
| 21 | 53.724816 | -1.067095 | 4.10 | 3.00 | 7.10 |
| 22 | 53.724232 | -1.065378 | 5.02 | 3.00 | 8.02 |
| 23 | 53.723902 | -1.064413 | 5.31 | 3.00 | 8.31 |
| 24 | 53.723102 | -1.062889 | 4.97 | 3.00 | 7.97 |
| 25 | 53.722772 | -1.061967 | 4.94 | 3.00 | 7.94 |
| 26 | 53.722391 | -1.061259 | 4.76 | 3.00 | 7.76 |
| 27 | 53.722239 | -1.060443 | 4.97 | 3.00 | 7.97 |
| 28 | 53.722125 | -1.059520 | 4.52 | 3.00 | 7.52 |
| 29 | 53.722468 | -1.058040 | 4.09 | 3.00 | 7.09 |
| 30 | 53.722607 | -1.057503 | 4.44 | 3.00 | 7.44 |
| 31 | 53.722556 | -1.056538 | 4.15 | 3.00 | 7.15 |
| 32 | 53.722239 | -1.054757 | 4.51 | 3.00 | 7.51 |
| 33 | 53.722099 | -1.054349 | 4.89 | 3.00 | 7.89 |
| 34 | 53.722645 | -1.050036 | 5.26 | 3.00 | 8.26 |
| 35 | 53.722036 | -1.048920 | 5.29 | 3.00 | 8.29 |
| 36 | 53.724207 | -1.048899 | 4.85 | 3.00 | 7.85 |
| 37 | 53.724423 | -1.048727 | 4.81 | 3.00 | 7.81 |
| 38 | 53.724601 | -1.047483 | 5.47 | 3.00 | 8.47 |
| 39 | 53.724410 | -1.046968 | 5.56 | 3.00 | 8.56 |
| 40 | 53.723724 | -1.046968 | 5.11 | 3.00 | 8.11 |
| 41 | 53.722252 | -1.047933 | 4.35 | 3.00 | 7.35 |
| 42 | 53.721884 | -1.048963 | 4.88 | 3.00 | 7.88 |
| 43 | 53.721541 | -1.049221 | 5.66 | 3.00 | 8.66 |
| 44 | 53.721071 | -1.048942 | 5.65 | 3.00 | 8.65 |
| 45 | 53.720766 | -1.048920 | 5.68 | 3.00 | 8.68 |
| 46 | 53.720360 | -1.048556 | 5.47 | 3.00 | 8.47 |
| 47 | 53.720309 | -1.048105 | 5.72 | 3.00 | 8.72 |
| 48 | 53.719687 | -1.048148 | 5.67 | 3.00 | 8.67 |
| 49 | 53.719344 | -1.048534 | 5.99 | 3.00 | 8.99 |
| 50 | 53.719128 | -1.048899 | 5.14 | 3.00 | 8.14 |
| 51 | 53.718785 | -1.048856 | 4.83 | 3.00 | 7.83 |
| 52 | 53.717831 | -1.047809 | 5.63 | 3.00 | 8.63 |
| 53 | 53.716790 | -1.046779 | 5.84 | 3.00 | 8.84 |
| 54 | 53.716155 | -1.046414 | 6.38 | 3.00 | 9.38 |
| 55 | 53.714974 | -1.045685 | 6.65 | 3.00 | 9.65 |
| 56 | 53.714453 | -1.045663 | 4.04 | 3.00 | 7.04 |
| 57 | 53.714339 | -1.046886 | 5.01 | 3.00 | 8.01 |
| 58 | 53.714821 | -1.046951 | 5.05 | 3.00 | 8.05 |
| 59 | 53.714923 | -1.047809 | 5.41 | 3.00 | 8.41 |
| 60 | 53.716320 | -1.048109 | 5.66 | 3.00 | 8.66 |
| 61 | 53.717107 | -1.048388 | 5.46 | 3.00 | 8.46 |
| 62 | 53.716726 | -1.051156 | 6.33 | 3.00 | 9.33 |
| 63 | 53.717209 | -1.051478 | 5.33 | 3.00 | 8.33 |
| 64 | 53.717209 | -1.052959 | 5.34 | 3.00 | 8.34 |
| 65 | 53.717259 | -1.053560 | 5.11 | 3.00 | 8.11 |
| 66 | 53.717704 | -1.055148 | 5.64 | 3.00 | 8.64 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.718605 | -1.055191 | 5.92 | 3.00 | 8.92 |
| 68 | 53.718885 | -1.058087 | 4.67 | 3.00 | 7.67 |
| 69 | 53.717856 | -1.057830 | 4.97 | 3.00 | 7.97 |
| 70 | 53.717945 | -1.059053 | 4.98 | 3.00 | 7.98 |
| 71 | 53.717399 | -1.059396 | 4.17 | 3.00 | 7.17 |
| 72 | 53.716536 | -1.059976 | 4.54 | 3.00 | 7.54 |
| 73 | 53.715850 | -1.060319 | 4.98 | 3.00 | 7.98 |
| 74 | 53.713894 | -1.061263 | 4.46 | 3.00 | 7.46 |
| 75 | 53.714656 | -1.062765 | 5.24 | 3.00 | 8.24 |
| 76 | 53.714847 | -1.066735 | 5.68 | 3.00 | 8.68 |
| 77 | 53.715748 | -1.069503 | 5.81 | 3.00 | 8.81 |
| 78 | 53.716497 | -1.069996 | 6.36 | 3.00 | 9.36 |
| 79 | 53.717145 | -1.070082 | 5.58 | 3.00 | 8.58 |
| 80 | 53.717310 | -1.070576 | 4.86 | 3.00 | 7.86 |
| 81 | 53.718364 | -1.072335 | 4.58 | 3.00 | 7.58 |
| 82 | 53.717374 | -1.072979 | 5.62 | 3.00 | 8.62 |
| 83 | 53.717894 | -1.074932 | 5.00 | 3.00 | 8.00 |
| 84 | 53.717361 | -1.075125 | 5.05 | 3.00 | 8.05 |

**Name**: PV array 2
**Footprint area**: 88,675 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714504 | -1.065662 | 5.86 | 3.00 | 8.86 |
| 2 | 53.711570 | -1.066370 | 6.08 | 3.00 | 9.08 |
| 3 | 53.710923 | -1.063001 | 6.45 | 3.00 | 9.45 |
| 4 | 53.713716 | -1.061521 | 5.54 | 3.00 | 8.54 |
| 5 | 53.714237 | -1.062915 | 5.66 | 3.00 | 8.66 |

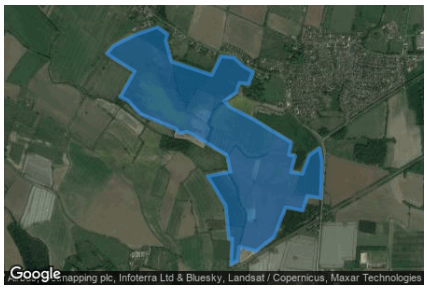
**Name**: PV array 3
**Footprint area**: 175,902 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714377 | -1.044033 | 3.79 | 3.00 | 6.79 |
| 2 | 53.713793 | -1.044419 | 3.21 | 3.00 | 6.21 |
| 3 | 53.713247 | -1.045427 | 4.43 | 3.00 | 7.43 |
| 4 | 53.713069 | -1.046758 | 4.33 | 3.00 | 7.33 |
| 5 | 53.712154 | -1.046522 | 4.37 | 3.00 | 7.37 |
| 6 | 53.711723 | -1.046758 | 4.66 | 3.00 | 7.66 |
| 7 | 53.711494 | -1.047487 | 5.96 | 3.00 | 8.96 |
| 8 | 53.710948 | -1.047723 | 4.12 | 3.00 | 7.12 |
| 9 | 53.710783 | -1.047552 | 4.25 | 3.00 | 7.25 |
| 10 | 53.710503 | -1.046908 | 2.93 | 3.00 | 5.93 |
| 11 | 53.710224 | -1.046371 | 4.40 | 3.00 | 7.40 |
| 12 | 53.710211 | -1.045556 | 4.27 | 3.00 | 7.27 |
| 13 | 53.710161 | -1.044548 | 4.46 | 3.00 | 7.46 |
| 14 | 53.709983 | -1.043668 | 5.07 | 3.00 | 8.07 |
| 15 | 53.711519 | -1.039441 | 4.84 | 3.00 | 7.84 |
| 16 | 53.712828 | -1.039548 | 3.63 | 3.00 | 6.63 |
| 17 | 53.713323 | -1.040363 | 4.24 | 3.00 | 7.24 |
| 18 | 53.713882 | -1.040964 | 4.20 | 3.00 | 7.20 |
| 19 | 53.714148 | -1.042016 | 3.87 | 3.00 | 6.87 |

**Name**: PV array 4
**Footprint area**: 648,018 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716146 | -1.026557 | 4.12 | 3.00 | 7.12 |
| 2 | 53.715942 | -1.027158 | 4.42 | 3.00 | 7.42 |
| 3 | 53.717352 | -1.027050 | 3.85 | 3.00 | 6.85 |
| 4 | 53.717314 | -1.027351 | 3.92 | 3.00 | 6.92 |
| 5 | 53.718215 | -1.027501 | 3.62 | 3.00 | 6.62 |
| 6 | 53.719142 | -1.027651 | 3.50 | 3.00 | 6.50 |
| 7 | 53.720742 | -1.029325 | 3.71 | 3.00 | 6.71 |
| 8 | 53.720983 | -1.027200 | 3.73 | 3.00 | 6.73 |
| 9 | 53.721898 | -1.027544 | 4.19 | 3.00 | 7.19 |
| 10 | 53.722431 | -1.029046 | 4.36 | 3.00 | 7.36 |
| 11 | 53.723167 | -1.031170 | 4.72 | 3.00 | 7.72 |
| 12 | 53.723078 | -1.031921 | 4.38 | 3.00 | 7.38 |
| 13 | 53.723282 | -1.032157 | 4.59 | 3.00 | 7.59 |
| 14 | 53.724031 | -1.035140 | 4.48 | 3.00 | 7.48 |
| 15 | 53.724158 | -1.035547 | 4.50 | 3.00 | 7.50 |
| 16 | 53.724843 | -1.036620 | 4.01 | 3.00 | 7.01 |
| 17 | 53.725046 | -1.037350 | 4.14 | 3.00 | 7.14 |
| 18 | 53.726443 | -1.036020 | 4.31 | 3.00 | 7.31 |
| 19 | 53.727395 | -1.038594 | 4.82 | 3.00 | 7.82 |
| 20 | 53.727839 | -1.037951 | 5.13 | 3.00 | 8.13 |
| 21 | 53.728410 | -1.036041 | 4.43 | 3.00 | 7.43 |
| 22 | 53.728855 | -1.033917 | 4.78 | 3.00 | 7.78 |
| 23 | 53.728449 | -1.032994 | 4.59 | 3.00 | 7.59 |
| 24 | 53.728106 | -1.033166 | 4.57 | 3.00 | 7.57 |
| 25 | 53.726989 | -1.032651 | 4.74 | 3.00 | 7.74 |
| 26 | 53.726240 | -1.028917 | 4.76 | 3.00 | 7.76 |
| 27 | 53.727268 | -1.028080 | 5.30 | 3.00 | 8.30 |
| 28 | 53.727192 | -1.026879 | 5.08 | 3.00 | 8.08 |
| 29 | 53.726722 | -1.026042 | 5.03 | 3.00 | 8.03 |
| 30 | 53.726430 | -1.025119 | 5.24 | 3.00 | 8.24 |
| 31 | 53.725757 | -1.025548 | 4.52 | 3.00 | 7.52 |
| 32 | 53.725821 | -1.026385 | 4.53 | 3.00 | 7.53 |
| 33 | 53.725313 | -1.026643 | 4.37 | 3.00 | 7.37 |
| 34 | 53.724830 | -1.027780 | 4.79 | 3.00 | 7.79 |
| 35 | 53.724500 | -1.027265 | 4.49 | 3.00 | 7.49 |
| 36 | 53.723866 | -1.025183 | 4.55 | 3.00 | 7.55 |
| 37 | 53.722571 | -1.021600 | 4.61 | 3.00 | 7.61 |
| 38 | 53.721898 | -1.021836 | 4.09 | 3.00 | 7.09 |
| 39 | 53.721847 | -1.021257 | 4.71 | 3.00 | 7.71 |
| 40 | 53.720959 | -1.021644 | 3.89 | 3.00 | 6.89 |
| 41 | 53.720870 | -1.020593 | 4.68 | 3.00 | 7.68 |
| 42 | 53.721860 | -1.019971 | 5.06 | 3.00 | 8.06 |
| 43 | 53.722279 | -1.019027 | 4.71 | 3.00 | 7.71 |
| 44 | 53.721568 | -1.018791 | 6.25 | 3.00 | 9.25 |
| 45 | 53.719556 | -1.018903 | 5.25 | 3.00 | 8.25 |
| 46 | 53.719670 | -1.020147 | 4.70 | 3.00 | 7.70 |
| 47 | 53.718871 | -1.020555 | 4.76 | 3.00 | 7.76 |
| 48 | 53.719048 | -1.022143 | 4.25 | 3.00 | 7.25 |
| 49 | 53.717436 | -1.023194 | 4.59 | 3.00 | 7.59 |
| 50 | 53.716674 | -1.024847 | 4.49 | 3.00 | 7.49 |
| 51 | 53.716902 | -1.026370 | 3.42 | 3.00 | 6.42 |

**Name**: PV array 5
**Footprint area**: 330,274 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.725701 | -1.041375 | 3.24 | 3.00 | 6.24 |
| 2 | 53.725917 | -1.042448 | 3.59 | 3.00 | 6.59 |
| 3 | 53.725904 | -1.043413 | 3.92 | 3.00 | 6.92 |
| 4 | 53.726615 | -1.043692 | 5.02 | 3.00 | 8.02 |
| 5 | 53.726996 | -1.043413 | 4.54 | 3.00 | 7.54 |
| 6 | 53.727288 | -1.043971 | 5.41 | 3.00 | 8.41 |
| 7 | 53.727618 | -1.045259 | 4.41 | 3.00 | 7.41 |
| 8 | 53.728570 | -1.047104 | 4.11 | 3.00 | 7.11 |
| 9 | 53.729637 | -1.049679 | 5.34 | 3.00 | 8.34 |
| 10 | 53.730030 | -1.049443 | 5.42 | 3.00 | 8.42 |
| 11 | 53.731490 | -1.046782 | 4.92 | 3.00 | 7.92 |
| 12 | 53.733127 | -1.045645 | 4.92 | 3.00 | 7.92 |
| 13 | 53.731807 | -1.042212 | 4.86 | 3.00 | 7.86 |
| 14 | 53.730792 | -1.039680 | 4.41 | 3.00 | 7.41 |
| 15 | 53.730487 | -1.038049 | 4.37 | 3.00 | 7.37 |
| 16 | 53.728507 | -1.039573 | 3.99 | 3.00 | 6.99 |
| 17 | 53.727961 | -1.038221 | 4.61 | 3.00 | 7.61 |

**Name**: PV array 6
**Footprint area**: 687,716 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.731554 | -1.036804 | 4.77 | 3.00 | 7.77 |
| 2 | 53.730754 | -1.037899 | 4.21 | 3.00 | 7.21 |
| 3 | 53.731148 | -1.039744 | 4.67 | 3.00 | 7.67 |
| 4 | 53.733496 | -1.045409 | 5.35 | 3.00 | 8.35 |
| 5 | 53.734017 | -1.045302 | 5.31 | 3.00 | 8.31 |
| 6 | 53.734309 | -1.046224 | 5.18 | 3.00 | 8.18 |
| 7 | 53.734867 | -1.046997 | 5.52 | 3.00 | 8.52 |
| 8 | 53.736352 | -1.050280 | 5.55 | 3.00 | 8.55 |
| 9 | 53.738345 | -1.047447 | 6.50 | 3.00 | 9.50 |
| 10 | 53.739360 | -1.048005 | 5.49 | 3.00 | 8.49 |
| 11 | 53.736961 | -1.051632 | 5.59 | 3.00 | 8.59 |
| 12 | 53.738472 | -1.055258 | 5.59 | 3.00 | 8.59 |
| 13 | 53.744436 | -1.053241 | 5.19 | 3.00 | 8.19 |
| 14 | 53.745172 | -1.052984 | 5.40 | 3.00 | 8.40 |
| 15 | 53.745464 | -1.051675 | 6.29 | 3.00 | 9.29 |
| 16 | 53.744703 | -1.051009 | 6.74 | 3.00 | 9.74 |
| 17 | 53.745401 | -1.049314 | 6.55 | 3.00 | 9.55 |
| 18 | 53.742647 | -1.046911 | 5.63 | 3.00 | 8.63 |
| 19 | 53.741683 | -1.050087 | 6.11 | 3.00 | 9.11 |
| 20 | 53.740883 | -1.049464 | 5.43 | 3.00 | 8.43 |
| 21 | 53.741886 | -1.046310 | 6.40 | 3.00 | 9.40 |
| 22 | 53.739715 | -1.044229 | 6.14 | 3.00 | 9.14 |
| 23 | 53.738764 | -1.047190 | 6.91 | 3.00 | 9.91 |
| 24 | 53.738256 | -1.047211 | 5.42 | 3.00 | 8.42 |
| 25 | 53.736796 | -1.045945 | 5.17 | 3.00 | 8.17 |
| 26 | 53.737926 | -1.042577 | 6.29 | 3.00 | 9.29 |

**Name**: PV array 7
**Footprint area**: 1,719,622 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.740578 | -1.055129 | 5.66 | 3.00 | 8.66 |
| 2 | 53.741416 | -1.060580 | 4.92 | 3.00 | 7.92 |
| 3 | 53.741492 | -1.062597 | 5.61 | 3.00 | 8.61 |
| 4 | 53.739639 | -1.062554 | 5.97 | 3.00 | 8.97 |
| 5 | 53.737812 | -1.063326 | 6.48 | 3.00 | 9.48 |
| 6 | 53.737532 | -1.064571 | 5.80 | 3.00 | 8.80 |
| 7 | 53.736720 | -1.065987 | 5.39 | 3.00 | 8.39 |
| 8 | 53.736517 | -1.066845 | 6.00 | 3.00 | 9.00 |
| 9 | 53.738218 | -1.069163 | 6.17 | 3.00 | 9.17 |
| 10 | 53.738573 | -1.071308 | 5.50 | 3.00 | 8.50 |
| 11 | 53.738675 | -1.073669 | 5.67 | 3.00 | 8.67 |
| 12 | 53.738091 | -1.076072 | 5.37 | 3.00 | 8.37 |
| 13 | 53.737634 | -1.076458 | 5.08 | 3.00 | 8.08 |
| 14 | 53.737532 | -1.078475 | 5.07 | 3.00 | 8.07 |
| 15 | 53.738192 | -1.078947 | 5.94 | 3.00 | 8.94 |
| 16 | 53.738700 | -1.080321 | 5.80 | 3.00 | 8.80 |
| 17 | 53.739309 | -1.080578 | 6.07 | 3.00 | 9.07 |
| 18 | 53.739462 | -1.081050 | 6.76 | 3.00 | 9.76 |
| 19 | 53.742507 | -1.080020 | 6.72 | 3.00 | 9.72 |
| 20 | 53.741314 | -1.078261 | 6.62 | 3.00 | 9.62 |
| 21 | 53.742000 | -1.078089 | 6.95 | 3.00 | 9.95 |
| 22 | 53.742457 | -1.077531 | 6.81 | 3.00 | 9.81 |
| 23 | 53.743142 | -1.078003 | 6.78 | 3.00 | 9.78 |
| 24 | 53.744462 | -1.077359 | 5.62 | 3.00 | 8.62 |
| 25 | 53.744690 | -1.076802 | 6.29 | 3.00 | 9.29 |
| 26 | 53.744512 | -1.075815 | 6.26 | 3.00 | 9.26 |
| 27 | 53.745451 | -1.075514 | 5.36 | 3.00 | 8.36 |
| 28 | 53.745502 | -1.077531 | 5.13 | 3.00 | 8.13 |
| 29 | 53.744563 | -1.078046 | 5.53 | 3.00 | 8.53 |
| 30 | 53.744665 | -1.079334 | 5.67 | 3.00 | 8.67 |
| 31 | 53.746238 | -1.078733 | 5.48 | 3.00 | 8.48 |
| 32 | 53.746035 | -1.076673 | 4.47 | 3.00 | 7.47 |
| 33 | 53.748192 | -1.076244 | 5.48 | 3.00 | 8.48 |
| 34 | 53.748218 | -1.078261 | 5.39 | 3.00 | 8.39 |
| 35 | 53.750146 | -1.077617 | 5.85 | 3.00 | 8.85 |
| 36 | 53.751161 | -1.076544 | 6.07 | 3.00 | 9.07 |
| 37 | 53.751136 | -1.075857 | 6.11 | 3.00 | 9.11 |
| 38 | 53.752938 | -1.075385 | 5.73 | 3.00 | 8.73 |
| 39 | 53.752735 | -1.073883 | 5.15 | 3.00 | 8.15 |
| 40 | 53.752506 | -1.073368 | 5.53 | 3.00 | 8.53 |
| 41 | 53.749588 | -1.073712 | 5.86 | 3.00 | 8.86 |
| 42 | 53.748395 | -1.074699 | 6.46 | 3.00 | 9.46 |
| 43 | 53.747761 | -1.075428 | 4.95 | 3.00 | 7.95 |
| 44 | 53.747431 | -1.075514 | 5.37 | 3.00 | 8.37 |
| 45 | 53.747659 | -1.072768 | 5.25 | 3.00 | 8.25 |
| 46 | 53.750476 | -1.072424 | 5.67 | 3.00 | 8.67 |
| 47 | 53.750527 | -1.072939 | 6.80 | 3.00 | 9.80 |
| 48 | 53.752481 | -1.072639 | 6.44 | 3.00 | 9.44 |
| 49 | 53.752176 | -1.070364 | 4.74 | 3.00 | 7.74 |
| 50 | 53.751212 | -1.069248 | 4.22 | 3.00 | 7.22 |
| 51 | 53.750933 | -1.067746 | 5.00 | 3.00 | 8.00 |
| 52 | 53.750705 | -1.065129 | 5.26 | 3.00 | 8.26 |
| 53 | 53.749664 | -1.062554 | 5.46 | 3.00 | 8.46 |
| 54 | 53.748827 | -1.062554 | 4.70 | 3.00 | 7.70 |
| 55 | 53.748573 | -1.061867 | 4.83 | 3.00 | 7.83 |
| 56 | 53.745578 | -1.061738 | 4.81 | 3.00 | 7.81 |
| 57 | 53.745299 | -1.067446 | 4.97 | 3.00 | 7.97 |
| 58 | 53.744081 | -1.067918 | 5.26 | 3.00 | 8.26 |
| 59 | 53.744081 | -1.066502 | 6.03 | 3.00 | 9.03 |
| 60 | 53.743446 | -1.064142 | 5.59 | 3.00 | 8.59 |
| 61 | 53.743472 | -1.061180 | 5.64 | 3.00 | 8.64 |
| 62 | 53.746111 | -1.061266 | 5.21 | 3.00 | 8.21 |
| 63 | 53.746162 | -1.060622 | 5.18 | 3.00 | 8.18 |
| 64 | 53.744665 | -1.059249 | 5.34 | 3.00 | 8.34 |
| 65 | 53.744817 | -1.058477 | 2.92 | 3.00 | 5.92 |
| 66 | 53.745248 | -1.057747 | 5.79 | 3.00 | 8.79 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.745781 | -1.054400 | 5.57 | 3.00 | 8.57 |
| 68 | 53.745934 | -1.053284 | 5.21 | 3.00 | 8.21 |

## Discrete Observation Receptors

| Number | Latitude | Longitude | Ground elevation | Height above ground | Total Elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| OP 1 | 53.753833 | -1.089004 | 6.42 | 1.50 | 7.92 |
| OP 2 | 53.753351 | -1.085957 | 6.56 | 1.50 | 8.06 |
| OP 3 | 53.754645 | -1.083296 | 7.08 | 1.50 | 8.58 |
| OP 4 | 53.752716 | -1.072953 | 6.05 | 1.50 | 7.55 |
| OP 5 | 53.752310 | -1.070207 | 4.82 | 1.50 | 6.32 |
| OP 6 | 53.751295 | -1.068662 | 4.03 | 1.50 | 5.53 |
| OP 7 | 53.750965 | -1.065443 | 6.42 | 1.50 | 7.92 |
| OP 8 | 53.749824 | -1.062139 | 5.93 | 1.50 | 7.43 |
| OP 9 | 53.749519 | -1.059392 | 4.36 | 1.50 | 5.86 |
| OP 10 | 53.748644 | -1.057032 | 4.10 | 1.50 | 5.60 |
| OP 11 | 53.748529 | -1.054392 | 4.77 | 1.50 | 6.27 |
| OP 12 | 53.755964 | -1.058469 | 5.89 | 1.50 | 7.39 |
| OP 13 | 53.754556 | -1.057246 | 6.61 | 1.50 | 8.11 |
| OP 14 | 53.752729 | -1.055594 | 6.03 | 1.50 | 7.53 |
| OP 15 | 53.751181 | -1.054199 | 5.17 | 1.50 | 6.67 |
| OP 16 | 53.749697 | -1.052762 | 5.69 | 1.50 | 7.19 |
| OP 17 | 53.748187 | -1.051474 | 5.45 | 1.50 | 6.95 |
| OP 18 | 53.746296 | -1.049822 | 6.65 | 1.50 | 8.15 |
| OP 19 | 53.744659 | -1.048234 | 6.91 | 1.50 | 8.41 |
| OP 20 | 53.743111 | -1.046861 | 6.73 | 1.50 | 8.23 |
| OP 21 | 53.741652 | -1.045638 | 7.31 | 1.50 | 8.81 |
| OP 22 | 53.739862 | -1.043964 | 6.13 | 1.50 | 7.63 |
| OP 23 | 53.738276 | -1.042548 | 6.79 | 1.50 | 8.29 |
| OP 24 | 53.736638 | -1.041024 | 5.24 | 1.50 | 6.74 |
| OP 25 | 53.735357 | -1.039973 | 5.17 | 1.50 | 6.67 |
| OP 26 | 53.733884 | -1.038600 | 6.50 | 1.50 | 8.00 |
| OP 27 | 53.732361 | -1.037162 | 6.62 | 1.50 | 8.12 |
| OP 28 | 53.730609 | -1.035553 | 5.16 | 1.50 | 6.66 |
| OP 29 | 53.729251 | -1.033557 | 5.43 | 1.50 | 6.93 |
| OP 30 | 53.728312 | -1.031218 | 5.94 | 1.50 | 7.44 |
| OP 31 | 53.727499 | -1.028128 | 5.57 | 1.50 | 7.07 |
| OP 32 | 53.726737 | -1.025532 | 5.53 | 1.50 | 7.03 |
| OP 33 | 53.726166 | -1.022656 | 6.19 | 1.50 | 7.69 |
| OP 34 | 53.724554 | -1.022034 | 6.00 | 1.50 | 7.50 |
| OP 35 | 53.723208 | -1.019846 | 5.56 | 1.50 | 7.06 |
| OP 36 | 53.721989 | -1.018494 | 4.63 | 1.50 | 6.13 |
| OP 37 | 53.719894 | -1.018687 | 5.79 | 1.50 | 7.29 |
| OP 38 | 53.718142 | -1.018901 | 8.14 | 1.50 | 9.64 |
| OP 39 | 53.716580 | -1.019052 | 6.43 | 1.50 | 7.93 |
| OP 40 | 53.714777 | -1.019309 | 8.43 | 1.50 | 9.93 |
| OP 41 | 53.712897 | -1.019481 | 8.80 | 1.50 | 10.30 |
| OP 42 | 53.711119 | -1.019695 | 9.83 | 1.50 | 11.33 |
| OP 43 | 53.709151 | -1.020511 | 8.32 | 1.50 | 9.82 |
| OP 44 | 53.709595 | -1.022184 | 6.85 | 1.50 | 8.35 |
| OP 45 | 53.711424 | -1.022957 | 6.80 | 1.50 | 8.30 |
| OP 46 | 53.711526 | -1.026025 | 4.83 | 1.50 | 6.33 |
| OP 47 | 53.712491 | -1.028107 | 4.61 | 1.50 | 6.11 |
| OP 48 | 53.714231 | -1.029823 | 4.98 | 1.50 | 6.48 |
| OP 49 | 53.715666 | -1.031111 | 4.45 | 1.50 | 5.95 |
| OP 50 | 53.716834 | -1.032999 | 4.02 | 1.50 | 5.52 |
| OP 51 | 53.718091 | -1.034823 | 4.34 | 1.50 | 5.84 |
| OP 52 | 53.719881 | -1.035896 | 5.14 | 1.50 | 6.64 |
| OP 53 | 53.721151 | -1.038063 | 5.04 | 1.50 | 6.54 |
| OP 54 | 53.722243 | -1.040295 | 4.82 | 1.50 | 6.32 |
| OP 55 | 53.723589 | -1.042870 | 5.82 | 1.50 | 7.32 |
| OP 56 | 53.724770 | -1.040853 | 1.49 | 1.50 | 2.99 |
| OP 57 | 53.726179 | -1.040488 | 5.05 | 1.50 | 6.55 |
| OP 58 | 53.727550 | -1.038621 | 5.10 | 1.50 | 6.60 |
| OP 59 | 53.728629 | -1.036368 | 4.82 | 1.50 | 6.32 |
| OP 60 | 53.724351 | -1.045938 | 5.61 | 1.50 | 7.11 |
| OP 61 | 53.725074 | -1.048234 | 4.98 | 1.50 | 6.48 |
| OP 62 | 53.726369 | -1.049436 | 4.20 | 1.50 | 5.70 |
| OP 63 | 53.727182 | -1.051796 | 5.74 | 1.50 | 7.24 |
| OP 64 | 53.728362 | -1.051410 | 6.18 | 1.50 | 7.68 |

| | | | | | |
|---|---|---|---|---|---|
| OP 65 | 53.730000 | -1.049715 | 5.84 | 1.50 | 7.34 |
| OP 66 | 53.731371 | -1.047247 | 5.13 | 1.50 | 6.63 |
| OP 67 | 53.733021 | -1.045960 | 5.07 | 1.50 | 6.57 |
| OP 68 | 53.730647 | -1.038299 | 4.56 | 1.50 | 6.06 |
| OP 69 | 53.731637 | -1.041475 | 5.11 | 1.50 | 6.61 |
| OP 70 | 53.732780 | -1.044221 | 5.59 | 1.50 | 7.09 |
| OP 71 | 53.734189 | -1.046389 | 6.46 | 1.50 | 7.96 |
| OP 72 | 53.735471 | -1.048813 | 5.19 | 1.50 | 6.69 |
| OP 73 | 53.736613 | -1.051109 | 6.68 | 1.50 | 8.18 |
| OP 74 | 53.737641 | -1.053684 | 7.31 | 1.50 | 8.81 |
| OP 75 | 53.738834 | -1.055422 | 6.05 | 1.50 | 7.55 |
| OP 76 | 53.740700 | -1.054714 | 5.29 | 1.50 | 6.79 |
| OP 77 | 53.742718 | -1.054049 | 6.27 | 1.50 | 7.77 |
| OP 78 | 53.744532 | -1.053448 | 5.06 | 1.50 | 6.56 |
| OP 79 | 53.746068 | -1.052762 | 5.45 | 1.50 | 6.95 |
| OP 80 | 53.745230 | -1.033664 | 5.45 | 1.50 | 6.95 |

## Summary of PV Glare Analysis

*PV configuration and total predicted glare*

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced | Data File |
|---|---|---|---|---|---|---|
| | deg | deg | min | min | kWh | |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - | |

## PV & Receptor Analysis Results

*Results for each PV array and receptor*

### PV array 1 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 2 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 3 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 4 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 5 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 6 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## PV array 7 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |
| OP: OP 52 | 0 | 0 |
| OP: OP 53 | 0 | 0 |

| | | |
|---|---|---|
| OP: OP 54 | 0 | 0 |
| OP: OP 55 | 0 | 0 |
| OP: OP 56 | 0 | 0 |
| OP: OP 57 | 0 | 0 |
| OP: OP 58 | 0 | 0 |
| OP: OP 59 | 0 | 0 |
| OP: OP 60 | 0 | 0 |
| OP: OP 61 | 0 | 0 |
| OP: OP 62 | 0 | 0 |
| OP: OP 63 | 0 | 0 |
| OP: OP 64 | 0 | 0 |
| OP: OP 65 | 0 | 0 |
| OP: OP 66 | 0 | 0 |
| OP: OP 67 | 0 | 0 |
| OP: OP 68 | 0 | 0 |
| OP: OP 69 | 0 | 0 |
| OP: OP 70 | 0 | 0 |
| OP: OP 71 | 0 | 0 |
| OP: OP 72 | 0 | 0 |
| OP: OP 73 | 0 | 0 |
| OP: OP 74 | 0 | 0 |
| OP: OP 75 | 0 | 0 |
| OP: OP 76 | 0 | 0 |
| OP: OP 77 | 0 | 0 |
| OP: OP 78 | 0 | 0 |
| OP: OP 79 | 0 | 0 |
| OP: OP 80 | 0 | 0 |

*No glare found*

## Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.

# Appendix 4.1E: Road Glare Results

# (Receptors 81 – 131)

ForgeSolar

# Helios Renewable Energy Project

## Road Receptors 81 - 131

**Created** April 14, 2022
**Updated** April 14, 2022
**Time-step** 1 minute
**Timezone offset** UTC0
**Site ID** 67609.11927

**Project type** Advanced
**Project status:** active
**Category** 100 MW to 1 GW

### Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

## Summary of Results No glare predicted!

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced |
|---|---|---|---|---|---|
| | deg | deg | min | min | kWh |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - |

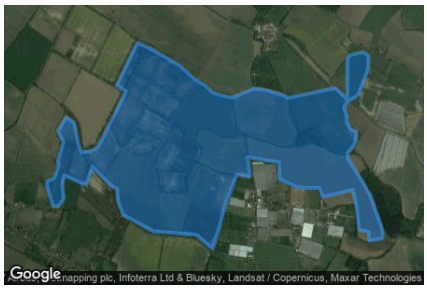
## Component Data

## PV Array(s)

**Total PV footprint area:** 4,863,335 m^2

**Name**: PV array 1
**Footprint area**: 1,213,127 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716640 | -1.074980 | 6.42 | 3.00 | 9.42 |
| 2 | 53.716234 | -1.075431 | 5.31 | 3.00 | 8.31 |
| 3 | 53.716221 | -1.075946 | 5.99 | 3.00 | 8.99 |
| 4 | 53.717224 | -1.076504 | 6.90 | 3.00 | 9.90 |
| 5 | 53.717555 | -1.076546 | 6.07 | 3.00 | 9.07 |
| 6 | 53.717732 | -1.075881 | 5.11 | 3.00 | 8.11 |
| 7 | 53.718431 | -1.075431 | 5.15 | 3.00 | 8.15 |
| 8 | 53.718685 | -1.075517 | 5.36 | 3.00 | 8.36 |
| 9 | 53.719713 | -1.075002 | 5.04 | 3.00 | 8.04 |
| 10 | 53.720297 | -1.075495 | 4.84 | 3.00 | 7.84 |
| 11 | 53.721059 | -1.074744 | 4.49 | 3.00 | 7.49 |
| 12 | 53.720742 | -1.074036 | 4.42 | 3.00 | 7.42 |
| 13 | 53.719548 | -1.073607 | 4.57 | 3.00 | 7.57 |
| 14 | 53.719142 | -1.073371 | 4.15 | 3.00 | 7.15 |
| 15 | 53.719218 | -1.072448 | 4.65 | 3.00 | 7.65 |
| 16 | 53.719434 | -1.071826 | 4.48 | 3.00 | 7.48 |
| 17 | 53.721135 | -1.070345 | 4.67 | 3.00 | 7.67 |
| 18 | 53.722481 | -1.069251 | 5.19 | 3.00 | 8.19 |
| 19 | 53.722760 | -1.070109 | 5.29 | 3.00 | 8.29 |
| 20 | 53.725096 | -1.068211 | 5.06 | 3.00 | 8.06 |
| 21 | 53.724816 | -1.067095 | 4.10 | 3.00 | 7.10 |
| 22 | 53.724232 | -1.065378 | 5.02 | 3.00 | 8.02 |
| 23 | 53.723902 | -1.064413 | 5.31 | 3.00 | 8.31 |
| 24 | 53.723102 | -1.062889 | 4.97 | 3.00 | 7.97 |
| 25 | 53.722772 | -1.061967 | 4.94 | 3.00 | 7.94 |
| 26 | 53.722391 | -1.061259 | 4.76 | 3.00 | 7.76 |
| 27 | 53.722239 | -1.060443 | 4.97 | 3.00 | 7.97 |
| 28 | 53.722125 | -1.059520 | 4.52 | 3.00 | 7.52 |
| 29 | 53.722468 | -1.058040 | 4.09 | 3.00 | 7.09 |
| 30 | 53.722607 | -1.057503 | 4.44 | 3.00 | 7.44 |
| 31 | 53.722556 | -1.056538 | 4.15 | 3.00 | 7.15 |
| 32 | 53.722239 | -1.054757 | 4.51 | 3.00 | 7.51 |
| 33 | 53.722099 | -1.054349 | 4.89 | 3.00 | 7.89 |
| 34 | 53.722645 | -1.050036 | 5.26 | 3.00 | 8.26 |
| 35 | 53.722036 | -1.048920 | 5.29 | 3.00 | 8.29 |
| 36 | 53.724207 | -1.048899 | 4.85 | 3.00 | 7.85 |
| 37 | 53.724423 | -1.048727 | 4.81 | 3.00 | 7.81 |
| 38 | 53.724601 | -1.047483 | 5.47 | 3.00 | 8.47 |
| 39 | 53.724410 | -1.046968 | 5.56 | 3.00 | 8.56 |
| 40 | 53.723724 | -1.046968 | 5.11 | 3.00 | 8.11 |
| 41 | 53.722252 | -1.047933 | 4.35 | 3.00 | 7.35 |
| 42 | 53.721884 | -1.048963 | 4.88 | 3.00 | 7.88 |
| 43 | 53.721541 | -1.049221 | 5.66 | 3.00 | 8.66 |
| 44 | 53.721071 | -1.048942 | 5.65 | 3.00 | 8.65 |
| 45 | 53.720766 | -1.048920 | 5.68 | 3.00 | 8.68 |
| 46 | 53.720360 | -1.048556 | 5.47 | 3.00 | 8.47 |
| 47 | 53.720309 | -1.048105 | 5.72 | 3.00 | 8.72 |
| 48 | 53.719687 | -1.048148 | 5.67 | 3.00 | 8.67 |
| 49 | 53.719344 | -1.048534 | 5.99 | 3.00 | 8.99 |
| 50 | 53.719128 | -1.048899 | 5.14 | 3.00 | 8.14 |
| 51 | 53.718785 | -1.048856 | 4.83 | 3.00 | 7.83 |
| 52 | 53.717831 | -1.047809 | 5.63 | 3.00 | 8.63 |
| 53 | 53.716790 | -1.046779 | 5.84 | 3.00 | 8.84 |
| 54 | 53.716155 | -1.046414 | 6.38 | 3.00 | 9.38 |
| 55 | 53.714974 | -1.045685 | 6.65 | 3.00 | 9.65 |
| 56 | 53.714453 | -1.045663 | 4.04 | 3.00 | 7.04 |
| 57 | 53.714339 | -1.046886 | 5.01 | 3.00 | 8.01 |
| 58 | 53.714821 | -1.046951 | 5.05 | 3.00 | 8.05 |
| 59 | 53.714923 | -1.047809 | 5.41 | 3.00 | 8.41 |
| 60 | 53.716320 | -1.048109 | 5.66 | 3.00 | 8.66 |
| 61 | 53.717107 | -1.048388 | 5.46 | 3.00 | 8.46 |
| 62 | 53.716726 | -1.051156 | 6.33 | 3.00 | 9.33 |
| 63 | 53.717209 | -1.051478 | 5.33 | 3.00 | 8.33 |
| 64 | 53.717209 | -1.052959 | 5.34 | 3.00 | 8.34 |
| 65 | 53.717259 | -1.053560 | 5.11 | 3.00 | 8.11 |
| 66 | 53.717704 | -1.055148 | 5.64 | 3.00 | 8.64 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.718605 | -1.055191 | 5.92 | 3.00 | 8.92 |
| 68 | 53.718885 | -1.058087 | 4.67 | 3.00 | 7.67 |
| 69 | 53.717856 | -1.057830 | 4.97 | 3.00 | 7.97 |
| 70 | 53.717945 | -1.059053 | 4.98 | 3.00 | 7.98 |
| 71 | 53.717399 | -1.059396 | 4.17 | 3.00 | 7.17 |
| 72 | 53.716536 | -1.059976 | 4.54 | 3.00 | 7.54 |
| 73 | 53.715850 | -1.060319 | 4.98 | 3.00 | 7.98 |
| 74 | 53.713894 | -1.061263 | 4.46 | 3.00 | 7.46 |
| 75 | 53.714656 | -1.062765 | 5.24 | 3.00 | 8.24 |
| 76 | 53.714847 | -1.066735 | 5.68 | 3.00 | 8.68 |
| 77 | 53.715748 | -1.069503 | 5.81 | 3.00 | 8.81 |
| 78 | 53.716497 | -1.069996 | 6.36 | 3.00 | 9.36 |
| 79 | 53.717145 | -1.070082 | 5.58 | 3.00 | 8.58 |
| 80 | 53.717310 | -1.070576 | 4.86 | 3.00 | 7.86 |
| 81 | 53.718364 | -1.072335 | 4.58 | 3.00 | 7.58 |
| 82 | 53.717374 | -1.072979 | 5.62 | 3.00 | 8.62 |
| 83 | 53.717894 | -1.074932 | 5.00 | 3.00 | 8.00 |
| 84 | 53.717361 | -1.075125 | 5.05 | 3.00 | 8.05 |

**Name**: PV array 2
**Footprint area**: 88,675 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714504 | -1.065662 | 5.86 | 3.00 | 8.86 |
| 2 | 53.711570 | -1.066370 | 6.08 | 3.00 | 9.08 |
| 3 | 53.710923 | -1.063001 | 6.45 | 3.00 | 9.45 |
| 4 | 53.713716 | -1.061521 | 5.54 | 3.00 | 8.54 |
| 5 | 53.714237 | -1.062915 | 5.66 | 3.00 | 8.66 |

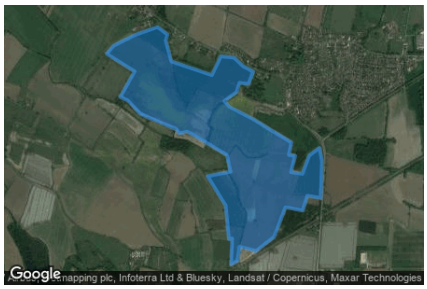
**Name**: PV array 3
**Footprint area**: 175,902 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714377 | -1.044033 | 3.79 | 3.00 | 6.79 |
| 2 | 53.713793 | -1.044419 | 3.21 | 3.00 | 6.21 |
| 3 | 53.713247 | -1.045427 | 4.43 | 3.00 | 7.43 |
| 4 | 53.713069 | -1.046758 | 4.33 | 3.00 | 7.33 |
| 5 | 53.712154 | -1.046522 | 4.37 | 3.00 | 7.37 |
| 6 | 53.711723 | -1.046758 | 4.66 | 3.00 | 7.66 |
| 7 | 53.711494 | -1.047487 | 5.96 | 3.00 | 8.96 |
| 8 | 53.710948 | -1.047723 | 4.12 | 3.00 | 7.12 |
| 9 | 53.710783 | -1.047552 | 4.25 | 3.00 | 7.25 |
| 10 | 53.710503 | -1.046908 | 2.93 | 3.00 | 5.93 |
| 11 | 53.710224 | -1.046371 | 4.40 | 3.00 | 7.40 |
| 12 | 53.710211 | -1.045556 | 4.27 | 3.00 | 7.27 |
| 13 | 53.710161 | -1.044548 | 4.46 | 3.00 | 7.46 |
| 14 | 53.709983 | -1.043668 | 5.07 | 3.00 | 8.07 |
| 15 | 53.711519 | -1.039441 | 4.84 | 3.00 | 7.84 |
| 16 | 53.712828 | -1.039548 | 3.63 | 3.00 | 6.63 |
| 17 | 53.713323 | -1.040363 | 4.24 | 3.00 | 7.24 |
| 18 | 53.713882 | -1.040964 | 4.20 | 3.00 | 7.20 |
| 19 | 53.714148 | -1.042016 | 3.87 | 3.00 | 6.87 |

**Name**: PV array 4
**Footprint area**: 648,018 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716146 | -1.026557 | 4.12 | 3.00 | 7.12 |
| 2 | 53.715942 | -1.027158 | 4.42 | 3.00 | 7.42 |
| 3 | 53.717352 | -1.027050 | 3.85 | 3.00 | 6.85 |
| 4 | 53.717314 | -1.027351 | 3.92 | 3.00 | 6.92 |
| 5 | 53.718215 | -1.027501 | 3.62 | 3.00 | 6.62 |
| 6 | 53.719142 | -1.027651 | 3.50 | 3.00 | 6.50 |
| 7 | 53.720742 | -1.029325 | 3.71 | 3.00 | 6.71 |
| 8 | 53.720983 | -1.027200 | 3.73 | 3.00 | 6.73 |
| 9 | 53.721898 | -1.027544 | 4.19 | 3.00 | 7.19 |
| 10 | 53.722431 | -1.029046 | 4.36 | 3.00 | 7.36 |
| 11 | 53.723167 | -1.031170 | 4.72 | 3.00 | 7.72 |
| 12 | 53.723078 | -1.031921 | 4.38 | 3.00 | 7.38 |
| 13 | 53.723282 | -1.032157 | 4.59 | 3.00 | 7.59 |
| 14 | 53.724031 | -1.035140 | 4.48 | 3.00 | 7.48 |
| 15 | 53.724158 | -1.035547 | 4.50 | 3.00 | 7.50 |
| 16 | 53.724843 | -1.036620 | 4.01 | 3.00 | 7.01 |
| 17 | 53.725046 | -1.037350 | 4.14 | 3.00 | 7.14 |
| 18 | 53.726443 | -1.036020 | 4.31 | 3.00 | 7.31 |
| 19 | 53.727395 | -1.038594 | 4.82 | 3.00 | 7.82 |
| 20 | 53.727839 | -1.037951 | 5.13 | 3.00 | 8.13 |
| 21 | 53.728410 | -1.036041 | 4.43 | 3.00 | 7.43 |
| 22 | 53.728855 | -1.033917 | 4.78 | 3.00 | 7.78 |
| 23 | 53.728449 | -1.032994 | 4.59 | 3.00 | 7.59 |
| 24 | 53.728106 | -1.033166 | 4.57 | 3.00 | 7.57 |
| 25 | 53.726989 | -1.032651 | 4.74 | 3.00 | 7.74 |
| 26 | 53.726240 | -1.028917 | 4.76 | 3.00 | 7.76 |
| 27 | 53.727268 | -1.028080 | 5.30 | 3.00 | 8.30 |
| 28 | 53.727192 | -1.026879 | 5.08 | 3.00 | 8.08 |
| 29 | 53.726722 | -1.026042 | 5.03 | 3.00 | 8.03 |
| 30 | 53.726430 | -1.025119 | 5.24 | 3.00 | 8.24 |
| 31 | 53.725757 | -1.025548 | 4.52 | 3.00 | 7.52 |
| 32 | 53.725821 | -1.026385 | 4.53 | 3.00 | 7.53 |
| 33 | 53.725313 | -1.026643 | 4.37 | 3.00 | 7.37 |
| 34 | 53.724830 | -1.027780 | 4.79 | 3.00 | 7.79 |
| 35 | 53.724500 | -1.027265 | 4.49 | 3.00 | 7.49 |
| 36 | 53.723866 | -1.025183 | 4.55 | 3.00 | 7.55 |
| 37 | 53.722571 | -1.021600 | 4.61 | 3.00 | 7.61 |
| 38 | 53.721898 | -1.021836 | 4.09 | 3.00 | 7.09 |
| 39 | 53.721847 | -1.021257 | 4.71 | 3.00 | 7.71 |
| 40 | 53.720959 | -1.021644 | 3.89 | 3.00 | 6.89 |
| 41 | 53.720870 | -1.020593 | 4.68 | 3.00 | 7.68 |
| 42 | 53.721860 | -1.019971 | 5.06 | 3.00 | 8.06 |
| 43 | 53.722279 | -1.019027 | 4.71 | 3.00 | 7.71 |
| 44 | 53.721568 | -1.018791 | 6.25 | 3.00 | 9.25 |
| 45 | 53.719556 | -1.018903 | 5.25 | 3.00 | 8.25 |
| 46 | 53.719670 | -1.020147 | 4.70 | 3.00 | 7.70 |
| 47 | 53.718871 | -1.020555 | 4.76 | 3.00 | 7.76 |
| 48 | 53.719048 | -1.022143 | 4.25 | 3.00 | 7.25 |
| 49 | 53.717436 | -1.023194 | 4.59 | 3.00 | 7.59 |
| 50 | 53.716674 | -1.024847 | 4.49 | 3.00 | 7.49 |
| 51 | 53.716902 | -1.026370 | 3.42 | 3.00 | 6.42 |

**Name**: PV array 5
**Footprint area**: 330,274 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.725701 | -1.041375 | 3.24 | 3.00 | 6.24 |
| 2 | 53.725917 | -1.042448 | 3.59 | 3.00 | 6.59 |
| 3 | 53.725904 | -1.043413 | 3.92 | 3.00 | 6.92 |
| 4 | 53.726615 | -1.043692 | 5.02 | 3.00 | 8.02 |
| 5 | 53.726996 | -1.043413 | 4.54 | 3.00 | 7.54 |
| 6 | 53.727288 | -1.043971 | 5.41 | 3.00 | 8.41 |
| 7 | 53.727618 | -1.045259 | 4.41 | 3.00 | 7.41 |
| 8 | 53.728570 | -1.047104 | 4.11 | 3.00 | 7.11 |
| 9 | 53.729637 | -1.049679 | 5.34 | 3.00 | 8.34 |
| 10 | 53.730030 | -1.049443 | 5.42 | 3.00 | 8.42 |
| 11 | 53.731490 | -1.046782 | 4.92 | 3.00 | 7.92 |
| 12 | 53.733127 | -1.045645 | 4.92 | 3.00 | 7.92 |
| 13 | 53.731807 | -1.042212 | 4.86 | 3.00 | 7.86 |
| 14 | 53.730792 | -1.039680 | 4.41 | 3.00 | 7.41 |
| 15 | 53.730487 | -1.038049 | 4.37 | 3.00 | 7.37 |
| 16 | 53.728507 | -1.039573 | 3.99 | 3.00 | 6.99 |
| 17 | 53.727961 | -1.038221 | 4.61 | 3.00 | 7.61 |

**Name**: PV array 6
**Footprint area**: 687,716 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.731554 | -1.036804 | 4.77 | 3.00 | 7.77 |
| 2 | 53.730754 | -1.037899 | 4.21 | 3.00 | 7.21 |
| 3 | 53.731148 | -1.039744 | 4.67 | 3.00 | 7.67 |
| 4 | 53.733496 | -1.045409 | 5.35 | 3.00 | 8.35 |
| 5 | 53.734017 | -1.045302 | 5.31 | 3.00 | 8.31 |
| 6 | 53.734309 | -1.046224 | 5.18 | 3.00 | 8.18 |
| 7 | 53.734867 | -1.046997 | 5.52 | 3.00 | 8.52 |
| 8 | 53.736352 | -1.050280 | 5.55 | 3.00 | 8.55 |
| 9 | 53.738345 | -1.047447 | 6.50 | 3.00 | 9.50 |
| 10 | 53.739360 | -1.048005 | 5.49 | 3.00 | 8.49 |
| 11 | 53.736961 | -1.051632 | 5.59 | 3.00 | 8.59 |
| 12 | 53.738472 | -1.055258 | 5.59 | 3.00 | 8.59 |
| 13 | 53.744436 | -1.053241 | 5.19 | 3.00 | 8.19 |
| 14 | 53.745172 | -1.052984 | 5.40 | 3.00 | 8.40 |
| 15 | 53.745464 | -1.051675 | 6.29 | 3.00 | 9.29 |
| 16 | 53.744703 | -1.051009 | 6.74 | 3.00 | 9.74 |
| 17 | 53.745401 | -1.049314 | 6.55 | 3.00 | 9.55 |
| 18 | 53.742647 | -1.046911 | 5.63 | 3.00 | 8.63 |
| 19 | 53.741683 | -1.050087 | 6.11 | 3.00 | 9.11 |
| 20 | 53.740883 | -1.049464 | 5.43 | 3.00 | 8.43 |
| 21 | 53.741886 | -1.046310 | 6.40 | 3.00 | 9.40 |
| 22 | 53.739715 | -1.044229 | 6.14 | 3.00 | 9.14 |
| 23 | 53.738764 | -1.047190 | 6.91 | 3.00 | 9.91 |
| 24 | 53.738256 | -1.047211 | 5.42 | 3.00 | 8.42 |
| 25 | 53.736796 | -1.045945 | 5.17 | 3.00 | 8.17 |
| 26 | 53.737926 | -1.042577 | 6.29 | 3.00 | 9.29 |

**Name**: PV array 7
**Footprint area**: 1,719,622 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.740578 | -1.055129 | 5.66 | 3.00 | 8.66 |
| 2 | 53.741416 | -1.060580 | 4.92 | 3.00 | 7.92 |
| 3 | 53.741492 | -1.062597 | 5.61 | 3.00 | 8.61 |
| 4 | 53.739639 | -1.062554 | 5.97 | 3.00 | 8.97 |
| 5 | 53.737812 | -1.063326 | 6.48 | 3.00 | 9.48 |
| 6 | 53.737532 | -1.064571 | 5.80 | 3.00 | 8.80 |
| 7 | 53.736720 | -1.065987 | 5.39 | 3.00 | 8.39 |
| 8 | 53.736517 | -1.066845 | 6.00 | 3.00 | 9.00 |
| 9 | 53.738218 | -1.069163 | 6.17 | 3.00 | 9.17 |
| 10 | 53.738573 | -1.071308 | 5.50 | 3.00 | 8.50 |
| 11 | 53.738675 | -1.073669 | 5.67 | 3.00 | 8.67 |
| 12 | 53.738091 | -1.076072 | 5.37 | 3.00 | 8.37 |
| 13 | 53.737634 | -1.076458 | 5.08 | 3.00 | 8.08 |
| 14 | 53.737532 | -1.078475 | 5.07 | 3.00 | 8.07 |
| 15 | 53.738192 | -1.078947 | 5.94 | 3.00 | 8.94 |
| 16 | 53.738700 | -1.080321 | 5.80 | 3.00 | 8.80 |
| 17 | 53.739309 | -1.080578 | 6.07 | 3.00 | 9.07 |
| 18 | 53.739462 | -1.081050 | 6.76 | 3.00 | 9.76 |
| 19 | 53.742507 | -1.080020 | 6.72 | 3.00 | 9.72 |
| 20 | 53.741314 | -1.078261 | 6.62 | 3.00 | 9.62 |
| 21 | 53.742000 | -1.078089 | 6.95 | 3.00 | 9.95 |
| 22 | 53.742457 | -1.077531 | 6.81 | 3.00 | 9.81 |
| 23 | 53.743142 | -1.078003 | 6.78 | 3.00 | 9.78 |
| 24 | 53.744462 | -1.077359 | 5.62 | 3.00 | 8.62 |
| 25 | 53.744690 | -1.076802 | 6.29 | 3.00 | 9.29 |
| 26 | 53.744512 | -1.075815 | 6.26 | 3.00 | 9.26 |
| 27 | 53.745451 | -1.075514 | 5.36 | 3.00 | 8.36 |
| 28 | 53.745502 | -1.077531 | 5.13 | 3.00 | 8.13 |
| 29 | 53.744563 | -1.078046 | 5.53 | 3.00 | 8.53 |
| 30 | 53.744665 | -1.079334 | 5.67 | 3.00 | 8.67 |
| 31 | 53.746238 | -1.078733 | 5.48 | 3.00 | 8.48 |
| 32 | 53.746035 | -1.076673 | 4.47 | 3.00 | 7.47 |
| 33 | 53.748192 | -1.076244 | 5.48 | 3.00 | 8.48 |
| 34 | 53.748218 | -1.078261 | 5.39 | 3.00 | 8.39 |
| 35 | 53.750146 | -1.077617 | 5.85 | 3.00 | 8.85 |
| 36 | 53.751161 | -1.076544 | 6.07 | 3.00 | 9.07 |
| 37 | 53.751136 | -1.075857 | 6.11 | 3.00 | 9.11 |
| 38 | 53.752938 | -1.075385 | 5.73 | 3.00 | 8.73 |
| 39 | 53.752735 | -1.073883 | 5.15 | 3.00 | 8.15 |
| 40 | 53.752506 | -1.073368 | 5.53 | 3.00 | 8.53 |
| 41 | 53.749588 | -1.073712 | 5.86 | 3.00 | 8.86 |
| 42 | 53.748395 | -1.074699 | 6.46 | 3.00 | 9.46 |
| 43 | 53.747761 | -1.075428 | 4.95 | 3.00 | 7.95 |
| 44 | 53.747431 | -1.075514 | 5.37 | 3.00 | 8.37 |
| 45 | 53.747659 | -1.072768 | 5.25 | 3.00 | 8.25 |
| 46 | 53.750476 | -1.072424 | 5.67 | 3.00 | 8.67 |
| 47 | 53.750527 | -1.072939 | 6.80 | 3.00 | 9.80 |
| 48 | 53.752481 | -1.072639 | 6.44 | 3.00 | 9.44 |
| 49 | 53.752176 | -1.070364 | 4.74 | 3.00 | 7.74 |
| 50 | 53.751212 | -1.069248 | 4.22 | 3.00 | 7.22 |
| 51 | 53.750933 | -1.067746 | 5.00 | 3.00 | 8.00 |
| 52 | 53.750705 | -1.065129 | 5.26 | 3.00 | 8.26 |
| 53 | 53.749664 | -1.062554 | 5.46 | 3.00 | 8.46 |
| 54 | 53.748827 | -1.062554 | 4.70 | 3.00 | 7.70 |
| 55 | 53.748573 | -1.061867 | 4.83 | 3.00 | 7.83 |
| 56 | 53.745578 | -1.061738 | 4.81 | 3.00 | 7.81 |
| 57 | 53.745299 | -1.067446 | 4.97 | 3.00 | 7.97 |
| 58 | 53.744081 | -1.067918 | 5.26 | 3.00 | 8.26 |
| 59 | 53.744081 | -1.066502 | 6.03 | 3.00 | 9.03 |
| 60 | 53.743446 | -1.064142 | 5.59 | 3.00 | 8.59 |
| 61 | 53.743472 | -1.061180 | 5.64 | 3.00 | 8.64 |
| 62 | 53.746111 | -1.061266 | 5.21 | 3.00 | 8.21 |
| 63 | 53.746162 | -1.060622 | 5.18 | 3.00 | 8.18 |
| 64 | 53.744665 | -1.059249 | 5.34 | 3.00 | 8.34 |
| 65 | 53.744817 | -1.058477 | 2.92 | 3.00 | 5.92 |
| 66 | 53.745248 | -1.057747 | 5.79 | 3.00 | 8.79 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.745781 | -1.054400 | 5.57 | 3.00 | 8.57 |
| 68 | 53.745934 | -1.053284 | 5.21 | 3.00 | 8.21 |

## Discrete Observation Receptors

| Number | Latitude | Longitude | Ground elevation | Height above ground | Total Elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| OP 1 | 53.743212 | -1.035617 | 4.18 | 1.50 | 5.68 |
| OP 2 | 53.741575 | -1.037183 | 7.40 | 1.50 | 8.90 |
| OP 3 | 53.739773 | -1.038986 | 5.81 | 1.50 | 7.31 |
| OP 4 | 53.738085 | -1.040316 | 6.54 | 1.50 | 8.04 |
| OP 5 | 53.726872 | -1.021018 | 8.47 | 1.50 | 9.97 |
| OP 6 | 53.727944 | -1.018519 | 6.97 | 1.50 | 8.47 |
| OP 7 | 53.727989 | -1.015868 | 6.10 | 1.50 | 7.60 |
| OP 8 | 53.727329 | -1.013369 | 5.70 | 1.50 | 7.20 |
| OP 9 | 53.727252 | -1.010236 | 6.57 | 1.50 | 8.07 |
| OP 10 | 53.726833 | -1.007768 | 5.54 | 1.50 | 7.04 |
| OP 11 | 53.726021 | -1.009914 | 5.56 | 1.50 | 7.06 |
| OP 12 | 53.725247 | -1.012017 | 5.98 | 1.50 | 7.48 |
| OP 13 | 53.724459 | -1.014216 | 6.33 | 1.50 | 7.83 |
| OP 14 | 53.723310 | -1.017177 | 6.51 | 1.50 | 8.01 |
| OP 15 | 53.707595 | -1.050759 | 7.43 | 1.50 | 8.93 |
| OP 16 | 53.707868 | -1.053334 | 6.45 | 1.50 | 7.95 |
| OP 17 | 53.708345 | -1.056209 | 7.26 | 1.50 | 8.76 |
| OP 18 | 53.709291 | -1.058913 | 5.84 | 1.50 | 7.34 |
| OP 19 | 53.710313 | -1.061691 | 6.63 | 1.50 | 8.13 |
| OP 20 | 53.711012 | -1.064105 | 5.86 | 1.50 | 7.36 |
| OP 21 | 53.711481 | -1.066777 | 6.23 | 1.50 | 7.73 |
| OP 22 | 53.712028 | -1.069888 | 6.79 | 1.50 | 8.29 |
| OP 23 | 53.712536 | -1.072774 | 7.51 | 1.50 | 9.01 |
| OP 24 | 53.713526 | -1.075961 | 7.55 | 1.50 | 9.05 |
| OP 25 | 53.714345 | -1.078224 | 7.27 | 1.50 | 8.77 |
| OP 26 | 53.714720 | -1.081175 | 7.46 | 1.50 | 8.96 |
| OP 27 | 53.715577 | -1.083213 | 6.25 | 1.50 | 7.75 |
| OP 28 | 53.717361 | -1.082441 | 7.24 | 1.50 | 8.74 |
| OP 29 | 53.717952 | -1.084780 | 7.61 | 1.50 | 9.11 |
| OP 30 | 53.718155 | -1.088224 | 8.69 | 1.50 | 10.19 |
| OP 31 | 53.718523 | -1.091185 | 8.05 | 1.50 | 9.55 |
| OP 32 | 53.718434 | -1.083299 | 5.85 | 1.50 | 7.35 |
| OP 33 | 53.719958 | -1.081271 | 6.01 | 1.50 | 7.51 |
| OP 34 | 53.721456 | -1.078943 | 5.08 | 1.50 | 6.58 |
| OP 35 | 53.722929 | -1.077774 | 5.29 | 1.50 | 6.79 |
| OP 36 | 53.724573 | -1.076186 | 5.30 | 1.50 | 6.80 |
| OP 37 | 53.725957 | -1.074995 | 6.52 | 1.50 | 8.02 |
| OP 38 | 53.727905 | -1.073450 | 5.80 | 1.50 | 7.30 |
| OP 39 | 53.729334 | -1.072527 | 5.58 | 1.50 | 7.08 |
| OP 40 | 53.731092 | -1.072570 | 4.14 | 1.50 | 5.64 |
| OP 41 | 53.732526 | -1.073053 | 4.94 | 1.50 | 6.44 |
| OP 42 | 53.732996 | -1.075735 | 4.98 | 1.50 | 6.48 |
| OP 43 | 53.734436 | -1.077259 | 5.75 | 1.50 | 7.25 |
| OP 44 | 53.734424 | -1.079984 | 5.66 | 1.50 | 7.16 |
| OP 45 | 53.734551 | -1.082902 | 6.82 | 1.50 | 8.32 |
| OP 46 | 53.734843 | -1.085520 | 6.19 | 1.50 | 7.69 |
| OP 47 | 53.735921 | -1.088288 | 6.26 | 1.50 | 7.76 |
| OP 48 | 53.736797 | -1.090026 | 6.43 | 1.50 | 7.93 |
| OP 49 | 53.737736 | -1.092365 | 6.21 | 1.50 | 7.71 |
| OP 50 | 53.738511 | -1.094790 | 6.47 | 1.50 | 7.97 |
| OP 51 | 53.740313 | -1.095691 | 6.66 | 1.50 | 8.16 |

## Summary of PV Glare Analysis

*PV configuration and total predicted glare*

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced | Data File |
|---|---|---|---|---|---|---|
| | deg | deg | min | min | kWh | |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - | |

## PV & Receptor Analysis Results

*Results for each PV array and receptor*

### PV array 1 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## PV array 2 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## PV array 3 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## PV array 4 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## PV array 5 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## PV array 6 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## PV array 7 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |
| OP: OP 47 | 0 | 0 |
| OP: OP 48 | 0 | 0 |
| OP: OP 49 | 0 | 0 |
| OP: OP 50 | 0 | 0 |
| OP: OP 51 | 0 | 0 |

*No glare found*

## Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.

# Appendix 4.1F: Rail Glare Results

ForgeSolar

# Helios Renewable Energy Project

## Rail Receptors

**Created** April 14, 2022
**Updated** April 14, 2022
**Time-step** 1 minute
**Timezone offset** UTC0
**Site ID** 67606.11927

**Project type** Advanced
**Project status:** active
**Category** 100 MW to 1 GW

### Misc. Analysis Settings

DNI: **varies (1,000.0 W/m^2 peak)**
Ocular transmission coefficient: **0.5**
Pupil diameter: **0.002 m**
Eye focal length: **0.017 m**
Sun subtended angle: **9.3 mrad**

Analysis Methodologies:

- Observation point: **Version 2**
- 2-Mile Flight Path: **Version 2**
- Route: **Version 2**

## Summary of Results No glare predicted!

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced |
|---|---|---|---|---|---|
| | deg | deg | min | min | kWh |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - |

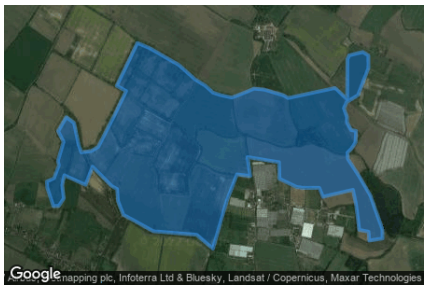
## Component Data

## PV Array(s)

**Total PV footprint area:** 4,863,335 m^2

**Name**: PV array 1
**Footprint area**: 1,213,127 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716640 | -1.074980 | 6.42 | 3.00 | 9.42 |
| 2 | 53.716234 | -1.075431 | 5.31 | 3.00 | 8.31 |
| 3 | 53.716221 | -1.075946 | 5.99 | 3.00 | 8.99 |
| 4 | 53.717224 | -1.076504 | 6.90 | 3.00 | 9.90 |
| 5 | 53.717555 | -1.076546 | 6.07 | 3.00 | 9.07 |
| 6 | 53.717732 | -1.075881 | 5.11 | 3.00 | 8.11 |
| 7 | 53.718431 | -1.075431 | 5.15 | 3.00 | 8.15 |
| 8 | 53.718685 | -1.075517 | 5.36 | 3.00 | 8.36 |
| 9 | 53.719713 | -1.075002 | 5.04 | 3.00 | 8.04 |
| 10 | 53.720297 | -1.075495 | 4.84 | 3.00 | 7.84 |
| 11 | 53.721059 | -1.074744 | 4.49 | 3.00 | 7.49 |
| 12 | 53.720742 | -1.074036 | 4.42 | 3.00 | 7.42 |
| 13 | 53.719548 | -1.073607 | 4.57 | 3.00 | 7.57 |
| 14 | 53.719142 | -1.073371 | 4.15 | 3.00 | 7.15 |
| 15 | 53.719218 | -1.072448 | 4.65 | 3.00 | 7.65 |
| 16 | 53.719434 | -1.071826 | 4.48 | 3.00 | 7.48 |
| 17 | 53.721135 | -1.070345 | 4.67 | 3.00 | 7.67 |
| 18 | 53.722481 | -1.069251 | 5.19 | 3.00 | 8.19 |
| 19 | 53.722760 | -1.070109 | 5.29 | 3.00 | 8.29 |
| 20 | 53.725096 | -1.068211 | 5.06 | 3.00 | 8.06 |
| 21 | 53.724816 | -1.067095 | 4.10 | 3.00 | 7.10 |
| 22 | 53.724232 | -1.065378 | 5.02 | 3.00 | 8.02 |
| 23 | 53.723902 | -1.064413 | 5.31 | 3.00 | 8.31 |
| 24 | 53.723102 | -1.062889 | 4.97 | 3.00 | 7.97 |
| 25 | 53.722772 | -1.061967 | 4.94 | 3.00 | 7.94 |
| 26 | 53.722391 | -1.061259 | 4.76 | 3.00 | 7.76 |
| 27 | 53.722239 | -1.060443 | 4.97 | 3.00 | 7.97 |
| 28 | 53.722125 | -1.059520 | 4.52 | 3.00 | 7.52 |
| 29 | 53.722468 | -1.058040 | 4.09 | 3.00 | 7.09 |
| 30 | 53.722607 | -1.057503 | 4.44 | 3.00 | 7.44 |
| 31 | 53.722556 | -1.056538 | 4.15 | 3.00 | 7.15 |
| 32 | 53.722239 | -1.054757 | 4.51 | 3.00 | 7.51 |
| 33 | 53.722099 | -1.054349 | 4.89 | 3.00 | 7.89 |
| 34 | 53.722645 | -1.050036 | 5.26 | 3.00 | 8.26 |
| 35 | 53.722036 | -1.048920 | 5.29 | 3.00 | 8.29 |
| 36 | 53.724207 | -1.048899 | 4.85 | 3.00 | 7.85 |
| 37 | 53.724423 | -1.048727 | 4.81 | 3.00 | 7.81 |
| 38 | 53.724601 | -1.047483 | 5.47 | 3.00 | 8.47 |
| 39 | 53.724410 | -1.046968 | 5.56 | 3.00 | 8.56 |
| 40 | 53.723724 | -1.046968 | 5.11 | 3.00 | 8.11 |
| 41 | 53.722252 | -1.047933 | 4.35 | 3.00 | 7.35 |
| 42 | 53.721884 | -1.048963 | 4.88 | 3.00 | 7.88 |
| 43 | 53.721541 | -1.049221 | 5.66 | 3.00 | 8.66 |
| 44 | 53.721071 | -1.048942 | 5.65 | 3.00 | 8.65 |
| 45 | 53.720766 | -1.048920 | 5.68 | 3.00 | 8.68 |
| 46 | 53.720360 | -1.048556 | 5.47 | 3.00 | 8.47 |
| 47 | 53.720309 | -1.048105 | 5.72 | 3.00 | 8.72 |
| 48 | 53.719687 | -1.048148 | 5.67 | 3.00 | 8.67 |
| 49 | 53.719344 | -1.048534 | 5.99 | 3.00 | 8.99 |
| 50 | 53.719128 | -1.048899 | 5.14 | 3.00 | 8.14 |
| 51 | 53.718785 | -1.048856 | 4.83 | 3.00 | 7.83 |
| 52 | 53.717831 | -1.047809 | 5.63 | 3.00 | 8.63 |
| 53 | 53.716790 | -1.046779 | 5.84 | 3.00 | 8.84 |
| 54 | 53.716155 | -1.046414 | 6.38 | 3.00 | 9.38 |
| 55 | 53.714974 | -1.045685 | 6.65 | 3.00 | 9.65 |
| 56 | 53.714453 | -1.045663 | 4.04 | 3.00 | 7.04 |
| 57 | 53.714339 | -1.046886 | 5.01 | 3.00 | 8.01 |
| 58 | 53.714821 | -1.046951 | 5.05 | 3.00 | 8.05 |
| 59 | 53.714923 | -1.047809 | 5.41 | 3.00 | 8.41 |
| 60 | 53.716320 | -1.048109 | 5.66 | 3.00 | 8.66 |
| 61 | 53.717107 | -1.048388 | 5.46 | 3.00 | 8.46 |
| 62 | 53.716726 | -1.051156 | 6.33 | 3.00 | 9.33 |
| 63 | 53.717209 | -1.051478 | 5.33 | 3.00 | 8.33 |
| 64 | 53.717209 | -1.052959 | 5.34 | 3.00 | 8.34 |
| 65 | 53.717259 | -1.053560 | 5.11 | 3.00 | 8.11 |
| 66 | 53.717704 | -1.055148 | 5.64 | 3.00 | 8.64 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.718605 | -1.055191 | 5.92 | 3.00 | 8.92 |
| 68 | 53.718885 | -1.058087 | 4.67 | 3.00 | 7.67 |
| 69 | 53.717856 | -1.057830 | 4.97 | 3.00 | 7.97 |
| 70 | 53.717945 | -1.059053 | 4.98 | 3.00 | 7.98 |
| 71 | 53.717399 | -1.059396 | 4.17 | 3.00 | 7.17 |
| 72 | 53.716536 | -1.059976 | 4.54 | 3.00 | 7.54 |
| 73 | 53.715850 | -1.060319 | 4.98 | 3.00 | 7.98 |
| 74 | 53.713894 | -1.061263 | 4.46 | 3.00 | 7.46 |
| 75 | 53.714656 | -1.062765 | 5.24 | 3.00 | 8.24 |
| 76 | 53.714847 | -1.066735 | 5.68 | 3.00 | 8.68 |
| 77 | 53.715748 | -1.069503 | 5.81 | 3.00 | 8.81 |
| 78 | 53.716497 | -1.069996 | 6.36 | 3.00 | 9.36 |
| 79 | 53.717145 | -1.070082 | 5.58 | 3.00 | 8.58 |
| 80 | 53.717310 | -1.070576 | 4.86 | 3.00 | 7.86 |
| 81 | 53.718364 | -1.072335 | 4.58 | 3.00 | 7.58 |
| 82 | 53.717374 | -1.072979 | 5.62 | 3.00 | 8.62 |
| 83 | 53.717894 | -1.074932 | 5.00 | 3.00 | 8.00 |
| 84 | 53.717361 | -1.075125 | 5.05 | 3.00 | 8.05 |

**Name**: PV array 2
**Footprint area**: 88,675 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714504 | -1.065662 | 5.86 | 3.00 | 8.86 |
| 2 | 53.711570 | -1.066370 | 6.08 | 3.00 | 9.08 |
| 3 | 53.710923 | -1.063001 | 6.45 | 3.00 | 9.45 |
| 4 | 53.713716 | -1.061521 | 5.54 | 3.00 | 8.54 |
| 5 | 53.714237 | -1.062915 | 5.66 | 3.00 | 8.66 |

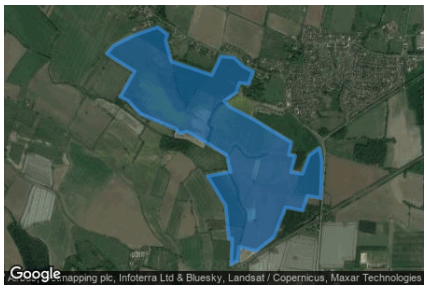
**Name**: PV array 3
**Footprint area**: 175,902 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.714377 | -1.044033 | 3.79 | 3.00 | 6.79 |
| 2 | 53.713793 | -1.044419 | 3.21 | 3.00 | 6.21 |
| 3 | 53.713247 | -1.045427 | 4.43 | 3.00 | 7.43 |
| 4 | 53.713069 | -1.046758 | 4.33 | 3.00 | 7.33 |
| 5 | 53.712154 | -1.046522 | 4.37 | 3.00 | 7.37 |
| 6 | 53.711723 | -1.046758 | 4.66 | 3.00 | 7.66 |
| 7 | 53.711494 | -1.047487 | 5.96 | 3.00 | 8.96 |
| 8 | 53.710948 | -1.047723 | 4.12 | 3.00 | 7.12 |
| 9 | 53.710783 | -1.047552 | 4.25 | 3.00 | 7.25 |
| 10 | 53.710503 | -1.046908 | 2.93 | 3.00 | 5.93 |
| 11 | 53.710224 | -1.046371 | 4.40 | 3.00 | 7.40 |
| 12 | 53.710211 | -1.045556 | 4.27 | 3.00 | 7.27 |
| 13 | 53.710161 | -1.044548 | 4.46 | 3.00 | 7.46 |
| 14 | 53.709983 | -1.043668 | 5.07 | 3.00 | 8.07 |
| 15 | 53.711519 | -1.039441 | 4.84 | 3.00 | 7.84 |
| 16 | 53.712828 | -1.039548 | 3.63 | 3.00 | 6.63 |
| 17 | 53.713323 | -1.040363 | 4.24 | 3.00 | 7.24 |
| 18 | 53.713882 | -1.040964 | 4.20 | 3.00 | 7.20 |
| 19 | 53.714148 | -1.042016 | 3.87 | 3.00 | 6.87 |

**Name**: PV array 4
**Footprint area**: 648,018 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad




| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.716146 | -1.026557 | 4.12 | 3.00 | 7.12 |
| 2 | 53.715942 | -1.027158 | 4.42 | 3.00 | 7.42 |
| 3 | 53.717352 | -1.027050 | 3.85 | 3.00 | 6.85 |
| 4 | 53.717314 | -1.027351 | 3.92 | 3.00 | 6.92 |
| 5 | 53.718215 | -1.027501 | 3.62 | 3.00 | 6.62 |
| 6 | 53.719142 | -1.027651 | 3.50 | 3.00 | 6.50 |
| 7 | 53.720742 | -1.029325 | 3.71 | 3.00 | 6.71 |
| 8 | 53.720983 | -1.027200 | 3.73 | 3.00 | 6.73 |
| 9 | 53.721898 | -1.027544 | 4.19 | 3.00 | 7.19 |
| 10 | 53.722431 | -1.029046 | 4.36 | 3.00 | 7.36 |
| 11 | 53.723167 | -1.031170 | 4.72 | 3.00 | 7.72 |
| 12 | 53.723078 | -1.031921 | 4.38 | 3.00 | 7.38 |
| 13 | 53.723282 | -1.032157 | 4.59 | 3.00 | 7.59 |
| 14 | 53.724031 | -1.035140 | 4.48 | 3.00 | 7.48 |
| 15 | 53.724158 | -1.035547 | 4.50 | 3.00 | 7.50 |
| 16 | 53.724843 | -1.036620 | 4.01 | 3.00 | 7.01 |
| 17 | 53.725046 | -1.037350 | 4.14 | 3.00 | 7.14 |
| 18 | 53.726443 | -1.036020 | 4.31 | 3.00 | 7.31 |
| 19 | 53.727395 | -1.038594 | 4.82 | 3.00 | 7.82 |
| 20 | 53.727839 | -1.037951 | 5.13 | 3.00 | 8.13 |
| 21 | 53.728410 | -1.036041 | 4.43 | 3.00 | 7.43 |
| 22 | 53.728855 | -1.033917 | 4.78 | 3.00 | 7.78 |
| 23 | 53.728449 | -1.032994 | 4.59 | 3.00 | 7.59 |
| 24 | 53.728106 | -1.033166 | 4.57 | 3.00 | 7.57 |
| 25 | 53.726989 | -1.032651 | 4.74 | 3.00 | 7.74 |
| 26 | 53.726240 | -1.028917 | 4.76 | 3.00 | 7.76 |
| 27 | 53.727268 | -1.028080 | 5.30 | 3.00 | 8.30 |
| 28 | 53.727192 | -1.026879 | 5.08 | 3.00 | 8.08 |
| 29 | 53.726722 | -1.026042 | 5.03 | 3.00 | 8.03 |
| 30 | 53.726430 | -1.025119 | 5.24 | 3.00 | 8.24 |
| 31 | 53.725757 | -1.025548 | 4.52 | 3.00 | 7.52 |
| 32 | 53.725821 | -1.026385 | 4.53 | 3.00 | 7.53 |
| 33 | 53.725313 | -1.026643 | 4.37 | 3.00 | 7.37 |
| 34 | 53.724830 | -1.027780 | 4.79 | 3.00 | 7.79 |
| 35 | 53.724500 | -1.027265 | 4.49 | 3.00 | 7.49 |
| 36 | 53.723866 | -1.025183 | 4.55 | 3.00 | 7.55 |
| 37 | 53.722571 | -1.021600 | 4.61 | 3.00 | 7.61 |
| 38 | 53.721898 | -1.021836 | 4.09 | 3.00 | 7.09 |
| 39 | 53.721847 | -1.021257 | 4.71 | 3.00 | 7.71 |
| 40 | 53.720959 | -1.021644 | 3.89 | 3.00 | 6.89 |
| 41 | 53.720870 | -1.020593 | 4.68 | 3.00 | 7.68 |
| 42 | 53.721860 | -1.019971 | 5.06 | 3.00 | 8.06 |
| 43 | 53.722279 | -1.019027 | 4.71 | 3.00 | 7.71 |
| 44 | 53.721568 | -1.018791 | 6.25 | 3.00 | 9.25 |
| 45 | 53.719556 | -1.018903 | 5.25 | 3.00 | 8.25 |
| 46 | 53.719670 | -1.020147 | 4.70 | 3.00 | 7.70 |
| 47 | 53.718871 | -1.020555 | 4.76 | 3.00 | 7.76 |
| 48 | 53.719048 | -1.022143 | 4.25 | 3.00 | 7.25 |
| 49 | 53.717436 | -1.023194 | 4.59 | 3.00 | 7.59 |
| 50 | 53.716674 | -1.024847 | 4.49 | 3.00 | 7.49 |
| 51 | 53.716902 | -1.026370 | 3.42 | 3.00 | 6.42 |

**Name**: PV array 5
**Footprint area**: 330,274 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.725701 | -1.041375 | 3.24 | 3.00 | 6.24 |
| 2 | 53.725917 | -1.042448 | 3.59 | 3.00 | 6.59 |
| 3 | 53.725904 | -1.043413 | 3.92 | 3.00 | 6.92 |
| 4 | 53.726615 | -1.043692 | 5.02 | 3.00 | 8.02 |
| 5 | 53.726996 | -1.043413 | 4.54 | 3.00 | 7.54 |
| 6 | 53.727288 | -1.043971 | 5.41 | 3.00 | 8.41 |
| 7 | 53.727618 | -1.045259 | 4.41 | 3.00 | 7.41 |
| 8 | 53.728570 | -1.047104 | 4.11 | 3.00 | 7.11 |
| 9 | 53.729637 | -1.049679 | 5.34 | 3.00 | 8.34 |
| 10 | 53.730030 | -1.049443 | 5.42 | 3.00 | 8.42 |
| 11 | 53.731490 | -1.046782 | 4.92 | 3.00 | 7.92 |
| 12 | 53.733127 | -1.045645 | 4.92 | 3.00 | 7.92 |
| 13 | 53.731807 | -1.042212 | 4.86 | 3.00 | 7.86 |
| 14 | 53.730792 | -1.039680 | 4.41 | 3.00 | 7.41 |
| 15 | 53.730487 | -1.038049 | 4.37 | 3.00 | 7.37 |
| 16 | 53.728507 | -1.039573 | 3.99 | 3.00 | 6.99 |
| 17 | 53.727961 | -1.038221 | 4.61 | 3.00 | 7.61 |

**Name**: PV array 6
**Footprint area**: 687,716 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.731554 | -1.036804 | 4.77 | 3.00 | 7.77 |
| 2 | 53.730754 | -1.037899 | 4.21 | 3.00 | 7.21 |
| 3 | 53.731148 | -1.039744 | 4.67 | 3.00 | 7.67 |
| 4 | 53.733496 | -1.045409 | 5.35 | 3.00 | 8.35 |
| 5 | 53.734017 | -1.045302 | 5.31 | 3.00 | 8.31 |
| 6 | 53.734309 | -1.046224 | 5.18 | 3.00 | 8.18 |
| 7 | 53.734867 | -1.046997 | 5.52 | 3.00 | 8.52 |
| 8 | 53.736352 | -1.050280 | 5.55 | 3.00 | 8.55 |
| 9 | 53.738345 | -1.047447 | 6.50 | 3.00 | 9.50 |
| 10 | 53.739360 | -1.048005 | 5.49 | 3.00 | 8.49 |
| 11 | 53.736961 | -1.051632 | 5.59 | 3.00 | 8.59 |
| 12 | 53.738472 | -1.055258 | 5.59 | 3.00 | 8.59 |
| 13 | 53.744436 | -1.053241 | 5.19 | 3.00 | 8.19 |
| 14 | 53.745172 | -1.052984 | 5.40 | 3.00 | 8.40 |
| 15 | 53.745464 | -1.051675 | 6.29 | 3.00 | 9.29 |
| 16 | 53.744703 | -1.051009 | 6.74 | 3.00 | 9.74 |
| 17 | 53.745401 | -1.049314 | 6.55 | 3.00 | 9.55 |
| 18 | 53.742647 | -1.046911 | 5.63 | 3.00 | 8.63 |
| 19 | 53.741683 | -1.050087 | 6.11 | 3.00 | 9.11 |
| 20 | 53.740883 | -1.049464 | 5.43 | 3.00 | 8.43 |
| 21 | 53.741886 | -1.046310 | 6.40 | 3.00 | 9.40 |
| 22 | 53.739715 | -1.044229 | 6.14 | 3.00 | 9.14 |
| 23 | 53.738764 | -1.047190 | 6.91 | 3.00 | 9.91 |
| 24 | 53.738256 | -1.047211 | 5.42 | 3.00 | 8.42 |
| 25 | 53.736796 | -1.045945 | 5.17 | 3.00 | 8.17 |
| 26 | 53.737926 | -1.042577 | 6.29 | 3.00 | 9.29 |

**Name**: PV array 7
**Footprint area**: 1,719,622 m^2
**Axis tracking**: Single-axis rotation
**Backtracking**: None
**Tracking axis orientation**: 180.0 deg
**Tracking axis tilt**: 0.0 deg
**Tracking axis panel offset**: 0.0 deg
**Maximum tracking angle**: 60.0 deg

**Rated power**: -
**Panel material**: Light textured glass with AR coating
**Vary reflectivity with sun position?** Yes
**Correlate slope error with surface type?** Yes
**Slope error**: 9.16 mrad


| Vertex | Latitude | Longitude | Ground elevation | Height above ground | Total elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| 1 | 53.740578 | -1.055129 | 5.66 | 3.00 | 8.66 |
| 2 | 53.741416 | -1.060580 | 4.92 | 3.00 | 7.92 |
| 3 | 53.741492 | -1.062597 | 5.61 | 3.00 | 8.61 |
| 4 | 53.739639 | -1.062554 | 5.97 | 3.00 | 8.97 |
| 5 | 53.737812 | -1.063326 | 6.48 | 3.00 | 9.48 |
| 6 | 53.737532 | -1.064571 | 5.80 | 3.00 | 8.80 |
| 7 | 53.736720 | -1.065987 | 5.39 | 3.00 | 8.39 |
| 8 | 53.736517 | -1.066845 | 6.00 | 3.00 | 9.00 |
| 9 | 53.738218 | -1.069163 | 6.17 | 3.00 | 9.17 |
| 10 | 53.738573 | -1.071308 | 5.50 | 3.00 | 8.50 |
| 11 | 53.738675 | -1.073669 | 5.67 | 3.00 | 8.67 |
| 12 | 53.738091 | -1.076072 | 5.37 | 3.00 | 8.37 |
| 13 | 53.737634 | -1.076458 | 5.08 | 3.00 | 8.08 |
| 14 | 53.737532 | -1.078475 | 5.07 | 3.00 | 8.07 |
| 15 | 53.738192 | -1.078947 | 5.94 | 3.00 | 8.94 |
| 16 | 53.738700 | -1.080321 | 5.80 | 3.00 | 8.80 |
| 17 | 53.739309 | -1.080578 | 6.07 | 3.00 | 9.07 |
| 18 | 53.739462 | -1.081050 | 6.76 | 3.00 | 9.76 |
| 19 | 53.742507 | -1.080020 | 6.72 | 3.00 | 9.72 |
| 20 | 53.741314 | -1.078261 | 6.62 | 3.00 | 9.62 |
| 21 | 53.742000 | -1.078089 | 6.95 | 3.00 | 9.95 |
| 22 | 53.742457 | -1.077531 | 6.81 | 3.00 | 9.81 |
| 23 | 53.743142 | -1.078003 | 6.78 | 3.00 | 9.78 |
| 24 | 53.744462 | -1.077359 | 5.62 | 3.00 | 8.62 |
| 25 | 53.744690 | -1.076802 | 6.29 | 3.00 | 9.29 |
| 26 | 53.744512 | -1.075815 | 6.26 | 3.00 | 9.26 |
| 27 | 53.745451 | -1.075514 | 5.36 | 3.00 | 8.36 |
| 28 | 53.745502 | -1.077531 | 5.13 | 3.00 | 8.13 |
| 29 | 53.744563 | -1.078046 | 5.53 | 3.00 | 8.53 |
| 30 | 53.744665 | -1.079334 | 5.67 | 3.00 | 8.67 |
| 31 | 53.746238 | -1.078733 | 5.48 | 3.00 | 8.48 |
| 32 | 53.746035 | -1.076673 | 4.47 | 3.00 | 7.47 |
| 33 | 53.748192 | -1.076244 | 5.48 | 3.00 | 8.48 |
| 34 | 53.748218 | -1.078261 | 5.39 | 3.00 | 8.39 |
| 35 | 53.750146 | -1.077617 | 5.85 | 3.00 | 8.85 |
| 36 | 53.751161 | -1.076544 | 6.07 | 3.00 | 9.07 |
| 37 | 53.751136 | -1.075857 | 6.11 | 3.00 | 9.11 |
| 38 | 53.752938 | -1.075385 | 5.73 | 3.00 | 8.73 |
| 39 | 53.752735 | -1.073883 | 5.15 | 3.00 | 8.15 |
| 40 | 53.752506 | -1.073368 | 5.53 | 3.00 | 8.53 |
| 41 | 53.749588 | -1.073712 | 5.86 | 3.00 | 8.86 |
| 42 | 53.748395 | -1.074699 | 6.46 | 3.00 | 9.46 |
| 43 | 53.747761 | -1.075428 | 4.95 | 3.00 | 7.95 |
| 44 | 53.747431 | -1.075514 | 5.37 | 3.00 | 8.37 |
| 45 | 53.747659 | -1.072768 | 5.25 | 3.00 | 8.25 |
| 46 | 53.750476 | -1.072424 | 5.67 | 3.00 | 8.67 |
| 47 | 53.750527 | -1.072939 | 6.80 | 3.00 | 9.80 |
| 48 | 53.752481 | -1.072639 | 6.44 | 3.00 | 9.44 |
| 49 | 53.752176 | -1.070364 | 4.74 | 3.00 | 7.74 |
| 50 | 53.751212 | -1.069248 | 4.22 | 3.00 | 7.22 |
| 51 | 53.750933 | -1.067746 | 5.00 | 3.00 | 8.00 |
| 52 | 53.750705 | -1.065129 | 5.26 | 3.00 | 8.26 |
| 53 | 53.749664 | -1.062554 | 5.46 | 3.00 | 8.46 |
| 54 | 53.748827 | -1.062554 | 4.70 | 3.00 | 7.70 |
| 55 | 53.748573 | -1.061867 | 4.83 | 3.00 | 7.83 |
| 56 | 53.745578 | -1.061738 | 4.81 | 3.00 | 7.81 |
| 57 | 53.745299 | -1.067446 | 4.97 | 3.00 | 7.97 |
| 58 | 53.744081 | -1.067918 | 5.26 | 3.00 | 8.26 |
| 59 | 53.744081 | -1.066502 | 6.03 | 3.00 | 9.03 |
| 60 | 53.743446 | -1.064142 | 5.59 | 3.00 | 8.59 |
| 61 | 53.743472 | -1.061180 | 5.64 | 3.00 | 8.64 |
| 62 | 53.746111 | -1.061266 | 5.21 | 3.00 | 8.21 |
| 63 | 53.746162 | -1.060622 | 5.18 | 3.00 | 8.18 |
| 64 | 53.744665 | -1.059249 | 5.34 | 3.00 | 8.34 |
| 65 | 53.744817 | -1.058477 | 2.92 | 3.00 | 5.92 |
| 66 | 53.745248 | -1.057747 | 5.79 | 3.00 | 8.79 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 53.745781 | -1.054400 | 5.57 | 3.00 | 8.57 |
| 68 | 53.745934 | -1.053284 | 5.21 | 3.00 | 8.21 |

## Discrete Observation Receptors

| Number | Latitude | Longitude | Ground elevation | Height above ground | Total Elevation |
|---|---|---|---|---|---|
| | deg | deg | m | m | m |
| OP 1 | 53.753653 | -1.076880 | 7.78 | 2.75 | 10.53 |
| OP 2 | 53.751141 | -1.077717 | 7.15 | 2.75 | 9.90 |
| OP 3 | 53.749593 | -1.078167 | 6.17 | 2.75 | 8.92 |
| OP 4 | 53.747880 | -1.078682 | 5.57 | 2.75 | 8.32 |
| OP 5 | 53.746522 | -1.079112 | 6.45 | 2.75 | 9.20 |
| OP 6 | 53.744695 | -1.079670 | 6.26 | 2.75 | 9.01 |
| OP 7 | 53.742764 | -1.080292 | 6.75 | 2.75 | 9.50 |
| OP 8 | 53.741106 | -1.080893 | 7.84 | 2.75 | 10.59 |
| OP 9 | 53.739114 | -1.081515 | 8.31 | 2.75 | 11.06 |
| OP 10 | 53.737070 | -1.082180 | 6.08 | 2.75 | 8.83 |
| OP 11 | 53.735179 | -1.082759 | 6.62 | 2.75 | 9.37 |
| OP 12 | 53.733491 | -1.083296 | 5.29 | 2.75 | 8.04 |
| OP 13 | 53.731650 | -1.083832 | 5.78 | 2.75 | 8.53 |
| OP 14 | 53.729632 | -1.084498 | 7.54 | 2.75 | 10.29 |
| OP 15 | 53.727093 | -1.085313 | 7.60 | 2.75 | 10.35 |
| OP 16 | 53.725100 | -1.085957 | 5.89 | 2.75 | 8.64 |
| OP 17 | 53.723094 | -1.086579 | 5.95 | 2.75 | 8.70 |
| OP 18 | 53.721190 | -1.087137 | 8.35 | 2.75 | 11.10 |
| OP 19 | 53.719501 | -1.087664 | 9.10 | 2.75 | 11.85 |
| OP 20 | 53.717533 | -1.088244 | 7.72 | 2.75 | 10.47 |
| OP 21 | 53.715463 | -1.088952 | 7.47 | 2.75 | 10.22 |
| OP 22 | 53.714003 | -1.089381 | 9.07 | 2.75 | 11.82 |
| OP 23 | 53.712371 | -1.089918 | 10.34 | 2.75 | 13.09 |
| OP 24 | 53.714599 | -1.089403 | 7.97 | 2.75 | 10.72 |
| OP 25 | 53.715817 | -1.089206 | 7.79 | 2.75 | 10.54 |
| OP 26 | 53.718121 | -1.089077 | 9.36 | 2.75 | 12.11 |
| OP 27 | 53.719982 | -1.089217 | 9.51 | 2.75 | 12.26 |
| OP 28 | 53.721639 | -1.089506 | 8.66 | 2.75 | 11.41 |
| OP 29 | 53.707357 | -1.050639 | 7.37 | 2.75 | 10.12 |
| OP 30 | 53.708259 | -1.048193 | 7.24 | 2.75 | 9.99 |
| OP 31 | 53.709148 | -1.045575 | 6.94 | 2.75 | 9.69 |
| OP 32 | 53.710113 | -1.042786 | 6.48 | 2.75 | 9.23 |
| OP 33 | 53.711041 | -1.040211 | 5.97 | 2.75 | 8.72 |
| OP 34 | 53.711942 | -1.037614 | 5.83 | 2.75 | 8.58 |
| OP 35 | 53.712996 | -1.034589 | 4.53 | 2.75 | 7.28 |
| OP 36 | 53.713898 | -1.031885 | 5.43 | 2.75 | 8.18 |
| OP 37 | 53.714774 | -1.029503 | 4.58 | 2.75 | 7.33 |
| OP 38 | 53.715600 | -1.027093 | 5.02 | 2.75 | 7.77 |
| OP 39 | 53.716590 | -1.024110 | 4.57 | 2.75 | 7.32 |
| OP 40 | 53.717301 | -1.022072 | 5.37 | 2.75 | 8.12 |
| OP 41 | 53.718190 | -1.019604 | 6.25 | 2.75 | 9.00 |
| OP 42 | 53.719030 | -1.017176 | 5.65 | 2.75 | 8.40 |
| OP 43 | 53.720160 | -1.013893 | 5.74 | 2.75 | 8.49 |
| OP 44 | 53.721125 | -1.011168 | 5.40 | 2.75 | 8.15 |
| OP 45 | 53.721938 | -1.008808 | 6.11 | 2.75 | 8.86 |
| OP 46 | 53.722852 | -1.006147 | 5.46 | 2.75 | 8.21 |

## Summary of PV Glare Analysis

*PV configuration and total predicted glare*

| PV Name | Tilt | Orientation | "Green" Glare | "Yellow" Glare | Energy Produced | Data File |
|---|---|---|---|---|---|---|
| | deg | deg | min | min | kWh | |
| PV array 1 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 2 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 3 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 4 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 5 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 6 | SA tracking | SA tracking | 0 | 0 | - | |
| PV array 7 | SA tracking | SA tracking | 0 | 0 | - | |

## PV & Receptor Analysis Results

*Results for each PV array and receptor*

### PV array 1 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## PV array 2 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## PV array 3 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## PV array 4 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## PV array 5 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## PV array 6 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## PV array 7 no glare found

| Component | Green glare (min) | Yellow glare (min) |
|---|---|---|
| OP: OP 1 | 0 | 0 |
| OP: OP 2 | 0 | 0 |
| OP: OP 3 | 0 | 0 |
| OP: OP 4 | 0 | 0 |
| OP: OP 5 | 0 | 0 |
| OP: OP 6 | 0 | 0 |
| OP: OP 7 | 0 | 0 |
| OP: OP 8 | 0 | 0 |
| OP: OP 9 | 0 | 0 |
| OP: OP 10 | 0 | 0 |
| OP: OP 11 | 0 | 0 |
| OP: OP 12 | 0 | 0 |
| OP: OP 13 | 0 | 0 |
| OP: OP 14 | 0 | 0 |
| OP: OP 15 | 0 | 0 |
| OP: OP 16 | 0 | 0 |
| OP: OP 17 | 0 | 0 |
| OP: OP 18 | 0 | 0 |
| OP: OP 19 | 0 | 0 |
| OP: OP 20 | 0 | 0 |
| OP: OP 21 | 0 | 0 |
| OP: OP 22 | 0 | 0 |
| OP: OP 23 | 0 | 0 |
| OP: OP 24 | 0 | 0 |
| OP: OP 25 | 0 | 0 |
| OP: OP 26 | 0 | 0 |
| OP: OP 27 | 0 | 0 |
| OP: OP 28 | 0 | 0 |
| OP: OP 29 | 0 | 0 |
| OP: OP 30 | 0 | 0 |
| OP: OP 31 | 0 | 0 |
| OP: OP 32 | 0 | 0 |
| OP: OP 33 | 0 | 0 |
| OP: OP 34 | 0 | 0 |
| OP: OP 35 | 0 | 0 |
| OP: OP 36 | 0 | 0 |
| OP: OP 37 | 0 | 0 |
| OP: OP 38 | 0 | 0 |
| OP: OP 39 | 0 | 0 |
| OP: OP 40 | 0 | 0 |
| OP: OP 41 | 0 | 0 |
| OP: OP 42 | 0 | 0 |
| OP: OP 43 | 0 | 0 |
| OP: OP 44 | 0 | 0 |
| OP: OP 45 | 0 | 0 |
| OP: OP 46 | 0 | 0 |

*No glare found*

## Assumptions

- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several V1 calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results fo large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Refer to the **Help page** for detailed assumptions and limitations not listed here.

# Appendix 6.1: Designated Heritage Assets within the 3km Study Area

**Appendix 6.1 – Designated Heritage Assets within the 3km Study Area**

| NHLE Ref | Name | Grade/Designation | Direction from site boundary | Approx. distance from nearest part of site boundary |
|---|---|---|---|---|
| | | | | |
| 1132537 | CHURCH OF ST WILFRED | I | Northwest | 2.2km |
| 1148397 | CHURCH OF ST PETER AND ST PAUL | I | East | 700m |
| 1161899 | CHURCH OF ST LAWRENCE | I | Southeast | 2.1km |
| 1173983 | CAMBLESFORTH HALL | I | East | 250m |
| 1295955 | CARLTON TOWERS | I | South | 1.2km |
| 1148399 | CHURCH OF ST MARY (ROMAN CATHOLIC) | II* | South | 650m |
| 1083238 | FOX FARMHOUSE | II | Northeast | 2.3km |
| 1083239 | EAST END FARMHOUSE | II | Northeast | 2.4km |
| 1083240 | NATIONAL SCHOOL | II | Northeast | 2.4km |
| 1103284 | 18 AND 20, BEASTFAIR | II | South | 2.3km |
| 1103285 | MITTON HOUSE | II | South | 2.4km |
| 1103286 | 9 AND 11, CHURCH LANE | II | South | 2.2km |
| 1103287 | EASTFIELD HOUSE | II | South | 2.6km |
| 1103288 | ALTAR TOMB APPROXIMATELY 10 METRES SOUTH-EAST OF CHANCEL OF CHURCH OF ST LAWRENCE | II | South | 2.3km |
| 1103289 | 1, HIGH STREET | II | South | 2.3km |
| 1103290 | 7 AND 9, HIGH STREET | II | South | 2.3km |
| 1103291 | APRIL COTTAGE | II | South | 2.2km |
| 1103292 | 5 AND 7, MARKET PLACE | II | South | 2.3km |
| 1103293 | G H AND D ROWSBY | II | South | 2.3km |
| 1103294 | SNAITH HALL | II | South | 2.4km |
| 1103295 | THE PLOUGH INN | II | Northeast | 2.3km |
| 1119755 | BARLOW CHURCH | II | Northeast | 1.9km |
| 1132536 | BRAYTON BRIDGE | II | North | |
| 1132588 | SELBY COLLEGE OF FURTHER EDUCATION | II | North | 3km |
| 1148393 | GATES, RAILINGS AND PIERS APPROXIMATELY 8 METRES TO SOUTH OF HOUSE | II | South | 1.2km |
| 1148394 | GATEPIERS AND RAILINGS APPROXIMATELY 20 METRES TO SOUTH-WEST OF HOUSE | II | South | 1.4km |
| 1148395 | 9-15, HIGH STREET | II | South | 1km |
| 1148396 | PAIR OF HOUSES ADJOINING LEFT OF GROVE COTTAGE | II | South | 1km |
| 1148398 | MANOR FARMHOUSE | II | West | 560m |
| 1160126 | CHURCH OF ST HELEN | II | Northeast | 2.4km |
| 1161724 | 31 AND 33, BEASTFAIR | II | South | 2.3km |
| 1161751 | 33A Beast Fair | II | South | 2.3km |

| | | | | |
|---|---|---|---|---|
| 1161768 | LOCK-UP | II | South | 2.1km |
| 1161794 | 15, CHURCH LANE | II | South | 2.1km |
| 1161822 | FAIRHOLME | II | South | 2.6km |
| 1161892 | MILE-POST APPROXIMATELY 75 METRES WEST OF FAIRHOLME | II | South | 2.6km |
| 1162011 | ALTAR TOMB APPROXIMATELY 10 METRES SOUTH OF CHANCEL OF CHURCH OF SAINT LAWRENCE | II | South | 2.3km |
| 1162049 | THE NOOK | II | South | 2.2km |
| 1162140 | 5, HIGH STREET | II | South | 2.3km |
| 1162151 | 13, HIGH STREET | II | South | 2.2km |
| 1162168 | 1 AND 3, MARKET PLACE | II | South | 2.3km |
| 1162210 | 9 AND 9A, MARKET PLACE | II | South | 2.3km |
| 1162237 | THE DOWNE ARMS INN | II | South | 2.3km |
| 1162255 | THE LODGE | II | South | 2.3km |
| 1162291 | THE MANOR HOUSE | II | South | 2.3km |
| 1167599 | THE VICARAGE | II | Northwest | 2.2km |
| 1174041 | FOLLY APPROXIMATELY 40 METRES TO SOUTH OF CARLTON TOWERS | II | South | 1.4km |
| 1174050 | THE GABLES | II | South | 1km |
| 1174059 | DRAKES HOUSE | II | South | 1km |
| 1174078 | STAPLETON LODGE | II | South | 1km |
| 1174116 | CROSS BASE AND SHAFT IN CHURCHYARD OF ST PETER AND ST PAUL APPROXIMATELY 2 METRES TO SOUTH OF PORCH | II | East | 800m |
| 1174458 | HENSALL HOUSE | II | Southwest | 2km |
| 1246188 | BURTON BRIDGE AT SE 585 289 SELBY CANAL | II | West | 2.4km |
| 1295905 | TEMPLE MANOR | II | West | 1.3km |
| 1296820 | MILESTONE APPROXIMATELY 100 METRES NORTH OF COMMON LANE | II | West | 1.3km |
| 1309747 | 10 AND 12, MARKET PLACE | II | South | 2.3km |
| 1309942 | BEECH GROVE | II | South | 2.4km |
| 1310139 | STABLE/PIGEONCOTE APPROXIMATELY 20 METRES NORTH WEST OF GOWDALL HILL FARMHOUSE | II | South | 2.5km |
| 1310691 | HAWTHORNE HOUSE | II | Northeast | 2.4km |
| 1310693 | DUNSTALL HOUSE | II | Northeast | 2.4km |
| 1310730 | BANKFIELD FARMHOUSE | II | Northeast | 2.4km |
| 1316356 | DOVECOTE TO CAMBLESFORTH HALL APPROXIMATELY 5 METRES TO EAST OF HOUSE | II | East | 250m |
| 1316357 | MANOR FARMHOUSE | II | South | 1.1km |
| 1316358 | CHURCH OF ST MARY | II | South | 870m |
| 1316359 | PIGEONCOTE TO MANOR FARM | II | Southeast | 2.7km |
| 1346718 | SOUTH VIEW AND GARDEN WALL ATTACHED TO FRONT OF PROPERTY | II | Northeast | 2.2km |
| 1346719 | ROSEMOUNT | II | Northeast | 2.4km |
| 1346720 | GRAVESTONE APPROXIMATELY 25 METRES NORTH OF NORTH PORCH OF CHURCH OF ST HELEN | II | Northeast | 2.4km |

| | | | | |
|---|---|---|---|---|
| 1347045 | 3, BEASTFAIR | II | South | 2.3km |
| 1347046 | 1 AND 3, CHURCH LANE | II | South | 2.2km |
| 1347047 | METHODIST CHAPEL | II | South | 2.3km |
| 1347048 | THE GODDARDS | II | South | 2.8km |
| 1347049 | SNAITH OLD GRAMMAR SCHOOL | II | South | 2.1km |
| 1347050 | 3, HIGH STREET | II | South | 2.3km |
| 1347051 | 22, MARKET PLACE | II | South | 2.3km |
| 1347052 | 11, MARKET PLACE | II | South | 2.3km |
| 1365809 | MILESTONE 0.1 MILE NORTH OF JUNCTION WITH BARFF LANE | II | Northwest | 1.9km |
| 1471605 | Milestone, Chapel Haddlesey (No.18, Doncaster and Selby Turnpike) | II | West | 3km |
| 1473824 | Selby Canal, Brayton Tunnel | II | Northwest | 1km |
| | | | | |
| 1016857 | Drax Augustinian priory | Scheduled Monument | North | 1.2km |
| 1017455 | Castle Hill moated site, 350m south of St Peter and St Paul's Church | Scheduled Monument | Southeast | 1km |
| 1017485 | Scurff Hall moated site | Scheduled Monument | East | 3.9km |
| 1018403 | Medieval settlement and early post-medieval garden earthworks around Barlow Hall | Scheduled Monument | Northeast | 1.7km |
| | | | | |
| n/a | Snaith | Conservation Area | South | 2.1km |
| n/a | Brayton | Conservation Area | North | 1.9km |
| n/a | Armoury Road and Brook Street | Conservation Area | North | 2.9km |
| | | | | |

# Appendix 6.2: Cultural Heritage Assessment

## Methodology Tables

**Appendix 6.2 – Cultural Heritage Assessment Methodology Tables**

Value/Sensitivity

The value/sensitivity of a heritage asset for the purposes of Environmental Impact Assessments is determined by professional judgement guided by statutory and non-statutory designations, national and local policies.

**Table 1: Criteria for establishing value/sensitivity**

| Value/sensitivity | Criteria |
|---|---|
| High | Remains of inscribed international importance, such as World Heritage Sites<br>Grade I and II* Listed Buildings<br>Grade I and II* Registered Parks and Gardens<br>Scheduled Monuments<br>Registered Battlefield<br>Non-designated archaeological assets of schedulable quality<br>Non-designated buildings, monuments, Sites or landscape that can be shown to have a very important quality in their fabric or historical association |
| Moderate | Grade II Listed Buildings<br>Conservation Areas<br>Grade II Registered Parks and Gardens<br>Assets of high archaeological resource value identified through consultation |
| Low | Non-designated buildings, monuments or Sites or landscapes of local importance and of modest quality<br>Locally important historic or archaeological assets, assets with a local value for education or cultural appreciation and of medium archaeological value<br>Locally Listed buildings identified on a local list<br>Non-designated buildings, monuments, Sites or landscape that can be shown to have important qualities in their fabric or historical association<br>Historic townscapes with historic integrity<br>Parks and gardens of local interest |
| Not Significant | Assets identified as being of no historic, artistic, archaeological or architectural value<br>Assets that are so badly damaged that too little remains to justify inclusion into a higher grade<br>Assets whose values are compromised by poor preservation or survival to justify inclusion in a higher category |

Magnitude of Impact

Once a level of value/sensitivity has been assigned, the magnitude of impact as a result of the Proposed Development is assessed. Potential impacts are defined as a change resulting from the Proposed Development which affects the significance of a heritage asset. These impacts are considered in terms of being either direct, indirect or cumulative, from construction or operation and temporary, long-term or permanent. The assessment will

include consideration of an asset's setting in terms of its contribution to the assets significance.

The magnitude of an impact can be judged in a five-point scale. The impact score is arrived at without reference to the value/sensitivity of the asset and the impact is assessed without taking into account any subsequent mitigation proposals, but does take into account embedded mitigation derived throughout the design process.

**Table 2: Criteria for establishing level of impact**

| Level of Impact | Description of Impact |
|---|---|
| High | Change such that the significance of the asset is totally altered or destroyed. Comprehensive change to setting affecting significance, resulting in substantial changes in our ability to understand and appreciate the resource and its historical setting |
| Medium | Change such that the significance of the asset is affected. Changes such that the setting is noticeable different, affecting significance resulting in moderate changes to significance and in our ability to understand and appreciate the resource |
| Low | Change such that the significance of the asset is slightly affected. Changes to the setting that have a slight impact on significance resulting in changes in our ability to understand and appreciate the resource |
| Minimal | Changes to the asset that hardly affect significance. Changes to the setting of an asset that have little effect on significance and no real change in our ability to understand and appreciate the resource |
| No change | The development results in no change or such a negligible level of change that it does not affect the significance of the asset. Changes to the setting do not affect the significance of the asset or our appreciation of it. |

Residual Effect

The assessment of effects will be undertaken in two stages. The magnitude of impact is cross-referenced with the value of the asset to categorise the effect that is likely to result from the Proposed Development prior to additional mitigation measures.

Following this stage, further consideration of additional mitigation is carried out, and the mitigation is assessed as to whether this would reduce the significance of the effect. Once additional mitigation is applied, the asset is re-assessed, allowing the residual significance of effect to be determined, as seen in Table 3.

**Table 3: Levels of Effect**

| Value/sensitivity of asset | Magnitude of Impact | | | | |
|---|---|---|---|---|---|
| | No Change | Minimal | Low | Medium | High |
| **High** | Neutral | Minor | Moderate | Major | Major |
| **Moderate** | Neutral | Minor | Minor/Moderate* | Moderate | Major |
| **Low** | Neutral | Neutral | Minor | Minor/Moderate* | Moderate |
| **Not significant** | Neutral | Neutral | Neutral | Neutral | Neutral |

* - professional judgement to be applied when assigning a level of effect

# Appendix 8.1: Sensitivity, Magnitude and Significance of Effect Adopted Methodology (Biodiversity)

# Helios Renewable Energy Project

on behalf of Enso Green Holdings D Limited

## Appendix 8.1: Sensitivity, Magnitude and Significance of Effect Adopted Methodology (Biodiversity)

avianecology

| Document Control | | | | |
|---|---|---|---|---|
| Project Name: | Helios Renewable Energy Project | | | |
| Project Number: | EnsoE-517-1435 | | | |
| Report Title | Appendix 8.1: Sensitivity, Magnitude and Significance of Effect Adopted Methodology (Biodiversity) | | | |
| | | | | |
| **Issue** | **Date** | **Notes** | **Prepared** | **Reviewed** |
| V1 | 19/05/2022 | V1 Issue | D. Foy *BA (Hons)* | H. Fearn *MSc MCIEEM* |

## CONTENTS

# 1 INTRODUCTION

1.1.1 This Technical Appendix[1] sets out the significance of effect assessment methodologies that will be adopted within the Environmental Statement (ES) Biodiversity chapter required to inform the Helios Renewable Energy Project ('the Proposed Development') DCO application.

1.1.2 The Proposed Development comprises the proposed construction, operation and maintenance, and decommissioning of a renewable energy generating project on 757.46 hectares ('ha') (c.1,872 acres) of land located to the south west of the village of Camblesforth and to the north of the village of Hirst Courtney in North Yorkshire ('the site'), within the administrative areas of Selby District Council ('SDC') and North Yorkshire County Council ('NYCC').

# 2 ASSESSMENT OF SIGNIFICANCE

2.1.1 Ecological Impact Assessment (EcIA) is defined within the CIEEM guidelines[2] as

> *"…a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems*".

2.1.2 The EIA Regulations[3] require the description of the 'likely significant environmental effects of the proposed development on the environment' (Regulation 18(3)(b)). To determine the overall significance of each ecological effect, judgements on the sensitivity of the receptor(s) and the magnitude of impact from the Proposed Development are considered together in order to determine whether or not an effect is likely to be significant. This involves a combination of quantitative and qualitative assessment and the application of professional judgement.

2.1.3 For the purposes of the assessment, effects will be categorised as 'significant' or 'not significant', in line with the EIA Regulations. The assessment considers effects at different geographic scales i.e. where effects may be discernible at a local scale but are not considered significant in the context of the EIA Regulations. For the purpose of the assessment, moderate and major effects are deemed to be 'significant' in EIA terms unless stated otherwise.

2.1.4 A 'significant effect' is considered to be one that either supports or undermines biodiversity conservation objectives for 'important ecological features', or for biodiversity in general.

2.1.5 CIEEM guidelines on ecological impact assessment note that:

> *"A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures."*

2.1.6 For ease of reference, **Table 2.1** sets out adapted CIEEM terminology, which also shows the equivalent EIA terms to be used in the ES Biodiversity Chapter.

[1] Technical Appendix 8.1 of the Helios Renewable Energy Project Environmental Impact Assessment Scoping Report

[2] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (version 1.1). Chartered Institute of Ecology and Environmental Management, Winchester.

[3] Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended).

**Table 2.1: Summary of Significance Levels**

| Effect (Standard EIA-related terminology and associated assigned significance) | | Equivalent CIEEM terminology adapted for Ecological Assessment |
|---|---|---|
| Negligible | **Neutral** | No discernible or significant on ecological integrity or conservation status (e.g. species or habitat). |
| Minor Adverse | **Not Significant** | Adverse effect on ecological integrity or conservation status, discernible/significant in ecological terms at a Local geographic scale only. |
| Moderate-Major Adverse | **Significant** | Adverse effect on ecological integrity or conservation status at a County, National or International geographic scale. |

2.1.7 The Proposed Development has been assessed as having an operational lifespan of up to 40 years for the purpose of the assessment. Ecological effects will be described in terms of their duration as short, medium term and long-term as follows:

- Short term effects are defined as 0 - 3 years;
- Medium term effects are defined as 3 - 15 years; and
- Long term effects are defined as > 15 years

2.1.8 The ecological impact assessment will include:

- An evaluation of identified important ecological features and potential receptors; faunal species, habitats and vegetation (as appropriate) on an international, national and regional basis;
- A description and evaluation of the potential effects of the Proposed Development on statutory and non-statutory sites designated for nature conservation;
- A description and evaluation of the potential effects of the Proposed Development on species and habitats;
- Mitigation measures implemented to address any identified significant adverse effects;
- An assessment of cumulative effects;
- Identification of any residual effects after mitigation; and,
- Identification of opportunities for biodiversity enhancement.

2.1.9 For the purposes of the assessment the importance or sensitivity of an ecological feature will be considered within the context of a defined geographical area, ranging from International (high value) to Site (low/negligible), as detailed in **Table 2.2**.

**Table 2.2: Value/Sensitivity Assessment**

| Value or Sensitivity of Receptor / Geographic Scale of Importance | Definition Examples |
|---|---|
| High - International / European | Greater than a UK scale, typically valued at a European level such as internationally designated sites (Special Protection Areas (SPA), Special Areas of Conservation (SAC) and/ or Ramsar sites) or proposed/candidate site (pSPA or cSAC), large area of a habitats listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of the larger whole, large population of an internationally important species or site supporting such a species (or supplying a critical element of their habitat |

| Value or Sensitivity of Receptor / Geographic Scale of Importance | Definition Examples |
|---|---|
| | requirement) or species listed in Annex IV of the Habitats Directive. |
| High - National (England/UK) | England/UK: A nationally designated site (e.g. Site of Special Scientific Interest) or a discrete area which meets the selection criteria for national designation.<br>An area of a priority habitat listed under the Section 31 of the Natural Environment and Rural Communities Act 2006 (NERC) which constitutes a significant proportion of the resource of that habitat in England or the UK as a whole.<br>A regularly occurring, regionally significant population of any nationally important species listed as a UK BAP / Biodiversity List and priority species listed under the Section 31 of the NERC Act 2006, and Species listed under Schedule 1 or Schedule 5 of the Wildlife and Countryside Act or Annex II or Annex IV of the Habitats Directive. |
| Medium Regional / County (Yorkshire) | Locally designated sites (Local Nature Reserves, County or Local Wildlife Sites).<br>Areas of priority habitat which constitutes a significant proportion of the County's resource of that habitat.<br>A regularly occurring, locally significant population of any nationally important species listed as a UK BAP / priority species and priority species listed under Section 31 of the NERC Act 2006, and Species listed under Schedule 5 of the Wildlife and Countryside Act or Annex II or Annex IV of the Habitats Directive. |
| Low - Local | Local area around the Site.<br>For example areas of priority habitat which are not large enough to meet the criteria for County value, or small but sustainable populations of a protected or notable species. |
| Low/Negligible - Site | Within the Site. Features present but of value in relation to the Site only. |

2.1.10 Effects on ecological features will be assessed based upon the interaction between the importance, or sensitivity, of the feature and the magnitude of change it is likely to experience. In accordance with the CIEEM guidelines (2018), an EcIA need only assess in detail, impacts upon important ecological features i.e. those that are considered important and potentially affected. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable. Where ecological features are not considered important enough to warrant further consideration, or where they will not be significantly affected, these are scoped out of the assessment process, and justification for exclusion is provided.

2.1.11 Relevant European, national and local guidance from governments and specialist organisations will be referred to in order to determine the importance (or 'sensitivity') of ecological features. Importance will also be determined using professional judgement and taking account of the results of baseline surveys and the functional role of features within the context of the geographical area.

2.1.12 Importance does not necessarily relate solely to the level of legal protection that a feature receives and ecological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species or the geographical location of species relative to their known range.

2.1.13 Once identified, potential impacts are described making reference to the following characteristics as appropriate: positive or negative, extent, magnitude, duration, timing, frequency, and, reversibility. The judgements on magnitude may need to be adjusted (either up or down) to reflect the duration of the change (i.e. short, medium or long term) and whether it is potentially reversible. The assessment also identifies areas where no change is anticipated and the resulting effect is described as 'not discernible' or 'none'.

2.1.14 Ecological effects are described as far as possible and where available information allows in terms of the parameters detailed in **Table 2.3**.

2.1.15 Magnitude of effect, based on the effects that the Proposed Development would have upon the resource/receptor, is considered within the range of high, medium, low, negligible. Consideration is given to scale, duration of impact/effect (and extent of Proposed Development with reference to the definitions in **Table 2.2**). The assessment will consider how existing baseline conditions may change over time, as for example the baseline conditions could alter through operational land use, in the form of differing management and natural growth or succession of habitats.

**Table 2.3: Environmental Parameters**

| Environmental Parameter | Description |
|---|---|
| Magnitude | The 'size' or amount of the effect is referred to as the magnitude and is determined on a quantitative basis where possible supported by professional judgement. |
| Extent | The area over which an effect occurs. The magnitude and extent of an effect may be synonymous |
| Duration | The time over which an effect is expected to last prior to the recovery or replacement of the ecological receptor. This can be considered in terms of life cycles of species or regeneration of habitats. The duration may be longer than the duration of an activity. |
| Reversibility | Reversible (or temporary) effects are those that occur during the lifetime of the development and where spontaneous recovery or mitigation allows recovery within a reasonable timescale.<br>Permanent effects are those which cannot be recreated within the proposed development or there is no reasonable chance that actions can be undertaken to reverse it. |
| Timing and Frequency | The timing of effects in relation to important seasonal and/or life cycle constraints. The frequency with which activities and simultaneous effects would take place can be an important determinant. |

2.1.16 The assessment of effects is based upon the assessments of magnitude of effects and sensitivity of the resource/receptor to come to a professional judgement of how important this effect is. The magnitude of change effected on ecological receptors is described as set out in **Table 2.4**. The likelihood or probability that an effect will occur is addressed as far as possible based on available information. Whilst it is reasonably straightforward to identify effects that are certain to occur, or conversely will not occur, it is generally more difficult to assign a quantified level to occurrences defined as likely, unlikely or highly unlikely. In these circumstances, professional judgement has been used, with reasoning supported by available evidence.

**Table 2.4: Magnitude of Impact/Change**

| Magnitude | Criteria |
|---|---|
| High | The change may negatively or positively affect the conservation status of a site or species population, in terms of the coherence of its ecological structure and function, that sustains the habitat, complex of habitats and/or the population levels of species of interest. |
| Moderate | Conservation status of a site or species population will not be negatively or positively affected, but some element of the functioning of the site or population might be affected and the change to the site/ population is likely to be significant in terms of its ability to sustain some part of itself in the long term. |
| Low | Neither of the above applies, but some minor negative or positive change is evident on a temporary basis, or the change affects extent of habitat or individuals of a species abundant in the local area. |
| Negligible | No observable effect in either direction |

2.1.17 For an effect to be significant, the ecological integrity or conservation status of a sensitive feature must be influenced in some way. It may be that the effect is substantial in magnitude or scale, irreversible, has a long-term effect, or coincides with a critical period in a species' life-cycle. Where uncertainty or limitations exist, this is acknowledged.

2.1.18 It is recognized that discernible effects can also occur at a local geographic scale which are not sufficiently severe to be assessed as 'significant' in accordance with the EIA approach, and do not require specific mitigation, but nonetheless merit discussion. In the interest of completeness these effects will be discussed within the ES Biodiversity Chapter in relation to general construction good practices to be adopted to avoid or minimise low-level or minor disruption to local features, including for example standard pollution prevention and control measures.

# Appendix 11.1: Consultation Correspondence with Selby District Council

**From:** [redacted]
**Subject:** Re: Drax Solar Farm Noise Assessment Methodology
**Date:** 7 March 2022 at 10:54
**To:** [redacted]
**Cc:** [redacted]

Good Morning [redacted]

Thank you for speaking to me on the phone just now. As discussed, we will be collecting our equipment from site tomorrow slightly earlier than expected. We are satisfied the data set will be sufficient to conduct a robust assessment as weather conditions over the weekend were clear, including Sunday, which we expect to be the quietest period.

Kind Regards,

[redacted]
[redacted] / Senior Acoustic Consultant
[redacted]
[redacted]
Caswell Park, Caswell Lane, Clapton-in-Gordano, Bristol, BS20 7RT
www.inacoustic.co.uk

> On 3 Mar 2022, at 17:24, [redacted] wrote:
>
> Hi [redacted]
>
> Many thanks for taking the time to respond. Our survey work has now commenced, but please see our respective responses below:
>
> - Re the siting of MP9; due to the confidential nature of the scheme at present, we are only able to access land under the Applicant's control for the purposes of installing survey equipment. The need for discretion does mean that we have to be extremely careful about provoking local interest; however, MP9 does cover an area of the site that is currently proposed for the grid connection point, which is not anticipated to be significantly noise generating. Furthermore, the scale, distribution and relative separation distance of noise sources within the existing Drax site would mean that the localised reductions/changes in noise level between MP9 and the nearby NSRs would be negligible, particularly with regard to the L90 index.
>
> Notwithstanding, the above, an on-site qualitative audibility check will be conducted by the survey consultant, who, if deeming it necessary, has been asked to undertake several short-duration, time-synced validation measurements to check whether significant variations in the L90 occur locally.
>
> - Our aim is to always try to achieve no exceedence of the background sound level; however, given the necessary balance between national interest and amenity for such a scheme, we may need to push for more lenient criteria where background sound levels becoming prohibitively low.
>
> - Despite the scale of development, construction activity for such a scheme is typically not particularly intense or intrusive. We will, however, be using the relevant ABC criteria set out within BS5228, which will be informed by the robust on-site noise measurement that we have now commenced recording.
>
> I hope this answers any outstanding concerns and we'll look forward to liaising with you throughout the process of the scheme.
>
> Kind Regards,
>
> [redacted]
>
> [redacted] / Senior Acoustic Consultant
> [redacted]
> [redacted]
> Caswell Park, Caswell Lane, Clapton-in-Gordano, Bristol, BS20 7RT
> www.inacoustic.co.uk
>
> > On 3 Mar 2022, at 09:30, [redacted] wrote:
> >
> > Hi [redacted]
> >
> > Thanks for your email setting out the proposed acoustic monitoring procedure. Overall, the monitoring regime is sufficient in terms of duration and monitoring stations, and reference is made to the relevant BS4142:2014+A1:2019

methodology.

My observations are as follows:

- In terms of monitoring locations, I have some early reservations about the siting of MP9 and whether it will be a true representation of NSRs 2 & 3 due to its proximity to Drax power station. Consequently, there is a risk of elevated noise levels when establishing the representative background levels for the purpose of BS4142 methodology. In general terms, whilst acknowledging occasional difficulties in doing so, it would be preferred if arrangements were made with the occupant(s) of the NSRs with a view to carrying out long term monitoring at the receptor
- With regards assessment criteria, I note the proposed +3dB tolerance when absolute levels do not exceed 30dBA. Whilst acknowledging the scope for context to be considered in due course, the aim should always be not to exceed existing background levels to avoid introducing new noise exposure at NSRs. This should be achieved through good acoustic design in the first instance.
- Depending on the nature of the construction phase I would recommend that consideration is given to BS5228-1&2:2009+A1:2014 assessment methodology to avoid further monitoring at a later stage, although I note the intention to record $L_{Aeq,15mins}$ noise levels.

I hope this helps and please do not hesitate to contact me should you wish to discuss further.

Kind regards

[redacted]

[redacted]

Senior Environmental Health Officer

t:
e: [redacted]
w: www.selby.gov.uk

<image62528f.PNG> Follow us on twitter @SelbyDC

<image11ea0f.PNG> Like us on Facebook

Selby District Council, Civic Centre, Doncaster Road, Selby, YO8 9FT.

<image01cc5b.JPG>

this message or any part of it.

**From:** [redacted]>
**Sent:** 25 February 2022 16:10
**To:** [redacted]
**Cc:** [redacted]
**Subject:** Drax Solar Farm Noise Assessment Methodology

Good Afternoon [redacted],

I have been passed on your contact details by Barton Willmore, I understand you are the lead EHO at Selby and will be overseeing this application.

Inacoustic are undertaking the noise assessment for the project, led by myself and our technical director [redacted] Attached is the method statement outlining the approach we intend to take with regards to on site noise measurements. Our aim is to be on site towards the end of next week, to install the equipment and measure for 7 days. The stormy weather has meant we've had several delays so fingers crossed the weeks to follow will be calmer.

I would be grateful for any comments you have regarding our method, if you would like to discuss anything in the document please feel free to contact myself or my colleague [redacted]

Kind Regards,

[redacted]

[redacted] Senior Acoustic Consultant
[redacted]

<~WRD0000.jpg> [redacted]
Caswell Park, Caswell Lane, Clapton-in-Gordano, Bristol, BS20 7RT
www.inacoustic.co.uk

# Appendix 11.2: Noise Monitoring Results

| Measurement Position | Period | Noise Level, dB | | |
|---|---|---|---|---|
| | | $L_{Aeq,T}$ | $L_{AFmax}$ | $L_{A90}$ |
| MP1 | Daytime | 48 | 73 | 37 |
| | Night-Time | 48 | 69 | 32 |
| MP2 | Daytime | 60 | 73 | 50 |
| | Night-Time | 54 | 72 | 33 |
| MP3 | Daytime | 52 | 68 | 46 |
| | Night-Time | 46 | 65 | 37 |
| MP4 | Daytime | 56 | 83 | 40 |
| | Night-Time | 56 | 81 | 35 |
| MP5 | Daytime | 44 | 66 | 34 |
| | Night-Time | 40 | 58 | 31 |
| MP6 | Daytime | 43 | 69 | 27 |
| | Night-Time | 43 | 64 | 25 |
| MP7 | Daytime | 45 | 63 | 35 |
| | Night-Time | 42 | 53 | 31 |
| MP8 | Daytime | 50 | 73 | 32 |
| | Night-Time | 40 | 58 | 28 |
| MP9 | Daytime | 49 | 71 | 40 |
| | Night-Time | 48 | 63 | 42 |

# Appendix 14.1: Agricultural Land Classification

# AGRICULTURAL LAND CLASSIFICATION
# HELIOS RENEWABLE ENERGY PROJECT

CLIENT: ENSO GREEN HOLDINGS D LIMITED
PROJECT: HELIOS RENEWABLE ENERGY PROJECT
DATE: 31ST MAY 2022 – ISSUE 2
ISSUED BY: JAMES FULTON MRICS FAAV

# CONTENTS

# 1. EXECUTIVE SUMMARY

1.1 This report assesses the Agricultural Land Classification (ALC) grading of 537.3-hectares, of land approximately 3 miles south of Selby, North Yorkshire.

1.2 The limiting factor is found variously to be topsoil texture; wetness, a combination of the climatic regime, soil water regime and texture of the top 25cm of soil; and droughtiness, based on crop adjusted available water as calculated from the soil and the climatic regime.

1.3 The land is graded as follows:

| | | |
|---|---|---|
| Grade 1: | 46.8 Ha | 8.8% |
| Grade 2: | 191.8 ha | 36.0% |
| Grade 3a: | 262.5 ha | 49.3% |
| Grade 3b: | 31.1 Ha | 5.8% |
| Total Agricultural Land surveyed: | 532.2 Ha | 100% |
| Non-Agricultural land in the survey area | 5.1 Ha | |

## 2. INTRODUCTION

2.1 Amet Property Ltd have been instructed by Enso Green Holdings D Limited to produce an Agricultural Land Classification (ALC) report on a 537.3-hectare survey area on land to the south and west of the village of Camblesforth and to the north of the village of Hirst Courtney and a small parcel to the east of Drax power station. The report is produced in support of a DCO application for a renewable energy project.

2.2 The report's author is James Fulton BSc (Hons) MRICS FAAV who has worked as a chartered surveyor, agricultural valuer, and agricultural consultant since 2004, has a degree in agriculture which included a number of modules on soils and over 10 years' experience in producing agricultural land classification reports.

2.3 The report is based on site visits conducted in March 2022. During site visits conditions ranged from full sunshine to overcast and showery. During the inspection 15 trial pits were dug to a depth of 120cm. In addition to the trial pits an augur was used to take a minimum of one sample per hectare on the survey area to a depth of 120cm with smaller trial pits at some of these locations to confirm soil structure and colour where it was not clear from the augur samples. A plan of augur points can be found at *appendix 1.* The trial pit locations were selected as they were representative of the soils found on site. Where an augur was used to take samples soil structure was extrapolated from the locations at which trial pits were dug.

2.4 The survey area is made up of approximately 59 land parcels (depending on how a boundary is defined). The land is level with altitudes of the sample points ranging from 4m to 9m AOD.

2.5 At the time of the survey the land use was in an arable rotation that appeared to include combinable crops and root crops.

2.6 Further information has been obtained from the MAGIC website, the Soil Survey of England and Wales, the British Geological Survey, the Meteorological Office and 1:250,000 series Agricultural Land Classification maps.

2.7 The collected information has been judged against the Ministry of Agriculture Fisheries and Food Agricultural Land Classification of England and Wales revised guidelines and criteria for grading the quality of agricultural land.

2.8 The principal factors influencing agricultural production are climate, site and soil and the interaction between them MAFF (1988)[1] & Natural England (2012)[2].

[1] MAFF (1988) - *Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land*. MAFF Publications

[2] Natural England (2012) - *Technical Information Note 049 - Agricultural Land Classification: protecting the best and most versatile agricultural land*, Second Edition

## 3. PUBLISHED INFORMATION

3.1 The British Geological Survey 1:50,000 scale map identifies various bedrock and superficial geology across the survey area.

3.1.1 The bedrock geology of the block to the southwest of Camblesforth is recorded as Sherwood sandstone group – sandstone with superficial geology identified as Breighton sand formation – Sand on the majority of the survey area and small areas of Hemingborough glaciolacustrine formation – clay to the southeast of Hagg Bush House.

3.1.2 The bedrock geology of the block to the north of Hirst Courtney and of the block to the east of Drax power station is recorded as Sherwood sandstone group – sandstone with superficial geology identified as Hemingborough glaciolacustrine formation – clay.

3.2 The national soils map identifies 5 soil associations within the survey area.

3.2.1 The majority of the land to the southwest of Camblesforth is identified as Everingham Association – Deep stoneless permeable fine sandy soils some with bleached subsurface horizon. The very eastern tip of the block is identified as Newport 1 Association – Deep well drained sandy and course loamy soils. A small area to the southeast of Hagg Bush House is identified as Sessay Association – Fine and course loamy often stoneless, permeable soils affected by groundwater.

3.2.2 The majority of the block to the north of Hirst Courtney is identified as Sessay Association – Fine and course loamy often stoneless, permeable soils affected by groundwater. A small area to the south of the block is identified as Wick 1 Association – Deep well drained course loamy and sandy soils locally over gravel.

3.2.3 The land to the east of Drax power station is identified as Foggathorpe 2 Association – Slowly permeable seasonally waterlogged stoneless clayey and fine loamy over clayey soils.

3.3 The 1:250,000 series agricultural land classification mapping shows the majority of the survey area to be Grade 2 with some areas identified as Grade 3.

## 4. CLIMATE

4.1 Climate has a major, and in places overriding, influence on land quality affecting both the range of potential agricultural uses and the cost and level of production.

4.2 There is published agro-climatic data for England and Wales provided by the Meteorological Office, such data for the subject survey area is listed in the table below.

Figure 2.1 Agro-Climatic Data – Details at *appendix 2*

| | |
|---|---|
| Grid Reference | 462626 426368 |
| Altitude (ALT) | 6.28 |
| Average Annual Rainfall (AAR) | 604.70 |
| Accumulated Temperature - Jan to June (ATO) | 1406.53 |
| Duration of Field Capacity (FCD) | 126.20 |
| Moisture Deficit Wheat | 109.77 |
| Moisture Deficit Potatoes | 101.59 |

4.3 The main parameters used in assessing the climatic limitation are average annual rainfall (AAR), as a measure of overall wetness; and accumulated temperature, as a measure of the relative warmth of a locality.

4.4 The Average Annual Rainfall and Accumulated Temperature provide no climatic limitation to grade.

4.5 With the exception of some very small areas shown to be in flood zone 1 the whole area is shown by the environment agency mapping to be in an area benefitting from flood defences. There was no evidence of any flooding within the survey area and nothing to suggest that it is a limiting factor to land grade.

## 5. STONINESS

5.1 There was no area within the survey where any stones were recorded. There were very occasional areas with a very small number of stones but not that would affect land grade.

## 6. GRADIENT

6.1 The survey area is all level with no area where gradient would affect land grade.

## 7. SOILS

7.1 While there is variation in the soils found in the block to the south and west of Camblesforth they largely conform to the soil association descriptions found in the national soils map. The topsoil at most sample points was identified as a loamy sand with areas of slightly lighter (sand) and heavier (sandy loam) topsoil which tended to be grouped together. Colours and structures of subsoils varied but sand was the dominant texture with some areas of loamy sand and occasionally sandy loam. There was one notable exception in the block in an area to the south of Stockshill Farm, Camblesforth where there was an area with sandy clay loam topsoil and clay subsoil very similar to soils within the Foggathorpe Association. The majority of sand soils were identified by the lab tests as medium sand or loamy medium sand. The areas to the northeast of the site identified in field as sandy loam were found by the lab testing to be a fine sandy loam. The area identified on the soils map as Sessay Association had subsoils similar to the rest of the block but tended to have a sandy loam topsoil that at times verged on being a sandy clay loam which was noticeably heavier than the rest of the block.

7.2 The block to the north of Hirst Courtney largely consists of sandy clay loam or sandy loam topsoils, occasionally loamy sand topsoils with subsoils that are more variable than the rest of the survey area including generally medium to well-structured clay loam and sandy loam with loamy sand and sand at deeper horizons.

7.3 The block to the east of Drax power station has a clay topsoil on the north side of the road and a sandy clay loam topsoil on the south side of the road. The subsoil of both areas is a slowly permeable gleyed clay from around 35cm.

7.4 The soil topsoil texture can provide a limitation to land grade such that sand topsoil is not eligible to be graded grade 1, 2 or 3a and loamy sand topsoil is not eligible to be graded grade 1. This limitation is accounted for in the Table at *appendix 4*.

## INTERACTIVE FACTORS

### 8. WETNESS

8.1 An assessment of the wetness class of each sample point was made based on the flow chart at Figure 6 in the MAFF guidance. The wetness class and topsoil texture were then assessed against Table 6 of the MAFF guidance to determine the ALC grade according to wetness. The wetness assessment can be found at *appendix 4*.

### 9. DROUGHTINESS

9.1 Droughtiness limits are defined in terms of moisture balance for wheat and potatoes using the formula:

MB (Wheat) = AP (Wheat) - MD (Wheat)

and

MB (Potatoes) = AP (Potatoes) - MD (Potatoes)

Where:
MB = Moisture Balance
AP = Crop Adjusted available water capacity
MD = Moisture deficit

9.2 Moisture deficit for wheat and potatoes can be found in the agro-climatic data and are as follows:

MD (Wheat) = 109.77
MD (Potatoes) = 101.59

9.3 A large proportion of the land is being used for root vegetable production with evidence of irrigation in use. The moisture balance limitation for potatoes has therefore been disregarded as it is assumed that potatoes and root crops will be irrigated and so it is only where the moisture balance for wheat provides a limitation to land grade that a limitation is said to exist. The moisture balance for each sample point can be found at *appendix 4*.

## 10. AGRICULTURAL LAND CLASSIFICATION

10.1 The Agricultural Land Classification provides a framework for classifying land according to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways: they may affect the range of crops that can be grown, the level of yield, the consistency of yield and the cost of obtaining it.

10.2 The principle physical factors influencing agricultural production are climate, site and soil and the interactions between them which together form the basis for classifying land into one of 5 grades; grade 1 being of excellent quality and grade 5 being land of very poor quality. Grade 3 land, which constitutes approximately half of all agricultural land in the United Kingdom is divided into 2 subgrades – 3a and 3b. A full definition of all of the grades can be found at *appendix 5.*

10.3 This assessment sets out that for a number of locations the topsoil texture limits the sand topsoil to grade 3b and the loamy sand topsoil to grade 2. At most sample points no one factor limits the grade of the land, the interaction between climate and soil result in a wetness assessment that limits the heavier land to grade 3a or grade 3b and a droughtiness assessment limits the lighter land to grade 2 or 3a. In some locations there is no limitation to land grade and so the land is Grade 1.

10.4 The MAFF guidance sets out that 'where soil and site conditions vary significantly and repeatedly over short distances and impose a practical constraint on cropping and land management a 'pattern' limitation is said to exist. To this end where there are individual sample points that ae different to the land around them and where these could only be farmed as a whole the area has been graded alike.

10.5 Taking into account all limitations the survey area is graded as follows:

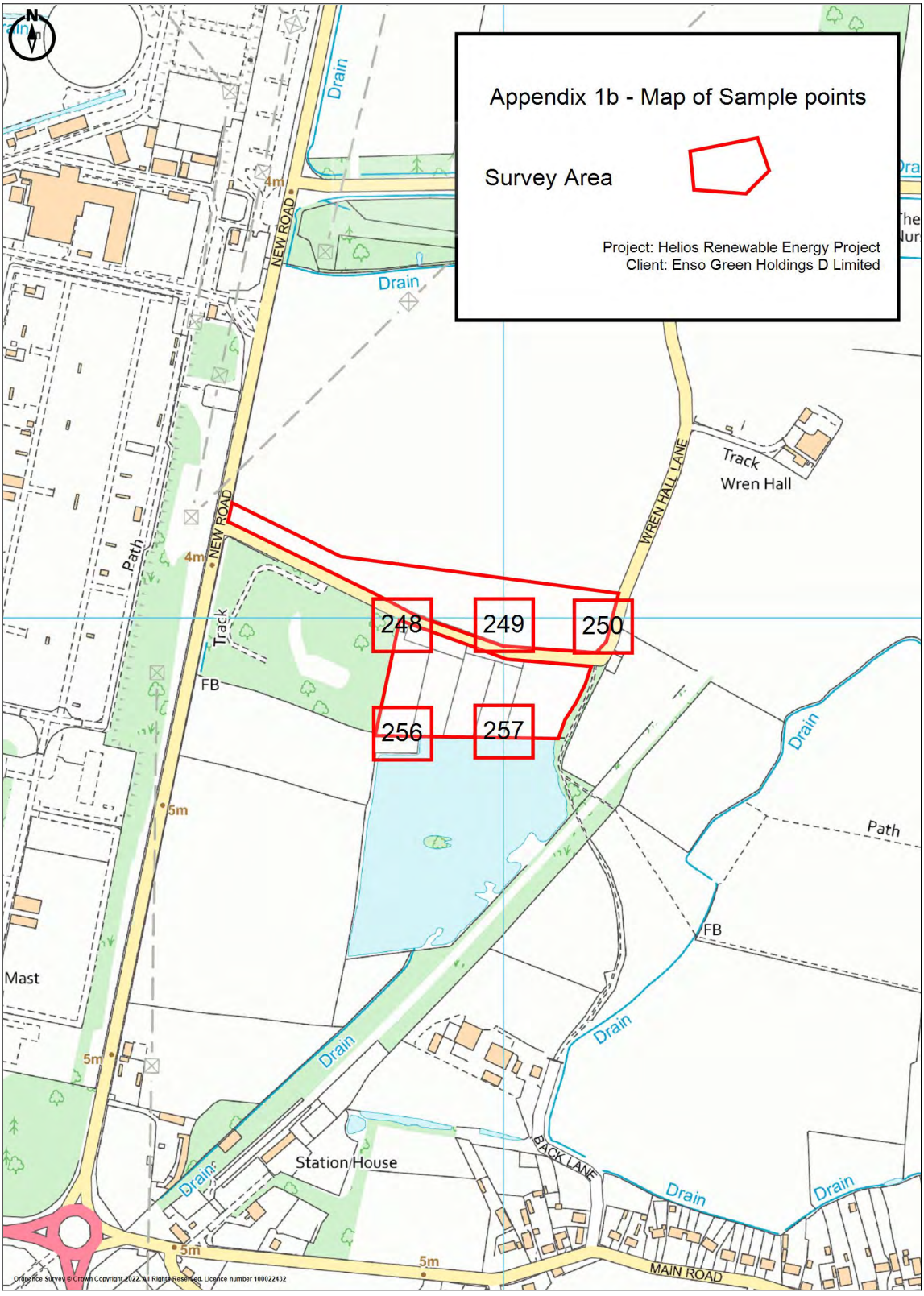
| | | |
|---|---|---|
| Grade 1: | 46.8 Ha | 8.8% |
| Grade 2: | 191.8 ha | 36.0% |
| Grade 3a: | 262.5 ha | 49.3% |
| Grade 3b: | 31.1 Ha | 5.8% |
| Total Agricultural Land surveyed: | 532.2 Ha | 100% |
| Non-Agricultural land in the survey area | 5.1 Ha | |

A plan of the land grading can be found at *appendix 6.*

# Appendix 1a - Map of Sample Points

Survey Area

Project: Helios Renewable Energy Project
Client: Enso Green Holdings D Limited




Promap
LANDMARK INFORMATION

## APPENDIX 2 – AGRO-CLIMATIC DATA

Survey area Details: Helios Renewable Energy Project

Grid reference (centre of survey area): 462626 426368

Altitude: Mean 6.28

Climatic data from surrounding locations:

| Grid Reference | ALT | AAR | LR_AAR | ASR | ATO | ATS | MDW | MDP | FCD |
|---|---|---|---|---|---|---|---|---|---|
| 46004250 | 6 | 612 | 1.4 | 315 | 1408 | 2367 | 110 | 102 | 128 |
| 46004300 | 8 | 600 | 0.9 | 325 | 1404 | 2363 | 107 | 99 | 126 |
| 46504250 | 5 | 603 | 3.1 | 310 | 1408 | 2369 | 111 | 104 | 126 |
| 46504300 | 4 | 584 | 1.4 | 315 | 1407 | 2368 | 110 | 102 | 121 |

Altitude Adjusted

| Grid Reference | AAR | ATO | FCD | MDW | MDP | Proximity Adjustment |
|---|---|---|---|---|---|---|
| 46004250 | 612.39 | 1407.68 | 128.06 | 109.94 | 101.30 | 33.46% |
| 46004300 | 598.45 | 1405.96 | 125.78 | 107.28 | 98.40 | 13.63% |
| 46504250 | 606.97 | 1406.54 | 126.57 | 110.59 | 103.21 | 38.12% |
| 46504300 | 587.19 | 1404.40 | 121.46 | 109.54 | 101.05 | 14.80% |

**Appendix 3 - Soil Sampling Data**

| | | Topsoil | | | | | | Subsoil 1 | | | | | | Subsoil 2 | | | | | | Subsoil 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample No | Altitude | Depth | Texture | Colour | Stoniness | Mottles | Structure | Depth | Texture | Colour | Stoniness | Mottles | Structure | Depth | Texture | Colour | Stoniness | Mottles | Structure | Depth | Texture | Colour | Stoniness | Mottles | Structure |
| 1 | 8 | 0-50 | S | 10YR 2/1 | | | G | 50-60 | S | 10YR 5/8 | | | SG | 60-120 | S | 10YR 4/2 | | | SG | | | | | | |
| 2 | 8 | 0-50 | S | 10YR 2/1 | | | G | 50-60 | S | 10YR 5/8 | | | SG | 60-120 | S | 10YR 4/2 | | | SG | | | | | | |
| 3 | 8 | 0-40 | S | 10YR 2/1 | | | G | 40-120 | S | 10YR 4/2 | | | SG | | | | | | | | | | | | |
| 4 | 7 | 0-50 | S | 10YR 2/1 | | | G | 50-100 | S | 10YR 5/8 | | | WFAB | 100-120 | SL | 10YR 6/2 | | CO | WMAB | | | | | | |
| 5 | 6 | 0-40 | LS | 10YR 2/1 | | | G | 40-70 | LS | 10YR 6/1 | | | WFAB | 70-120 | SL | 7.5YR 6/8 | | | M | | | | | | |
| 6 | 8 | 0-40 | LS | 10YR 2/1 | | | G | 40-100 | S | 10YR 5/8 | | | SG | 100-120 | SL | 10YR 4/2 | | | WMAB | | | | | | |
| 7 | 8 | 0-40 | S | 10YR 2/1 | | | G | 40-70 | S | 10YR 4/2 | | | SG | 70-120 | S | 10YR 5/8 | | | SG | | | | | | |
| 8 | 8 | 0-40 | S | 10YR 2/1 | | | G | 40-70 | S | 10YR 5/8 | | | SG | 70-120 | SL | 10YR 6/2 | | CO | WMAB | | | | | | |
| 9 | 8 | 0-40 | LS | 10YR 2/1 | | | G | 40-70 | LS | 10YR 6/1 | | | WFAB | 70-120 | SL | 7.5YR 6/8 | | | M | | | | | | |
| 10 | 7 | 0-40 | S | 10YR 2/1 | | | G | 40-70 | S | 10YR 5/8 | | | WFAB | 70-120 | S | 7.5YR 6/8 | | | SG | | | | | | |
| 11 | 6 | 0-40 | LS | 10YR 2/1 | | | WFSAB | 40-60 | SCL | 10YR 3/2 | | | WC PRISM | 60-120 | SCL | 10YR 4/1 | | CO | M | | | | | | |
| 12 | 8 | 0-40 | SL | 10YR 2/1 | | | WFSAB | 40-70 | S | 10YR 4/2 | | | SG | 70-120 | SL | 10YR 6/2 | | CO | WMAB | | | | | | |
| 13 | 8 | 0-40 | LS | 10YR 2/1 | | | WFAB | 40-70 | S | 10YR 4/2 | | | SG | 70-120 | SL | 10YR 6/2 | | CO | WMAB | | | | | | |
| 14 | 7 | 0-50 | LS | 10YR 2/1 | | | WFSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 15 | 6 | 0-40 | S | 10YR 2/1 | | | G | 40-90 | LS | 10YR 5/8 | | COB | WFAB | 90-120 | SL | 10YR 6/1 | | CO | M | | | | | | |
| 16 | 5 | 0-40 | S | 10YR 2/1 | | | G | 40-90 | LS | 10YR 5/8 | | COB | WFAB | 90-120 | SL | 10YR 6/1 | | CO | M | | | | | | |
| 17 | 7 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 18 | 7 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 19 | 8 | 0-40 | S | 10YR 2/1 | | | G | 40-90 | LS | 10YR 5/8 | | COB | WFAB | 90-120 | SL | 10YR 6/1 | | CO | M | | | | | | |
| 20 | 8 | 0-50 | LS | 10YR 2/1 | | | WMAB | 50-100 | SL | 10YR 4/2 | | CO | WMAB | 100-120 | S | 10YR 5/8 | | | SG | | | | | | |
| 21 | 8 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 22 | 8 | 0-50 | S | 10YR 2/1 | | | G | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 23 | 5 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 24 | 5 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 25 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 26 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 27 | 6 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 28 | 6 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 29 | 6 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 30 | 8 | 0-70 | LS | 10YR 2/1 | | | G | 70-80 | SL | 10YR 6/2 | | CO | WMAB | 80-120 | S | 10YR 4/2 | | | SG | | | | | | |
| 31 | 8 | 0-40 | S | 10YR 2/1 | | | G | 40-120 | S | 10YR 5/8 | | | WFAB | | | | | | | | | | | | |
| 32 | 8 | 0-40 | S | 10YR 2/1 | | | G | 40-120 | S | 10YR 5/8 | | | WFAB | | | | | | | | | | | | |
| 33 | 7 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 34 | 7 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 35 | 6 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 36 | 6 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 37 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 38 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 39 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 40 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 41 | 6 | 0-40 | S | 10YR 2/1 | | | G | 40-70 | S | 10YR 4/2 | | | SG | 70-120 | SL | 10YR 6/2 | | CO | WMAB | | | | | | |
| 42 | 7 | 0-40 | S | 10YR 2/1 | | | G | 40-70 | S | 10YR 5/8 | | | SG | 70-120 | S | 10YR 5/2 | | CO | SG | | | | | | |
| 43 | 7 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |
| 44 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |
| 45 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-70 | S | 10YR 5/8 | | | WFAB | 70-120 | SCL | 10YR 6/2 | | | WMAB | | | | | | |
| 46 | 7 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 47 | 6 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 48 | 6 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 49 | 5 | 0-40 | LS | 10YR 2/1 | | | G | 40-120 | LS | 10YR 5/8 | | OB | WFAB | | | | | | | | | | | | |
| 50 | 5 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 51 | 6 | 0-50 | LS | 10YR 2/1 | | | WSAB | 50-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 52 | 6 | 0-40 | S | 10YR 2/1 | | | G | 40-90 | S | 10YR 5/8 | | | SG | 90-120 | C | 2.5Y 4/1 | | | M | | | | | | |
| 53 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |
| 54 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-70 | S | 10YR 5/1 | | | WFAB | 70-120 | S | 10YR 6/2 | | | SG | | | | | | |
| 55 | 7 | 0-45 | LS | 10YR 2/1 | | | G | 45-70 | S | 10YR 5/1 | | | WFAB | 70-120 | S | 10YR 6/2 | | | SG | | | | | | |
| 56 | 6 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |
| 57 | 6 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/8 | | | WFAB | | | | | | | | | | | | |
| 58 | 5 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/8 | | | WFAB | | | | | | | | | | | | |
| 59 | 5 | 0-45 | LS | 10YR 2/1 | | | G | 45-65 | S | 10YR 5/1 | | | WFAB | 65-120 | S | 10YR 5/8 | | | SG | | | | | | |
| 60 | 5 | 0-40 | SL | 10YR 2/1 | | | WSAB | 40-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 61 | 6 | 0-40 | SL | 10YR 2/1 | | | WSAB | 40-120 | S | 10YR 6/1 | | CO | WFAB | | | | | | | | | | | | |
| 62 | 6 | 0-40 | HCL | 10YR 2/1 | | | WMAB | 40-60 | C | 10YR 2/1 | | MOB | CAB | 60-120 | C | 10YR 2/1 | | CO | C PRISM | | | | | | |
| 63 | 5 | 0-60 | S | 10YR 2/1 | | | G | 60-80 | S | 10YR 3/1 | | | SG | 80-120 | SL | 10YR 6/2 | | | WMAB | | | | | | |
| 64 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | SG | | | | | | | | | | | | |
| 65 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |
| 66 | 7 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |
| 67 | 8 | 0-45 | LS | 10YR 2/1 | | | G | 45-120 | S | 10YR 5/1 | | | WFAB | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | 8 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/1 | | WFAB | | | | | | | | | | | | | |
| 69 | 8 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/8 | | WFAB | | | | | | | | | | | | | |
| 70 | 8 | 0-45 | LS | 10YR 2/1 | G | 45-65 | S | 10YR 5/1 | | WFAB | 65-120 | S | 10YR 5/8 | | SG | | | | | | | | |
| 71 | 8 | 0-40 | SL | 10YR 2/1 | G | 40-120 | S | 10YR 5/1 | | SG | | | | | | | | | | | | | |
| 72 | 9 | 0-40 | SL | 10YR 2/1 | G | 40-120 | S | 10YR 5/1 | | SG | | | | | | | | | | | | | |
| 73 | 9 | 0-40 | SL | 10YR 2/1 | G | 40-120 | S | 10YR 5/1 | | SG | | | | | | | | | | | | | |
| 74 | 6 | 0-40 | SL | 10YR 2/1 | G | 40-120 | S | 10YR 5/1 | | SG | | | | | | | | | | | | | |
| 75 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 76 | 8 | 0-40 | S | 10YR 2/1 | G | 40-70 | S | 10YR 5/8 | | WFAB | 70-120 | S | 10YR 4/1 | | SG | | | | | | | | |
| 77 | 7 | 0-30 | LS | 10YR 2/1 | FSAB | 30-50 | SL | 10YR 5/8 | FOB | WMAB | 50-60 | C | 10YR 2/1 | MOB | C PRISM | 60-120 | S | 10YR 5/8 | | SG | | | |
| 78 | 7 | 0-45 | LS | 10YR 2/1 | G | 45-70 | S | 10YR 5/6 | | SG | 70-120 | LS | 10YR 5/1 | | WFAB | | | | | | | | |
| 79 | 7 | 0-45 | LS | 10YR 2/1 | G | 45-70 | S | 10YR 5/6 | | SG | 70-120 | LS | 10YR 5/1 | | WFAB | | | | | | | | |
| 80 | 6 | 0-45 | LS | 10YR 2/1 | G | 45-70 | S | 10YR 5/6 | | SG | 70-120 | LS | 10YR 5/1 | | WFAB | | | | | | | | |
| 81 | 7 | 0-45 | LS | 10YR 2/1 | G | 45-70 | S | 10YR 5/6 | | SG | 70-120 | LS | 10YR 5/1 | | WFAB | | | | | | | | |
| 82 | 6 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | | | | |
| 83 | 6 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | | | | |
| 84 | 8 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | | | | |
| 85 | 6 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | | | | |
| 86 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 87 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 88 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 89 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 90 | 9 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 91 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 92 | 9 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-70 | S | 10YR 5/6 | | SG | 70-120 | S | 10YR 5/2 | | SG | | | | | | | | |
| 93 | 8 | 0-40 | SL | 10YR 4/2 | WFSAB | 40-70 | SCL | 10YR 5/1 | CO | WCSAB | 70-120 | C | 10YR 5/1 | CO | WC PRISM | | | | | | | | |
| 94 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-70 | SL | 10YR 6/1 | COB | WFAB | 70-120 | S | 7.5YR 6/8 | | SG | | | | | | | | |
| 95 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-70 | SL | 10YR 6/1 | COB | WFAB | 70-120 | S | 7.5YR 6/8 | | SG | | | | | | | | |
| 96 | 9 | 0-90 | LS | 10YR 4/2 | WFSAB | 90 | IMP | | | | | | | | | | | | | | | | |
| 97 | 8 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | | | | |
| 98 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 99 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 100 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 101 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 102 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 103 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 104 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 105 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 106 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 107 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 108 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 109 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 110 | 7 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | | | | |
| 111 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 112 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 113 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 114 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 115 | 8 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 116 | 8 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 117 | 8 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | | | | |
| 118 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 119 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 120 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 121 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 122 | 7 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | | | | |
| 123 | 6 | 0-30 | HCL | 10YR 4/2 | WMAB | 30-90 | C | 10YR 5/2 | MOB | CAB | 90-120 | S | 10YR 5/1 | FO | SG | | | | | | | | |
| 124 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 125 | 8 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | | | | |
| 126 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 127 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 128 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 129 | 8 | 0-70 | LS | 10YR 2/1 | WMSAB | 70-120 | S | 10YR 5/2 | | SG | | | | | | | | | | | | | |
| 130 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-65 | S | 10YR 5/2 | | SG | 65-120 | S | 10YR 5/6 | | SG | | | | | | | | |
| 131 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | | | | |
| 132 | 8 | 0-45 | LS | 10YR 2/1 | WFSAB | 45-70 | SCL | 10YR 5/1 | MOB | WFSAB | 70-120 | S | 10YR 5/1 | | SG | | | | | | | | |
| 133 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 134 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 135 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 136 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 137 | 7 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |
| 138 | 7 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 139 | 8 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | |
| 140 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 141 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 142 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 143 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 144 | 8 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 3/1 | | SG | | | | | | | | | | |
| 145 | 8 | 0-40 | LS | 10YR 2/1 | G | 40-70 | S | 10YR 5/1 | | SG | 70-120 | S | 10YR 5/8 | | SG | | | | | |
| 146 | 8 | 0-40 | LS | 10YR 2/1 | G | 40-70 | S | 10YR 5/1 | | SG | 70-120 | S | 10YR 5/8 | | SG | | | | | |
| 147 | 8 | 0-40 | LS | 10YR 2/1 | G | 40-120 | S | 10YR 5/1 | | SG | | | | | | | | | | |
| 148 | 8 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/8 | | SG | | | | | | | | | | |
| 149 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 150 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 151 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 152 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 153 | 8 | Non-Agricultural | | | | | | | | | | | | | | | | | | |
| 154 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 155 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-70 | S | 10YR 5/8 | | SG | 70-85 | SC | 10YR 5/1 | MO | C PRISM | 85-120 | S | 10YR 5/8 | | |
| 156 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 157 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 158 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 159 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 160 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 161 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 162 | 8 | 0-35 | LS | 10YR 4/2 | WFSAB | 35-120 | S | 10YR 5/8 | COB | WFAB | | | | | | | | | | |
| 163 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 164 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 165 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 166 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 167 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 168 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 169 | 7 | 0-45 | LS | 10YR 2/1 | G | 45-120 | S | 10YR 5/8 | | SG | | | | | | | | | | |
| 170 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 171 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 172 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 173 | 8 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | | | | | |
| 174 | 9 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 175 | 9 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 176 | 8 | 0-45 | LS | 10YR 2/1 | G | 45-75 | S | 10YR 5/8 | | SG | 75-120 | S | 10YR 5/1 | | SG | | | | | |
| 177 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 178 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 179 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 180 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 181 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 182 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 183 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 184 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 185 | 7 | Non-Agricultural | | | | | | | | | | | | | | | | | | |
| 186 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 187 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 188 | 5 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 189 | 5 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-70 | S | 10YR 5/1 | | SG | 70-120 | S | 10YR 5/6 | | SG | | | | | |
| 190 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/1 | | SG | | | | | | | | | | |
| 191 | 5 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/1 | | SG | | | | | | | | | | |
| 192 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-70 | S | 10YR 5/1 | | SG | 70-120 | S | 10YR 5/6 | | SG | | | | | |
| 193 | 6 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-70 | S | 10YR 5/1 | | SG | 70-120 | S | 10YR 5/6 | | SG | | | | | |
| 194 | 5 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |
| 195 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 196 | 7 | 0-45 | LS | 10YR 2/1 | G | 45-70 | S | 10YR 5/1 | | SG | 70-120 | SC | 10YR 5/1 | MO | C PRISM | | | | | |
| 197 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 198 | 8 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 199 | 7 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 200 | 6 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 201 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 202 | 6 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 203 | 7 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 204 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | | | | | |
| 205 | 8 | Non-Agricultural | | | | | | | | | | | | | | | | | | |
| 206 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 207 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | | | | | |
| 208 | 5 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-70 | S | 10YR 5/2 | | SG | 70-120 | S | 10YR 5/6 | | SG | | | | | |
| 209 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/6 | | SG | | | | | | | | | | |

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| 210 | 7 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-70 | S | 10YR 5/2 | | SG | 70-120 | S | 10YR 5/6 | | | SG |
| 211 | 7 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/6 | | SG | | | | | | |
| 212 | 6 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 213 | 7 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 214 | 7 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 215 | 8 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 216 | 8 | 0-40 | SL | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 217 | 7 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 218 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 219 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 220 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 221 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 222 | 8 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 223 | 7 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | |
| 224 | 7 | 0-45 | LS | 10YR 2/1 | WMSAB | 45-120 | S | 10YR 5/2 | | SG | | | | | | |
| 225 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-60 | S | 10YR 3/2 | | SG | 60-120 | S | 10YR 5/2 | | | SG |
| 226 | 5 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 227 | 5 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 228 | 6 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 229 | 7 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 230 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-120 | S | 10YR 6/1 | CO | WFAB | | | | | | |
| 231 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 232 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 233 | 5 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-60 | S | 10YR 3/2 | | SG | 60-120 | S | 10YR 5/2 | | | SG |
| 234 | 5 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 3/2 | | SG | | | | | | |
| 235 | 6 | 0-40 | SL | 10YR 4/2 | WMAB | 40-120 | S | 10YR 6/1 | COB | WCAB | | | | | | |
| 236 | 8 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 237 | 7 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 238 | 7 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 239 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 240 | 5 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 241 | 4 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 242 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 243 | 7 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/2 | | SG | | | | | | |
| 244 | 8 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-60 | S | 10YR 5/2 | | SG | 60-120 | S | 10YR 5/6 | | | SG |
| 245 | 7 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-60 | S | 10YR 5/2 | | SG | 60-120 | S | 10YR 5/6 | | | SG |
| 246 | 7 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | | SG |
| 247 | 6 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | | SG |
| 248 | 6 | 0-35 | C | 10YR 4/1 | WCAB | 35-120 | C | 10YR 5/1 | MO | C PRISM | | | | | | |
| 249 | 7 | 0-35 | C | 10YR 4/1 | WCAB | 35-120 | C | 10YR 5/1 | MO | C PRISM | | | | | | |
| 250 | 6 | 0-35 | C | 10YR 4/1 | WCAB | 35-120 | C | 10YR 5/1 | MO | C PRISM | | | | | | |
| 251 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-120 | S | 10YR 5/6 | | SG | | | | | | |
| 252 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-60 | S | 10YR 5/2 | | SG | 60-120 | S | 10YR 5/6 | | | SG |
| 253 | 6 | 0-40 | SL | 10YR 2/1 | WMSAB | 40-60 | S | 10YR 5/2 | | SG | 60-120 | S | 10YR 5/6 | | | SG |
| 254 | 5 | 0-50 | SL | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 255 | 5 | 0-50 | SCL | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 256 | 5 | 0-35 | SCL | 10YR 4/1 | WFSAB | 35-120 | C | 10YR 5/1 | MO | C PRISM | | | | | | |
| 257 | 5 | 0-35 | SCL | 10YR 4/1 | WFSAB | 35-120 | C | 10YR 5/1 | MO | C PRISM | | | | | | |
| 258 | 6 | 0-40 | SL | 10YR 4/2 | G | 40-120 | LS | 10YR 5/2 | FO | SG | | | | | | |
| 259 | 7 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 260 | 7 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 261 | 7 | 0-50 | SCL | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 262 | 6 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 263 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 264 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 265 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 266 | 6 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 267 | 6 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 268 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | | SG |
| 269 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | | SG |
| 270 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 271 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 272 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 273 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 274 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | | SG |
| 275 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 276 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 277 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 278 | 7 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 279 | 7 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |
| 280 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | | SG |

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| 281 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | SG |
| 282 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 283 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | SG |
| 284 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | SG |
| 285 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 286 | 6 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 287 | 6 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | SG |
| 288 | 7 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 289 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 290 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 291 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 292 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 293 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 294 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 295 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 296 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | LS | 10YR 6/1 | FO | SG |
| 297 | 5 | 0-50 | LS | 10YR 4/1 | WFSAB | 50-60 | SC | 10YR 5/1 | MO | CAB | 60-120 | S | 10YR 5/1 | | |
| 298 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 299 | 5 | 0-50 | LS | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 300 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 301 | 5 | 0-50 | LS | 10YR 4/1 | WFSAB | 50-120 | S | 7.5YR 4/6 | | SG | | | | | |
| 302 | 6 | 0-50 | LS | 10YR 4/1 | WFSAB | 50-120 | S | 7.5YR 4/6 | | SG | | | | | |
| 303 | 7 | 0-40 | SL | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 304 | 6 | 0-40 | SL | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 305 | 5 | 0-50 | SL | 10YR 4/2 | G | 50-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 306 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | SG |
| 307 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 308 | 5 | 0-50 | LS | 10YR 4/1 | WFSAB | 50-120 | S | 7.5YR 4/6 | | SG | | | | | |
| 309 | 5 | 0-50 | LS | 10YR 4/1 | WFSAB | 50-120 | S | 7.5YR 4/6 | | SG | | | | | |
| 310 | 7 | 0-50 | LS | 10YR 4/1 | WFSAB | 50-120 | S | 7.5YR 4/6 | | SG | | | | | |
| 311 | 5 | 0-40 | SL | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 312 | 5 | 0-40 | SL | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | S | 10YR 6/1 | FO | SG |
| 313 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | S | 10YR 6/1 | FO | SG |
| 314 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 315 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 316 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 317 | 5 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 318 | 5 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 319 | 5 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 320 | 6 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 321 | 7 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 322 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 323 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 324 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 325 | 5 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 326 | 6 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 327 | 6 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 328 | 7 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 329 | 8 | 0-50 | S | 10YR 4/1 | G | 50-120 | S | 7.5YR 5/6 | | SG | | | | | |
| 330 | 5 | 0-70 | LS | 10YR 3/2 | WFSAB | 70-120 | LS | 5YR 4/6 | | WFAB | | | | | |
| 331 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 332 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | LS | 10YR 6/1 | FO | SG |
| 333 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-60 | LS | 10YR 6/1 | FO | WFAB | 60-120 | LS | 10YR 6/1 | FO | SG |
| 334 | 5 | 0-50 | LS | 10YR 3/2 | WFSAB | 50-120 | LS | 10YR 6/1 | CO | SG | | | | | |
| 335 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-60 | CL | 5YR 5/6 | | CAB | 60-120 | S | 10YR 5/1 | CO | SG |
| 336 | 5 | 0-40 | LS | 10YR 4/2 | G | 40-70 | LS | 10YR 6/1 | FO | WFAB | 70-120 | LS | 10YR 6/1 | FO | SG |
| 337 | 6 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-120 | S | 7.5YR 5/6 | MO | SG | | | | | |
| 338 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SL | 10YR 5/3 | COB | WMAB | 80-120 | LS | 10YR 5/1 | COB | WFSAB |
| 339 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SL | 10YR 5/3 | CO | WMAB | 80-120 | LS | 10YR 5/1 | CIO | WFSAB |
| 340 | 5 | 0-45 | SL | 10YR 3/2 | WMAB | 45-80 | LS | 10YR 5/1 | COB | WFSAB | 80-120 | C | 10YR 5/1 | CO | M |
| 341 | 5 | 0-70 | LS | 10YR 3/2 | WFSAB | 70-120 | LS | 5YR 4/6 | | WFAB | | | | | |
| 342 | 5 | 0-70 | LS | 10YR 3/2 | WFSAB | 70-120 | LS | 5YR 4/6 | | WFAB | | | | | |
| 343 | 8 | 0-70 | LS | 10YR 3/2 | WFSAB | 70-120 | LS | 5YR 4/6 | | WFAB | | | | | |
| 344 | 5 | 0-45 | SL | 10YR 3/2 | WMAB | 45-70 | SL | 10YR 5/1 | COB | WMAB | 70-120 | LS | 10YR 5/1 | COB | WFSAB |
| 345 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-80 | LS | 10YR 4/3 | COB | WFSAB | 80-120 | SCL | 10YR 5/1 | COB | WMAB |
| 346 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-60 | CL | 5YR 5/6 | | CAB | 60-120 | S | 10YR 5/1 | CO | SG |
| 347 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | S | 7.5YR 5/6 | MO | SG | | | | | |
| 348 | 5 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-120 | S | 7.5YR 5/6 | MO | SG | | | | | |
| 349 | 5 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-120 | S | 7.5YR 5/6 | MO | SG | | | | | |
| 350 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 5/1 | COB | WMAB | 70-120 | SL | 10YR 4/3 | COB | WMAB |
| 351 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-70 | SL | 10YR 5/1 | COB | WMAB | 70-120 | LS | 10YR 5/3 | CO | WFSAB |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 352 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 5/1 | COB | WMAB | 70-120 | SL | 10YR 4/3 | COB | WMAB |
| 353 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 5/1 | COB | WMAB | 70-120 | LS | 10YR 5/1 | COB | WFSAB |
| 354 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 5/1 | COB | WMAB | 70-120 | LS | 10YR 5/1 | COB | WFSAB |
| 355 | 6 | 0-50 | SL | 10YR 3/2 | WMAB | 70-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 356 | 5 | 0-50 | SL | 10YR 3/2 | WMAB | 70-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 357 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-60 | C | 5YR 5/6 | FO | CAB | 60-120 | S | 10YR 5/1 | CO | SG |
| 358 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-60 | C | 5YR 5/6 | FO | CAB | 60-120 | S | 10YR 5/1 | CO | SG |
| 359 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | C | 10YR 5/1 | FO | C PRISM | | | | | |
| 360 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | C | 10YR 5/1 | FO | C PRISM | | | | | |
| 361 | 7 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | C | 10YR 5/1 | FO | C PRISM | | | | | |
| 362 | 7 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 363 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 364 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SCL | 10YR 5/1 | COB | WMAB | 75-120 | SL | 10YR 5/1 | COB | WMAB |
| 365 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | C | 10YR 5/1 | COB | CAB | 75-120 | SL | 10YR 5/3 | COB | WMAB |
| 366 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-75 | SL | 10YR 5/1 | COB | WMAB | 75-120 | LS | 10YR 4/3 | COB | WFSAB |
| 367 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SL | 10YR 5/1 | COB | WMAB | 80-120 | SL | 10YR 4/3 | COB | WMAB |
| 368 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-120 | SL | 10YR 3/2 | COB | WMAB | | | | | |
| 369 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-120 | SL | 10YR 3/2 | COB | WMAB | | | | | |
| 370 | 5 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-120 | LS | 10YR 5/2 | CO | WFAB | | | | | |
| 371 | 7 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-120 | LS | 10YR 5/2 | CO | WFAB | | | | | |
| 372 | 7 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-120 | LS | 10YR 5/2 | CO | WFAB | | | | | |
| 373 | 6 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 374 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 375 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 376 | 5 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-120 | LS | 10YR 5/1 | MO | CAB | | | | | |
| 377 | 5 | 0-50 | SL | 10YR 3/2 | WMAB | 50-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 378 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | |
| 379 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | |
| 380 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | |
| 381 | 5 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 382 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-80 | LS | 5YR 4/4 | | WFAB | 80-120 | S | 5YR 4/6 | | SG |
| 383 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 5/1 | COB | WMAB | 70-120 | LS | 10YR 5/3 | COB | WFSAB |
| 384 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SCL | 10YR 5/1 | COB | WMAB | 75-120 | LS | 10YR 5/3 | COB | WFSAB |
| 385 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SCL | 10YR 5/3 | COB | WMAB | 75-120 | LS | 10YR 5/3 | COB | WFSAB |
| 386 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-65 | SCL | 10YR 5/3 | COB | WMAB | 65-120 | LS | 10YR 5/3 | COB | WFSAB |
| 387 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SL | 10YR 5/1 | COB | WMAB | 80-120 | LS | 10YR 5/1 | COB | WFSAB |
| 388 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SL | 10YR 5/3 | COB | WMAB | 80-120 | SCL | 10YR 5/1 | COB | WMAB |
| 389 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | |
| 390 | 5 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-80 | LS | 10YR 5/1 | CO | WMAB | 80-120 | LS | 10YR 5/1 | MO | WMAB |
| 391 | 8 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-120 | C | 10YR 5/1 | CO | C PRISM | | | | | |
| 392 | 8 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/1 | MO | WMAB | | | | | |
| 393 | 7 | 0-40 | SL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/1 | MO | WMAB | | | | | |
| 394 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 395 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 396 | 5 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-120 | LS | 10YR 5/1 | MO | CAB | | | | | |
| 397 | 8 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | |
| 398 | 5 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | |
| 399 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 400 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 401 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-80 | LS | 5YR 4/4 | | WFAB | 80-120 | S | 5YR 4/6 | | SG |
| 402 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 5/1 | COB | WMAB | 80-120 | LS | 10YR 5/3 | COB | WFSAB |
| 403 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-70 | SL | 10YR 5/1 | COB | WMAB | 70-120 | SL | 10YR 5/3 | COB | WMAB |
| 404 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-70 | SL | 10YR 5/1 | COB | WMAB | 70-120 | SL | 10YR 5/3 | COB | WMAB |
| 405 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-120 | SL | 10YR 5/1 | CO | WMAB | | | | | |
| 406 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SL | 10YR 5/1 | COB | WMAB | 75-120 | SL | 10YR 4/3 | COB | WMAB |
| 407 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-65 | LS | 10YR 4/3 | COB | WFSAB | 65-120 | LS | 10YR 3/3 | COB | WFSAB |
| 408 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SL | 10YR 5/3 | COB | WMAB | 80-120 | LS | 10YR 5/1 | COB | WFSAB |
| 409 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | |
| 410 | 6 | 0-40 | SL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | |
| 411 | 7 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 5/1 | CO | WMAB | 70-120 | C | 10YR 5/1 | FO | C PRISM |
| 412 | 8 | 0-60 | LS | 10YR 3/2 | WMSAB | 60-120 | LS | 10YR 3/2 | CO | WMAB | | | | | |
| 413 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 5/1 | CO | WMAB | | | | | |
| 414 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 5/1 | CO | WMAB | | | | | |
| 415 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 416 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/1 | MO | WFAB | | | | | |
| 417 | 5 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-90 | SL | 10YR 5/2 | FO | WC PRISM | 90-120 | ZSL | 10YR 5/2 | MO | M |
| 418 | 5 | 0-40 | SL | 10YR 4/2 | WMSAB | 40-120 | LS | 10YR 5/1 | MO | CAB | | | | | |
| 419 | 5 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 420 | 7 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |
| 421 | 7 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | |
| 422 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | |

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| 423 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 424 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-80 | LS | 5YR 4/4 | | WFAB | 80-120 | S | 5YR 4/6 | | SG | | | | | | | | |
| 425 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-80 | LS | 5YR 4/4 | | WFAB | 80-120 | S | 5YR 4/6 | | SG | | | | | | | | |
| 426 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 5/1 | COB | WMAB | 80-120 | LS | 10YR 5/3 | COB | WFSAB | | | | | | | | |
| 427 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/3 | COB | WFSAB | | | | | | | | | | | | | |
| 428 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/3 | COB | WFSAB | | | | | | | | | | | | | |
| 429 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 5/1 | COB | WMAB | 80-120 | LS | 10YR 5/3 | COB | WFSAB | | | | | | | | |
| 430 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-65 | SCL | 10YR 5/1 | COB | WMAB | 65-120 | LS | 10YR 4/3 | COB | WFSAB | | | | | | | | |
| 431 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-65 | LS | 10YR 4/3 | COB | WFSAB | 65-120 | LS | 10YR 3/3 | COB | WFSAB | | | | | | | | |
| 432 | 5 | 0-40 | LS | 10YR 3/2 | WMAB | 40-120 | SCL | 10YR 4/3 | CO | WMAB | | | | | | | | | | | | | |
| 433 | 5 | 0-40 | LS | 10YR 3/2 | WMAB | 40-120 | SCL | 10YR 4/3 | CO | WMAB | | | | | | | | | | | | | |
| 434 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-80 | LS | 10YR 5/1 | CO | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WC PRISM | | | | | | | | |
| 435 | 8 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/6 | CO | M | | | | | | | | |
| 436 | 8 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-60 | LS | 10YR 4/3 | FO | WMAB | 60-80 | SCL | 10YR 5/1 | CO | WC PRISM | 80-120 | S | 10YR 5/6 | | M | | | |
| 437 | 5 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-60 | LS | 10YR 5/1 | FO | WMAB | 60-120 | LS | 10YR 4/3 | CO | WMAB | | | | | | | | |
| 438 | 5 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-60 | LS | 10YR 5/1 | FO | WMAB | 60-120 | LS | 10YR 4/3 | CO | WMAB | | | | | | | | |
| 439 | 5 | Non-Agricultural | | | | | | | | | | | | | | | | | | | | | |
| 440 | 5 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | FO | WMAB | 70-120 | S | 10YR 5/6 | | M | | | | | | | | |
| 441 | 5 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-80 | SL | 10YR 5/2 | MOB | CAB | 80-120 | SCL | 10YR 5/1 | MO | SG | | | | | | | | |
| 442 | 5 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-80 | SL | 10YR 5/2 | MOB | CAB | 80-120 | SCL | 10YR 5/1 | MO | SG | | | | | | | | |
| 443 | 6 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 444 | 7 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | | | | | | | | | |
| 445 | 6 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | | | | | | | | | |
| 446 | 6 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | | | | | | | | | |
| 447 | 6 | 0-40 | SCL | 10YR 4/2 | WMSAB | 40-120 | CL | 10YR 5/1 | | C PRISM | | | | | | | | | | | | | |
| 448 | 7 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-70 | C | 10YR 5/1 | COB | CAB | 70-120 | LS | 10YR 5/3 | COB | WFSAB | | | | | | | | |
| 449 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-80 | C | 10YR 5/1 | COB | CAB | 80-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | | | | |
| 450 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SCL | 10YR 4/3 | COB | WMAB | 75-120 | SCL | 10YR 5/1 | COB | WMAB | | | | | | | | |
| 451 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SCL | 10YR 4/3 | COB | WMAB | 75-120 | SCL | 10YR 5/1 | COB | WMAB | | | | | | | | |
| 452 | 5 | 0-45 | SCL | 10YR 3/2 | WMAB | 45-120 | SC | 10YR 5/1 | CO | CAB | | | | | | | | | | | | | |
| 453 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SCL | 10YR 5/1 | COB | WMAB | 75-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | | | | |
| 454 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-65 | LS | 10YR 4/3 | COB | WFSAB | 65-120 | LS | 10YR 3/3 | COB | WFSAB | | | | | | | | |
| 455 | 5 | 0-40 | LS | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 4/3 | CO | WMAB | 70-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | | |
| 456 | 8 | 0-40 | LS | 10YR 3/2 | WMAB | 40-120 | SCL | 10YR 4/3 | CO | WMAB | | | | | | | | | | | | | |
| 457 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-60 | LS | 10YR 4/3 | FO | WMAB | 60-70 | SCL | 10YR 5/1 | CO | WC PRISM | 70-120 | LS | 10YR 5/6 | | M | | | |
| 458 | 5 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-60 | LS | 10YR 4/3 | CO | WMAB | 60-75 | LS | 10YR 5/1 | CO | WMAB | 75-120 | LS | 10YR 5/6 | | M | | | |
| 459 | 5 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/6 | CO | M | | | | | | | | |
| 460 | 6 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 5/1 | MO | WMAB | | | | | | | | | | | | | |
| 461 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 5/1 | MO | WMAB | 70-120 | S | 10YR 5/6 | | M | | | | | | | | |
| 462 | 6 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | MO | WMAB | 70-120 | LS | 10YR 5/6 | FO | WMAB | | | | | | | | |
| 463 | 6 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 5/1 | FO | WMAB | | | | | | | | | | | | | |
| 464 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 5/1 | FO | WMAB | | | | | | | | | | | | | |
| 465 | 5 | 0-40 | SL | 10YR 4/2 | WFSAB | 40-50 | S | 10YR 6/4 | FO | CAB | 50-120 | S | 10YR 5/1 | MO | SG | | | | | | | | |
| 466 | 5 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 467 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 468 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 469 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 470 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 4/3 | CO | WMAB | 80-120 | C | 10YR 5/1 | CO | M | | | | | | | | |
| 471 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SL | 10YR 5/3 | COB | WMAB | 75-120 | SCL | 10YR 5/1 | COB | WMAB | | | | | | | | |
| 472 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-120 | LS | 10YR 5/3 | COB | WFSAB | | | | | | | | | | | | | |
| 473 | 7 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SL | 10YR 5/1 | COB | WMAB | 75-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | | | | |
| 474 | 7 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-75 | SL | 10YR 5/1 | COB | WMAB | 75-120 | SL | 10YR 5/1 | COB | WMAB | | | | | | | | |
| 475 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | LS | 10YR 4/3 | CO | WFSAB | 80-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | | |
| 476 | 6 | 0-40 | LS | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 4/3 | CO | WMAB | 70-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | | |
| 477 | 6 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-80 | LS | 10YR 4/3 | FO | WMAB | 80-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | | |
| 478 | 5 | 0-40 | LS | 10YR 3/2 | WMAB | 40-60 | LS | 10YR 4/3 | FO | WMAB | 60-120 | SCL | 10YR 5/1 | CO | WC PRISM | | | | | | | | |
| 479 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | | |
| 480 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-75 | LS | 10YR 4/3 | CO | WMAB | 75-90 | LS | 10YR 5/1 | CO | WMAB | 90-120 | LS | 10YR 5/6 | | M | | | |
| 481 | 5 | 0-70 | LS | 10YR 3/2 | WMSAB | 70-120 | LS | 10YR 5/1 | MO | WMAB | | | | | | | | | | | | | |
| 482 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 5/1 | MO | WMAB | | | | | | | | | | | | | |
| 483 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 5/1 | MO | WMAB | 70-120 | S | 10YR 5/6 | M | | | | | | | | | |
| 484 | 8 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | | | | | | | |
| 485 | 5 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | | | | | | | |
| 486 | 5 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 487 | 5 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 488 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 489 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | | |
| 490 | 7 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 4/3 | CO | WMAB | 80-120 | C | 10YR 5/1 | CO | M | | | | | | | | |
| 491 | 6 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-80 | SCL | 10YR 4/3 | CO | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | | |
| 492 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-80 | C | 10YR 5/1 | COB | CAB | 80-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | | | | |
| 493 | 5 | 0-40 | SCL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 5/1 | COB | WMAB | 80-120 | LS | 10YR 5/1 | COB | WFSAB | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 494 | 5 | 0-40 | LS | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 4/3 | CO | WMAB | 70-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | |
| 495 | 5 | 0-40 | SL | 10YR 3/2 | WMAB | 40-70 | SCL | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | |
| 496 | 5 | 0-40 | LS | 10YR 3/2 | WSAB | 40-120 | LS | 10YR 4/3 | FO | WMAB | | | | | | | | | | | | |
| 497 | 6 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | |
| 498 | 6 | 0-40 | SL | 10YR 3/2 | WMAB | 40-60 | LS | 10YR 5/1 | CO | WMAB | 60-90 | LS | 10YR 4/3 | MO | WMAB | 90-120 | LS | 10YR 5/1 | MO | WMAB | | |
| 499 | 8 | 0-40 | SL | 10YR 3/2 | WMSAB | 40-60 | LS | 10YR 4/3 | CO | WMAB | 60-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | |
| 500 | 5 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-80 | SL | 10YR 5/2 | MOB | CAB | 80-120 | SCL | 10YR 5/1 | MO | SG | | | | | | | |
| 501 | 5 | 0-30 | SL | 10YR 3/2 | WCSAB | 30-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | |
| 502 | 5 | 0-40 | LS | 10YR 3/2 | WCSAB | 40-120 | LS | 10YR 5/1 | CO | WFAB | | | | | | | | | | | | |
| 503 | 8 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-80 | LS | 10YR 4/3 | CO | WFSAB | 80-120 | LS | 10YR 5/3 | CO | WFSAB | | | | | | | |
| 504 | 6 | 0-40 | LS | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 4/3 | CO | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | |
| 505 | 5 | 0-40 | SCL | 10YR 2/2 | WMAB | 40-75 | SCL | 10YR 5/1 | CO | WMAB | 75-120 | LS | 10YR 5/1 | CO | WFSAB | | | | | | | |
| 506 | 5 | 0-40 | LS | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 5/3 | CO | WMAB | 80-120 | SCL | 10YR 5/2 | CO | WMAB | | | | | | | |
| 507 | 5 | 0-50 | LS | 10YR 3/2 | WMAB | 50-90 | SCL | 10YR 5/6 | CO | WMAB | 90-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | |
| 508 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-80 | LS | 10YR 5/1 | CO | WMAB | 80-120 | LS | 10YR 5/6 | | WMAB | | | | | | | |
| 509 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-120 | LS | 10YR 4/3 | FO | WMAB | | | | | | | | | | | | |
| 510 | 5 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/1 | CO | WMAB | | | | | | | |
| 511 | 6 | 0-40 | LS | 10YR 4/2 | WFSAB | 40-80 | SL | 10YR 5/2 | MOB | CAB | 80-120 | SCL | 10YR 5/1 | MO | SG | | | | | | | |
| 512 | 8 | 0-40 | SL | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 4/3 | CO | WMAB | 80-120 | C | 10YR 5/1 | CO | M | | | | | | | |
| 513 | 7 | 0-40 | LS | 10YR 3/2 | WMAB | 40-80 | SCL | 10YR 4/3 | CO | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WMAB | | | | | | | |
| 514 | 6 | 0-40 | LS | 10YR 3/2 | WSAB | 40-70 | LS | 10YR 5/1 | FO | WMAB | 70-120 | SCL | 10YR 5/1 | CO | C PRISM | | | | | | | |
| 515 | 6 | 0-40 | LS | 10YR 3/2 | WSAB | 40-70 | LS | 10YR 5/1 | FO | WMAB | 70-120 | SCL | 10YR 5/1 | CO | C PRISM | | | | | | | |
| 516 | 8 | 0-40 | LS | 10YR 3/2 | WMSAB | 40-70 | LS | 10YR 4/3 | CO | WMAB | 70-120 | LS | 10YR 5/6 | CO | M | | | | | | | |
| 517 | 7 | 0-40 | SL | 10YR 4/2 | WFSAB | 40-80 | SL | 10YR 5/2 | MOB | CAB | 80-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 518 | 8 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-80 | LS | 10YR 5/1 | | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WC PRISM | | | | | | | |
| 519 | 5 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-80 | LS | 10YR 5/1 | | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WC PRISM | | | | | | | |
| 520 | 7 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-80 | LS | 10YR 5/1 | | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WC PRISM | | | | | | | |
| 521 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 522 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 523 | 8 | 0-50 | SL | 10YR 3/2 | WMSAB | 50-80 | LS | 10YR 5/1 | | WMAB | 80-120 | SCL | 10YR 5/1 | CO | WC PRISM | | | | | | | |
| 524 | 6 | 0-30 | SL | 10YR 3/2 | WMSAB | 30-90 | S | 10YR 3/4 | FO | SG | 90-120 | C | 10YR 5/2 | MO | M | | | | | | | |
| 525 | 7 | 0-50 | LS | 10YR 3/2 | WMSAB | 50-70 | S | 10YR 5/1 | FO | SG | 70-90 | SCL | 10YR 5/8 | | WC PRISM | 90-120 | C | 10YR 5/2 | MO | M | | |
| 526 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 527 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 528 | 6 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 529 | 7 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 530 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 531 | 8 | 0-50 | LS | 10YR 3/2 | WMSAB | 50-120 | S | 10YR 3/4 | FO | SG | | | | | | | | | | | | |
| 532 | 8 | 0-50 | LS | 10YR 3/2 | WMSAB | 50-120 | S | 10YR 3/4 | FO | SG | | | | | | | | | | | | |
| 533 | 8 | 0-50 | LS | 10YR 3/2 | WMSAB | 50-120 | S | 10YR 5/1 | FO | SG | | | | | | | | | | | | |
| 534 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 535 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 536 | 5 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 537 | 7 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 538 | 7 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 539 | 8 | 0-50 | LS | 10YR 3/2 | WMSAB | 50-120 | S | 10YR 3/4 | FO | SG | | | | | | | | | | | | |
| 540 | 8 | 0-50 | LS | 10YR 3/2 | WMSAB | 50-120 | S | 10YR 3/4 | FO | SG | | | | | | | | | | | | |
| 541 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/2 | MOB | WFAB | | | | | | | | | | | | |
| 542 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/2 | MOB | WFAB | | | | | | | | | | | | |
| 543 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/2 | MOB | WFAB | | | | | | | | | | | | |
| 544 | 7 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 545 | 8 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 546 | 6 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/2 | MOB | WFAB | | | | | | | | | | | | |
| 547 | 5 | 0-40 | LS | 10YR 3/2 | WFSAB | 40-120 | LS | 10YR 5/2 | MOB | WFAB | | | | | | | | | | | | |
| 548 | 7 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| 549 | 8 | 0-35 | SL | 10YR 4/2 | WMSAB | 35-70 | SL | 10YR 5/2 | MOB | CAB | 70-120 | S | 10YR 6/4 | | WCAB | | | | | | | |
| | 6.28233 | | | | | | | | | | | | | | | | | | | | | |

**Appendix 3b – Trial Pit Descriptions**

| Sample Point No. 4 | |
|---|---|
| Horizon 1 | 0-50 Black stoneless sand with a granular structure |
| Horizon 2 | 40-100 Yellowish brown stoneless sand with a weak fine angular blocky structure |
| Horizon 3 | 100-120 Light greyish brown stoneless sandy loam with common ochreous mottles and a weak medium angular blocky structure |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  |  |

| Sample Point No. 11 | |
|---|---|
| Horizon 1 | 0-40 Black stoneless non calcareous loamy sand with a weak fine subangular blocky structure |
| Horizon 2 | 40-60 Very dark greyish brown stoneless sandy clay loam with a weak course prismatic structure |
| Horizon 3 | 60-120 dark grey stoneless sandy clay loam with common ochreous mottles and a massive structure |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  |  |

| Sample Point No. 34 | | |
|---|---|---|
| Horizon 1 | 0-40 Black stoneless loamy sand with a granular structure | |
| Horizon 2 | 40-120 Yellowish brown stoneless sand with a weak fine angular blocky structure | |
| Horizon 3 | | |
| Pictures | | |
| Horizon 1  | Horizon 2  | Horizon 3 |

| Sample Point No. 62 | | |
|---|---|---|
| Horizon 1 | 0-40 Black stoneless heavy clay loam with a weak medium angular blocky structure | |
| Horizon 2 | 40-60 Black stoneless clay with many ochreous and black mottles and a course angular blocky structure | |
| Horizon 3 | 60-120 Black stoneless clay with common ochreous mottles and a course prismatic structure | |
| Pictures | | |
| Horizon 1 | Horizon 2  | Horizon 3  |

| Sample Point No. 93 | |
|---|---|
| Horizon 1 | 0-40 Dark greyish brown stoneless sandy loam with a weak fine subangular blocky structure |
| Horizon 2 | 40-70 Grey stoneless sandy clay loam with common ochreous mottles and a weak course subangular blocky structure |
| Horizon 3 | 70-120 Grey stoneless clay with common ochreous mottles and a weak course prismatic structure |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  |  |

| Sample Point No. 132 | |
|---|---|
| Horizon 1 | 0-45 Black stoneless loamy sand with a weak fine subangular blocky structure |
| Horizon 2 | 45-70 Grey stoneless sandy clay loam with many ochreous and black mottles and a weak fine subangular blocky structure |
| Horizon 3 | 70-120 Grey sand with a single grained structure |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  |  |

| Sample Point No. 235 | |
|---|---|
| Horizon 1 | 0-50 Dark greyish brown stoneless sandy loam with a weak medium angular blocky structure |
| Horizon 2 | 50-120 Grey sand with common ochreous and black mottles and a weak course angular blocky structure |
| Horizon 3 | |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  | |

| Sample Point No. 249 | |
|---|---|
| Horizon 1 | 0-35 Dark grey clay with a weak course angular blocky structure |
| Horizon 2 | 35-120 Grey clay with many ochreous mottles and a course prismatic structure |
| Horizon 3 | |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  | |

| Sample Point No. 359 | | |
|---|---|---|
| Horizon 1 | 0-40 Dark greyish brown sandy clay loam with a weak medium subangular blocky structure | |
| Horizon 2 | 40-120 Grey clay with few ochreous mottles and a course prismatic structure | |
| Horizon 3 | | |
| Pictures | | |
| Horizon 1  | Horizon 2  | Horizon 3 |

| Sample Point No. 417 | | |
|---|---|---|
| Horizon 1 | 0-40 Dark greyish brown sandy loam with a weak medium subangular blocky structure | |
| Horizon 2 | 40-90 Greyish brown sandy loam with few ochreous mottles and a weak course prismatic structure | |
| Horizon 3 | 90-120 Greyish brown sandy silty loam with many ochreous mottles and a massive structure | |
| Pictures | | |
| Horizon 1  | Horizon 2  | Horizon 3 |

| Sample Point No. 405 | |
|---|---|
| Horizon 1 | 0-40 Very dark greyish brown stoneless non calcareous sandy clay loam with a weak medium angular blocky structure |
| Horizon 2 | 40-120 Grey stoneless sandy loam with common ochreous mottles and a weak medium angular blocky structure |
| Horizon 3 | |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  | |

| Sample Point No. 425 | |
|---|---|
| Horizon 1 | 0-40 Very dark greyish brown loamy sand with a weak course subangular blocky structure |
| Horizon 2 | 40-80 Reddish brown loamy sand with a weak fine angular blocky structure |
| Horizon 3 | 80-120 Yellowish red sand with a single grained structure |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  |  |

| Sample Point No. 432 | |
|---|---|
| Horizon 1 | 0-40 Very dark greyish brown loamy sand with a weak medium angular blocky structure |
| Horizon 2 | 40-120 Brown sandy clay loam with common ochreous mottles and weak medium angular blocky structure |
| Horizon 3 | |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  | |

| Sample Point No. 452 | |
|---|---|
| Horizon 1 | 0-40 Very dark greyish brown stoneless non calcareous sandy clay loam with a weak medium angular blocky structure |
| Horizon 2 | 40-120 Grey stoneless sandy clay with common ochreous mottles and a coarse angular blocky structure |
| Horizon 3 | |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  | |

| Sample Point No. 478 | |
|---|---|
| Horizon 1 | 0-40 Very dark greyish brown loamy sand with a weak medium angular blocky structure |
| Horizon 2 | 40-60 Brown loamy sand with few ochreous mottles and weak medium angular blocky structure |
| Horizon 3 | 60-120 Grey sandy clay loam with common ochreous mottles and a weak course prismatic structure |
| Pictures | |

| Horizon 1 | Horizon 2 | Horizon 3 |
|---|---|---|
|  |  |  |

## ANALYTICAL REPORT

| | | | | | |
|---|---|---|---|---|---|
| **Report Number** | **18050-22** | **W250** | **AMET PROPERTY** | **Client** | **HELIOS RENEWABLE** |
| **Date Received** | **17-MAY-2022** | | **HENWICK BARN** | | **ENERGY PROJECTS** |
| **Date Reported** | **27-MAY-2022** | | **BULWICK** | | |
| **Project** | **SOIL LATE REQUEST** | | **CORBY** | | |
| **Reference** | **HELIOS RENEWABLE** | | **NORTHANTS** | | |
| **Order Number** | | | **NN17 3DU** | | |

| **Laboratory Reference** | | **SOIL563580** | **SOIL563581** | **SOIL563582** | **SOIL563583** | **SOIL563584** | **SOIL563585** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample Reference** | | **209** | **144** | **207** | **4** | **61** | **258** | | | | |
| **Determinand** | **Unit** | **SOIL** | **SOIL** | **SOIL** | **SOIL** | **SOIL** | **SOIL** | | | | |
| Coarse Sand 2.00-0.63mm | % w/w | 2 | 2 | 2 | 2 | 1 | 0 | | | | |
| Medium Sand 0.63-0.212mm | % w/w | 9 | 40 | 37 | 44 | 21 | 19 | | | | |
| Fine Sand 0.212-0.063mm | % w/w | 67 | 39 | 44 | 43 | 49 | 58 | | | | |
| Silt 0.063-0.002mm | % w/w | 11 | 10 | 10 | 7 | 17 | 12 | | | | |
| Clay <0.002mm | % w/w | 11 | 9 | 7 | 4 | 12 | 11 | | | | |
| Organic Matter LOI | % w/w | 2.4 | 2.8 | 3.3 | 3.9 | 3.6 | 3.0 | | | | |
| Textural Class ** | | fSL | LmS | LmS | mS | fSL | fSL | | | | |

**Notes**

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.



** Please see the attached document for the definition of textural classes.

Reported by *Myles Nicholson*

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# ANALYTICAL REPORT

| | | | |
|---|---|---|---|
| **Report Number** | **18051-22** | **W250** | **AMET PROPERTY** |
| **Date Received** | **17-MAY-2022** | | **HENWICK BARN** |
| **Date Reported** | **27-MAY-2022** | | **BULWICK** |
| **Project** | **SOIL LATE REQUEST** | | **CORBY** |
| **Reference** | **HELIOS SOLAR** | | **NORTHANTS** |
| **Order Number** | | | **NN17 3DU** |

| **Laboratory Reference** | | **SOIL563586** | **SOIL563587** | **SOIL563588** | **SOIL563589** | **SOIL563590** | **SOIL563591** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample Reference** | | **425** | **458 SUBSOIL 3** | **525** | **455** | **494** | **255** | | | | |
| **Determinand** | **Unit** | **SOIL** | **SOIL** | **SOIL** | **SOIL** | **SOIL** | **SOIL** | | | | |
| Coarse Sand 2.00-0.63mm | % w/w | 2 | 0 | 3 | 1 | 8 | 1 | | | | |
| Medium Sand 0.63-0.212mm | % w/w | 56 | 24 | 28 | 33 | 59 | 36 | | | | |
| Fine Sand 0.212-0.063mm | % w/w | 25 | 61 | 36 | 43 | 16 | 19 | | | | |
| Silt 0.063-0.002mm | % w/w | 8 | 6 | 17 | 12 | 8 | 21 | | | | |
| Clay <0.002mm | % w/w | 9 | 9 | 16 | 11 | 9 | 23 | | | | |
| Organic Matter LOI | % w/w | 3.2 | 1.4 | 3.2 | 2.7 | 2.5 | 4.5 | | | | |
| Textural Class ** | | LmS | LfS | mSL | mSL | LmS | SCL | | | | |

**Notes**

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.



** Please see the attached document for the definition of textural classes.

Reported by *Myles Nicholson*

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# ANALYTICAL REPORT

| | | | |
|---|---|---|---|
| **Report Number** | **18052-22** | **W250** | **AMET PROPERTY** |
| **Date Received** | **17-MAY-2022** | | **HENWICK BARN** |
| **Date Reported** | **27-MAY-2022** | | **BULWICK** |
| **Project** | **SOIL LATE REQUEST** | | **CORBY** |
| **Reference** | **HELIOS SOLAR** | | **NORTHANTS** |
| **Order Number** | | | **NN17 3DU** |

| **Laboratory Reference** | | **SOIL563592** | **SOIL563593** |
|---|---|---|---|
| **Sample Reference** | | **359** | **78** |
| **Determinand** | **Unit** | **SOIL** | **SOIL** |
| Coarse Sand 2.00-0.63mm | % w/w | 1 | 1 |
| Medium Sand 0.63-0.212mm | % w/w | 16 | 36 |
| Fine Sand 0.212-0.063mm | % w/w | 35 | 46 |
| Silt 0.063-0.002mm | % w/w | 22 | 10 |
| Clay <0.002mm | % w/w | 26 | 7 |
| Organic Matter LOI | % w/w | 4.7 | 1.8 |
| Textural Class ** | | SCL | LmS |

**Notes**

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.



** Please see the attached document for the definition of textural classes.

Reported by

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# ANALYTICAL REPORT

| | | | |
|---|---|---|---|
| **Report Number** | **18053-22** | **W250** | **AMET PROPERTY** |
| **Date Received** | **17-MAY-2022** | | **HENWICK BARN** |
| **Date Reported** | **27-MAY-2022** | | **BULWICK** |
| **Project** | **SOIL LATE REQUEST** | | **CORBY** |
| **Reference** | **AMET PROPERTY** | | **NORTHANTS** |
| **Order Number** | | | **NN17 3DU** |

| **Laboratory Reference** | | **SOIL563594** | **SOIL563595** |
|---|---|---|---|
| **Sample Reference** | | **SELBY 369** | **SELBY 474** |
| **Determinand** | **Unit** | **SOIL** | **SOIL** |
| Coarse Sand 2.00-0.63mm | % w/w | 1 | 2 |
| Medium Sand 0.63-0.212mm | % w/w | 35 | 33 |
| Fine Sand 0.212-0.063mm | % w/w | 44 | 35 |
| Silt 0.063-0.002mm | % w/w | 10 | 16 |
| Clay <0.002mm | % w/w | 10 | 14 |
| Organic Matter LOI | % w/w | 1.3 | 3.7 |
| Textural Class ** | | LmS/mSL | mSL |

**Notes**

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.

Document Control



** Please see the attached document for the definition of textural classes.

Reported by

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# ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

| Class | Code |
|---|---|
| Sand | S |
| Loamy sand | LS |
| Sandy loam | SL |
| Sandy Silt loam | SZL |
| Silt loam | ZL |
| Sandy clay loam | SCL |
| Clay loam | CL |
| Silt clay loam | ZCL |
| Clay | C |
| Silty clay | ZC |
| Sandy clay | SC |

For the *sand, loamy sand, sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

- vf Very Fine (more than 2/3's of sand less than 0.106 mm)
- f Fine (more than 2/3's of sand less than 0.212 mm)
- c Coarse (more than 1/3 of sand greater than 0.6 mm)
- m Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam classes* according to clay content are indicated as follows:

- M medium (less than 27% clay)
- H heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.

**Appendix 4 - Soil limiting factors wetness and droughtiness assesment**

| Sample No | Altitude | ALC Grade by Topsoil Texture | Wetness Assesment Depth to SPL | Depth to Gley | Wetness Class | Grade According to Wetness | Droughtiness Assessment MB Wheat | MB Potato | Grade According to Droughtiness | Grade by most limiting factor |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 2 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 3 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 4 | 7 | 3b | | | I | 1 | -2.76 | -27.59 | 3a | 3b |
| 5 | 6 | 2 | | | I | 1 | 47.24 | -13.59 | 1 | 2 |
| 6 | 8 | 2 | | | I | 1 | -3.76 | -21.09 | 3a | 3a |
| 7 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 8 | 8 | 3b | | | I | 1 | 10.24 | -32.59 | 2 | 3b |
| 9 | 8 | 2 | | | I | 1 | 47.24 | -13.59 | 1 | 2 |
| 10 | 7 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 11 | 6 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 12 | 8 | 1 | | | I | 1 | 30.24 | -12.59 | 1 | 1 |
| 13 | 8 | 2 | | | I | 1 | 14.24 | -21.09 | 2 | 2 |
| 14 | 7 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 15 | 6 | 3b | | | I | 1 | 4.24 | -35.59 | 3a | 3b |
| 16 | 5 | 3b | | | I | 1 | 4.24 | -35.59 | 3a | 3b |
| 17 | 7 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 18 | 7 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 19 | 8 | 3b | | | I | 1 | 4.24 | -35.59 | 3a | 3b |
| 20 | 8 | 2 | | | I | 1 | 20.24 | -6.59 | 2 | 2 |
| 21 | 8 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 22 | 8 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 23 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 24 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 25 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 26 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 27 | 6 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 28 | 6 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 29 | 6 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 30 | 8 | 2 | | | I | 1 | -11.76 | -10.59 | 3a | 3a |
| 31 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 32 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 33 | 7 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 34 | 7 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 35 | 6 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 36 | 6 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 37 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 38 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 39 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 40 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 41 | 6 | 3b | | | I | 1 | 10.24 | -32.59 | 2 | 3b |
| 42 | 7 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 43 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 44 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 45 | 8 | 2 | | | I | 1 | 12.24 | -18.09 | 2 | 2 |
| 46 | 7 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 47 | 6 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 48 | 6 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 49 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 50 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 51 | 6 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 52 | 6 | 3b | | | I | 1 | -10.76 | -32.59 | 3a | 3b |
| 53 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 54 | 8 | 2 | | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 55 | 7 | 2 | | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 56 | 6 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 57 | 6 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 58 | 5 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 59 | 5 | 2 | | | I | 1 | -15.26 | -22.09 | 3a | 3a |
| 60 | 5 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 61 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 62 | 6 | 1 | 40 | <40 | III | 3b | 84.24 | 21.41 | 1 | 3b |
| 63 | 5 | 3b | | | I | 1 | 20.24 | -27.59 | 2 | 3b |
| 64 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 65 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 66 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 67 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 68 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 69 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 70 | 8 | 2 | | | I | 1 | -15.26 | -22.09 | 3a | 3a |
| 71 | 8 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 72 | 9 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 73 | 9 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 74 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 75 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 76 | 8 | 3b | | | I | 1 | -19.76 | -32.59 | 3a | 3b |
| 77 | 7 | 2 | | | I | 1 | 23.24 | -9.59 | 2 | 2 |
| 78 | 7 | 2 | | | I | 1 | 7.24 | -25.59 | 2 | 2 |
| 79 | 7 | 2 | | | I | 1 | 7.24 | -25.59 | 2 | 2 |
| 80 | 6 | 2 | | | I | 1 | 7.24 | -25.59 | 2 | 2 |
| 81 | 7 | 2 | | | I | 1 | 7.24 | -25.59 | 2 | 2 |
| 82 | 6 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 83 | 6 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 84 | 8 | 2 | | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 85 | 6 | 2 | | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 86 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 87 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 88 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 89 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 90 | 9 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 91 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 92 | 9 | 2 | | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 93 | 8 | 1 | 40 | 40-70 | III | 2 | 33.24 | 11.41 | 1 | 2 |
| 94 | 8 | 2 | | | I | 1 | 4.24 | -4.59 | 3a | 3a |
| 95 | 8 | 2 | | | I | 1 | 4.24 | -4.59 | 3a | 3a |
| 96 | 9 | 2 | | | I | 1 | 3.24 | -10.59 | 3a | 3a |
| 97 | 8 | 2 | | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 98 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 99 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 100 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 101 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 102 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 103 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 104 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 105 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 106 | 6 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 107 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 108 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 109 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 110 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 111 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 112 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 113 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 114 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 115 | 8 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 116 | 8 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 117 | 8 | 2 | | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 118 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 119 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 120 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 121 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 122 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 123 | 6 | 1 | 35 | <40 | III | 3b | 83.24 | 20.41 | 1 | 3b |
| 124 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 125 | 8 | 2 | | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 126 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 127 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 128 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 129 | 8 | 2 | | | I | 1 | -1.76 | -9.09 | 3a | 3a |
| 130 | 8 | 2 | | | I | 1 | -15.26 | -22.09 | 3a | 3a |
| 131 | 8 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 132 | 8 | 2 | | | I | 1 | -3.76 | -5.59 | 3a | 3a |
| 133 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 134 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 135 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 136 | 6 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 137 | 7 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 138 | 7 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 139 | 8 | 2 | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 140 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 141 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 142 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 143 | 7 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 144 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 145 | 8 | 2 | | I | 1 | 4.24 | -28.59 | 3a | 3a |
| 146 | 8 | 2 | | I | 1 | 4.24 | -28.59 | 3a | 3a |
| 147 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 148 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 149 | 6 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 150 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 151 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 152 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 153 | 8 | | | | | | | | |
| 154 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 155 | 8 | 2 | | I | 1 | -5.26 | -18.09 | 3a | 3a |
| 156 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 157 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 158 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 159 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 160 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 161 | 5 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 162 | 8 | 2 | | I | 1 | -18.76 | -24.09 | 3a | 3a |
| 163 | 6 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 164 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 165 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 166 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 167 | 6 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 168 | 6 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 169 | 7 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 170 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 171 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 172 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 173 | 8 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 174 | 9 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 175 | 9 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 176 | 8 | 2 | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 177 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 178 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 179 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 180 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 181 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 182 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 183 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 184 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 185 | 7 | | | | | | | | |
| 186 | 6 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 187 | 6 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 188 | 5 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 189 | 5 | 2 | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 190 | 6 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 191 | 5 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 192 | 6 | 2 | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 193 | 6 | 2 | | I | 1 | -12.76 | -22.09 | 3a | 3a |
| 194 | 5 | 2 | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 195 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 196 | 7 | 2 | | I | 1 | 12.24 | -18.09 | 2 | 2 |
| 197 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 198 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 199 | 7 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 200 | 6 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 201 | 6 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 202 | 6 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 203 | 7 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 204 | 8 | 1 | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 205 | 8 | | | | | | | | |
| 206 | 8 | 2 | | I | 1 | -15.76 | -21.09 | 3a | 3a |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 207 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 208 | 5 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 209 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 210 | 7 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 211 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 212 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 213 | 7 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 214 | 7 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 215 | 8 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 216 | 8 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 217 | 7 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 218 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 219 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 220 | 6 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 221 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 222 | 8 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
| 223 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 224 | 7 | 2 | | | I | 1 | -12.76 | -18.09 | 3a | 3a |
| 225 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 226 | 5 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 227 | 5 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
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| 230 | 7 | 2 | | | I | 1 | -15.76 | -21.09 | 3a | 3a |
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| 242 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
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| 244 | 8 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 245 | 7 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 246 | 7 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
| 247 | 6 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
| 248 | 6 | 1 | 35 | <40 | III | 3b | 80.24 | 17.41 | 1 | 3b |
| 249 | 7 | 1 | 35 | <40 | III | 3b | 80.24 | 17.41 | 1 | 3b |
| 250 | 6 | 1 | 35 | <40 | III | 3b | 80.24 | 17.41 | 1 | 3b |
| 251 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 252 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 253 | 6 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
| 254 | 5 | 1 | | | I | 1 | 12.24 | 1.41 | 2 | 2 |
| 255 | 5 | 1 | | | I | 1 | 12.24 | 8.41 | 2 | 2 |
| 256 | 5 | 1 | 35 | <40 | III | 3a | 79.24 | 13.91 | 1 | 3a |
| 257 | 5 | 1 | 35 | <40 | III | 3a | 79.24 | 13.91 | 1 | 3a |
| 258 | 6 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 259 | 7 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 260 | 7 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 261 | 7 | 1 | | | I | 1 | 12.24 | 8.41 | 2 | 2 |
| 262 | 6 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 263 | 7 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
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| 267 | 6 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 268 | 6 | 2 | | | I | 1 | 0.24 | -16.59 | 3a | 3a |
| 269 | 6 | 2 | | | I | 1 | 0.24 | -16.59 | 3a | 3a |
| 270 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
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|---|---|---|---|---|---|---|---|---|---|---|
| 277 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
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| 294 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
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| 297 | 5 | 2 | | | I | 1 | -10.76 | -21.09 | 3a | 3a |
| 298 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
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| 303 | 7 | 1 | | | I | 1 | 4.24 | -6.59 | 3a | 3a |
| 304 | 6 | 1 | | | I | 1 | 4.24 | -6.59 | 3a | 3a |
| 305 | 5 | 1 | | | I | 1 | 12.24 | 1.41 | 2 | 2 |
| 306 | 5 | 2 | | | I | 1 | 0.24 | -16.59 | 3a | 3a |
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| 309 | 5 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 310 | 7 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 311 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
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| 313 | 5 | 2 | | | I | 1 | 0.24 | -16.59 | 3a | 3a |
| 314 | 5 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
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| 317 | 5 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 318 | 5 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 319 | 5 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 320 | 6 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 321 | 7 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
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| 326 | 6 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 327 | 6 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 328 | 7 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 329 | 8 | 3b | | | I | 1 | -14.76 | -32.59 | 3a | 3b |
| 330 | 5 | 2 | | | I | 1 | 18.24 | -13.59 | 2 | 2 |
| 331 | 5 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
| 332 | 5 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
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| 341 | 5 | 2 | | | I | 1 | 18.24 | -13.59 | 2 | 2 |
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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 347 | 5 | 1 | | | I | 1 | 0.24 | -12.59 | 3a | 3a |
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| 350 | 5 | 1 | | | I | 1 | 48.24 | 11.41 | 1 | 1 |
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| 365 | 5 | 1 | 40 | <40 | III | 3a | 43.74 | 13.41 | 1 | 3a |
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| 367 | 5 | 1 | | | I | 1 | 50.24 | 11.41 | 1 | 1 |
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| 369 | 5 | 1 | | | I | 1 | 50.24 | 11.41 | 1 | 1 |
| 370 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 371 | 7 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
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| 375 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 376 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 377 | 5 | 1 | | | I | 1 | 17.24 | 1.41 | 2 | 2 |
| 378 | 5 | 1 | 40 | <40 | III | 3a | 79.74 | 14.41 | 1 | 3a |
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| 380 | 5 | 1 | 40 | <40 | III | 3a | 79.74 | 14.41 | 1 | 3a |
| 381 | 5 | 1 | | | I | 1 | 1.24 | -14.59 | 3a | 3a |
| 382 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 383 | 5 | 1 | | | I | 1 | 23.42 | 11.41 | 2 | 2 |
| 384 | 5 | 1 | | | I | 1 | 25.24 | 11.41 | 2 | 2 |
| 385 | 5 | 1 | | | I | 1 | 25.24 | 11.41 | 2 | 2 |
| 386 | 5 | 1 | | | I | 1 | 21.24 | 8.41 | 2 | 2 |
| 387 | 5 | 1 | | | I | 1 | 30.24 | 11.41 | 1 | 1 |
| 388 | 5 | 1 | | | I | 1 | 46.24 | 11.41 | 1 | 1 |
| 389 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 390 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 391 | 8 | 1 | 40 | <40 | III | 3a | 79.74 | 14.41 | 1 | 3a |
| 392 | 8 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
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| 406 | 5 | 1 | | | I | 1 | 50.24 | 11.41 | 1 | 1 |
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| 409 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
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| 412 | 8 | 2 | | | I | 1 | 18.24 | -13.59 | 2 | 2 |
| 413 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 414 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 415 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 416 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 417 | 5 | 1 | | | I | 1 | 50.24 | 11.41 | 1 | 1 |
| 418 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 419 | 5 | 1 | | | I | 1 | 1.24 | -14.59 | 3a | 3a |
| 420 | 7 | 1 | | | I | 1 | 1.24 | -14.59 | 3a | 3a |
| 421 | 7 | 1 | 40 | <40 | III | 3a | 79.74 | 14.41 | 1 | 3a |
| 422 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 423 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 424 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 425 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
| 426 | 5 | 1 | | | I | 1 | 27.24 | 11.41 | 2 | 2 |
| 427 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 428 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 429 | 5 | 1 | | | I | 1 | 27.24 | 11.41 | 2 | 2 |
| 430 | 5 | 1 | 40 | 40-70 | III | 2 | 21.24 | 8.41 | 2 | 2 |
| 431 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 432 | 5 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 433 | 5 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
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| 440 | 5 | 1 | | | I | 1 | 4.24 | -6.59 | 3a | 3a |
| 441 | 5 | 2 | | | I | 1 | 22.24 | 2.41 | 2 | 2 |
| 442 | 5 | 2 | | | I | 1 | 22.24 | 2.41 | 2 | 2 |
| 443 | 6 | 1 | | | I | 1 | 1.24 | -14.59 | 3a | 3a |
| 444 | 7 | 1 | 40 | <40 | III | 3a | 79.74 | 14.41 | 1 | 3a |
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| 453 | 5 | 1 | | | I | 1 | 25.24 | 11.41 | 2 | 2 |
| 454 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
| 455 | 5 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 456 | 8 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 457 | 5 | 2 | | | I | 1 | 18.24 | -10.59 | 2 | 2 |
| 458 | 5 | 1 | | | I | 1 | 9.24 | -6.59 | 2 | 2 |
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| 460 | 6 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 461 | 5 | 2 | | | I | 1 | 6.24 | -10.59 | 2 | 2 |
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| 470 | 5 | 1 | 40 | 40-70 | III | 2 | 35.24 | 11.41 | 1 | 2 |
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| 477 | 6 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
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| 484 | 8 | 1 | | | I | 1 | 17.24 | 1.41 | 2 | 2 |
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|---|---|---|---|---|---|---|---|---|---|---|
| 487 | 5 | 1 | | | I | 1 | 1.24 | -14.59 | 3a | 3a |
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| 500 | 5 | 2 | | | I | 1 | 22.24 | 2.41 | 2 | 2 |
| 501 | 5 | 1 | | | I | 1 | 1.24 | -14.59 | 3a | 3a |
| 502 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
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| 504 | 6 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 505 | 5 | 1 | | | I | 1 | 25.24 | 11.41 | 2 | 2 |
| 506 | 5 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 507 | 5 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 508 | 5 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
| 509 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 510 | 5 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
| 511 | 6 | 2 | | | I | 1 | 22.24 | 2.41 | 2 | 2 |
| 512 | 8 | 1 | 40 | 40-70 | III | 2 | 35.24 | 11.41 | 1 | 2 |
| 513 | 7 | 2 | | | I | 1 | 27.24 | -4.59 | 2 | 2 |
| 514 | 6 | 2 | | | I | 1 | 22.24 | -13.59 | 2 | 2 |
| 515 | 6 | 2 | | | I | 1 | 22.24 | -13.59 | 2 | 2 |
| 516 | 8 | 2 | | | I | 1 | 26.24 | -10.59 | 2 | 2 |
| 517 | 7 | 1 | | | I | 1 | 30.24 | 11.41 | 1 | 1 |
| 518 | 8 | 1 | | | I | 1 | 33.24 | -6.59 | 1 | 1 |
| 519 | 5 | 1 | | | I | 1 | 33.24 | -6.59 | 1 | 1 |
| 520 | 7 | 1 | | | I | 1 | 33.24 | -6.59 | 1 | 1 |
| 521 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 522 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 523 | 8 | 1 | | | I | 1 | 33.24 | -6.59 | 1 | 1 |
| 524 | 6 | 1 | | | I | 1 | -0.76 | -22.59 | 3a | 3a |
| 525 | 7 | 2 | | | I | 1 | 12.24 | -18.09 | 2 | 2 |
| 526 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 527 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 528 | 6 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 529 | 7 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 530 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 531 | 8 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 532 | 8 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 533 | 8 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 534 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 535 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 536 | 5 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 537 | 7 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 538 | 7 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 539 | 8 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 540 | 8 | 2 | | | I | 1 | -9.76 | -15.09 | 3a | 3a |
| 541 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 542 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 543 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 544 | 7 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 545 | 8 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 546 | 6 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 547 | 5 | 2 | | | I | 1 | 17.24 | -13.59 | 2 | 2 |
| 548 | 7 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |
| 549 | 8 | 1 | | | I | 1 | 24.24 | 10.41 | 2 | 2 |

## APPENDIX 5 - DESCRIPTION OF ALC GRADES

Grade 1 - excellent quality agricultural land Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 - very good quality agricultural land Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 - good to moderate quality agricultural land Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - good quality agricultural land Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - moderate quality agricultural land Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 - poor quality agricultural land Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 - very poor-quality agricultural land Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

# Appendix 6a - Map of ALC Grades

Grade 1

Grade 2

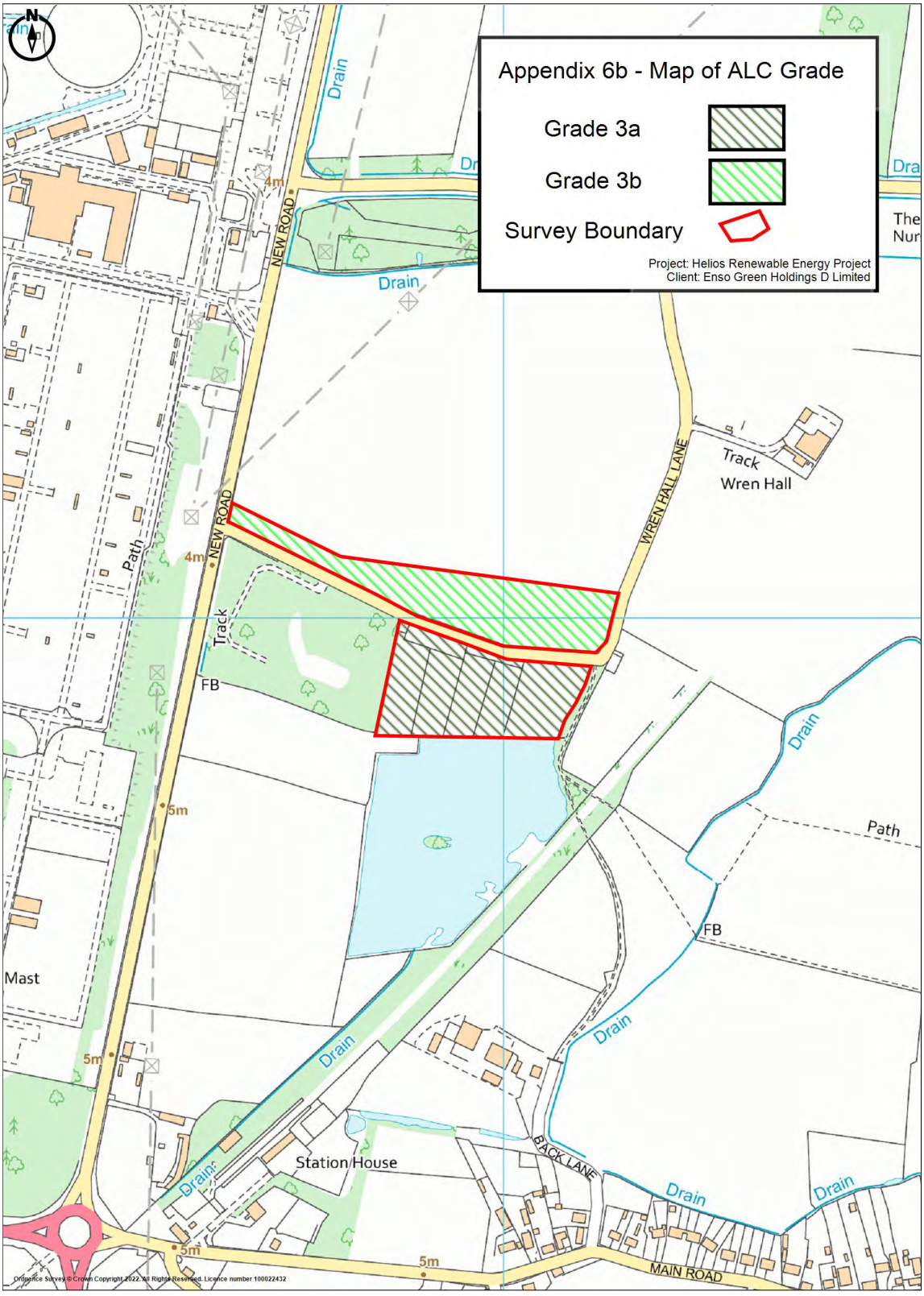
Grade 3a

Grade 3b

Non-Agricultural

Survey Boundary

Project: Helios Renewable Energy Project
Client: Enso Green Holdings D Limited



# Appendix 14.2: Soil Resource and Soil Function Assessment Methodology Tables

## Appendix 14.2 – Soil Resource and Soil Function Assessment Methodology Tables

This Appendix sets out the assessment methodology to be applied to the assessment of the likely significant effects of the Proposed Development on soil resource and soil function.

### Magnitude of Impact

Table 1 sets out guidance from the IEMA's A New Perspective on Land and Soil in Environmental Impact Assessment (2022) for identifying magnitude of impact on soil resource and soil function.

**Table 1: Guidance on Identifying Magnitude of Impact on Soil Resource and Soil Function**

| Magnitude of Impact (Change) | Description of Impacts Restricting Proposed Land Use |
|---|---|
| **Major** | Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha or loss of soil-related features (set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team (including effects from 'temporary developments'*)<br>or<br>Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha, or gain in soil-related features (as set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team (including effects from 'temporary developments'*) |
| **Moderate** | Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5 |

| Magnitude of Impact (Change) | Description of Impacts Restricting Proposed Land Use |
|---|---|
| | and 20ha or loss of soil-related features set out (as set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team (including effects from 'Temporary Developments'*)<br>or<br>Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 and 20ha, or gain in soil-related features (as set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team |
| **Minor** | Permanent, irreversible loss over less than 5ha or a temporary, reversible loss of one or more soil functions or soil volumes), or temporary, reversible loss of soil-related features (as set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team<br>or<br>Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features (as set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team |
| **Negligible** | No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or |

| Magnitude of Impact (Change) | Description of Impacts Restricting Proposed Land Use |
|---|---|
| | proposed land use |
| **Major** | Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha or loss of soil-related features (set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team (including effects from 'temporary developments'*)<br>or<br>Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20ha, or gain in soil-related features (as set out in Table 2 of IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022)), as advised by other topic specialists in EIA team (including effects from 'temporary developments'*) |

*Temporary developments can result in a permanent impact if resulting disturbance or land use change causes permanent damage to soils.

### Sensitivity of Receptor

The sensitivity of the soil resource and soil function sensitivities within the site would be based on the agricultural land classification grade and the soil resource's ability to produce arable crops (its current primary use), amongst other factors.

### Significance of Effect

IEMA's *A New Perspective on Land and Soil in Environmental Impact Assessment* (2022) provides a significance of effect matrix, set out in Table 2 below. This will be applied to the assessment of the likely significant effects of the Proposed Development.

**Table 2: Significance of Effect Matrix**

| Nature of Receptor (sensitivity/value/ importance) | Nature of Impact (magnitude/probability/reversibility) | | | | |
|---|---|---|---|---|---|
| | **No Change** | **Negligible** | **Minor** | **Moderate** | **Major** |
| **Very High** | Neutral | Slight | Moderate or large | Large or very large | Very large |
| **High** | Neutral | Slight | Slight or moderate | Moderate or large | Large or very large |
| **Medium** | Neutral | Neutral or slight | Slight | Moderate | Moderate or large |
| **Low** | Neutral | Neutral or slight | Neutral or slight | Slight | Slight or moderate |
| **Negligible** | Neutral | Slight | Neutral or slight | Neutral or slight | Slight |