



HELIOS RENEWABLE
ENERGY
PROJECT

Preliminary Environmental Information Report

Volume 2: Main Text and Figures

Chapter 4: Alternatives & Design
Evolution

October 2023

4. Alternatives and Design Evolution

4.1.1. This chapter is supported by the following figures:

- Figure 4.1 Scoping Redline Boundary; and
- Figure 4.2 Design Evolution Plan.

4.1.2. This chapter is supported by the following appendices:

- Appendix 4.1 Opportunities and Constraints Mapping for Site Selection.

4.2. Introduction

4.2.1. Regulation 14(2)(d) of the EIA Regulations requires an ES to include:

‘a description of the reasonable alternatives studied by the applicant which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment’.

4.2.2. Further, Regulation 12(2)(b) requires this information concerning alternatives to be included within the PEIR, where it is reasonably required for consultation bodies to develop an informed view of the likely significant environmental effects of the Proposed Development.

4.2.3. Alternative options typically comprise:

- The ‘do nothing’ alternative, where the development is not progressed;
- Consideration of Alternative Locations or Uses; and
- Consideration of Alternative Designs.

4.3. Guidance

4.3.1. On alternatives, the Revised (Draft) Overarching National Policy Statement (‘NPS’) for Energy (EN-1) (March 2023)¹ (‘Revised (Draft) NPS EN-1’) states at paragraph 4.2.9:

¹ Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf
Accessed: August 2023

'As in any planning case, the relevance or otherwise to the decision-making process of the existence (or alleged existence) of alternatives to the proposed development is, in the first instance, a matter of law. This NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective. Although there are specific requirements in relation to compulsory acquisition and HRA sites.

However, at paragraphs 4.2.15 to 4.2.17, it states:

'Applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility.

In some circumstances, the NPSs may impose a policy requirement to consider alternatives.

Where there is a policy or legal requirement to consider alternatives, the applicant should describe the alternatives considered in compliance with these requirements.'

4.3.2. Paragraph 4.2.21 of the Revised (Draft) NPS EN-1 goes on to state that:

'Given the level and urgency of need for new energy infrastructure, the Secretary of State should, subject to any relevant legal requirements (e.g. under the Habitats Regulations) which indicate otherwise, be guided by the following principles when deciding what weight should be given to alternatives:

- the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner*
- only alternatives that can meet the objectives of the proposed development need to be considered'*

4.3.3. Paragraphs 4.2.22 to 4.2.28 state:

'The Secretary of State should be guided in considering alternative

proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security, climate change, and other environmental benefits) in the same timescale as the proposed development.

The Secretary of State should not refuse an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and it should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals.

Alternatives not among the main alternatives studied by the applicant (as reflected in the ES) should only be considered to the extent that the Secretary of State thinks they are both important and relevant to the decision.

As the Secretary of State must assess an application in accordance with the relevant NPS (subject to the exceptions set out in section 104 of the Planning Act 2008), if the Secretary of State concludes that a decision to grant consent to a hypothetical alternative proposal would not be in accordance with the policies set out in the relevant NPS, the existence of that alternative is unlikely to be important and relevant to the Secretary of State's decision.

Alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the Secretary of State's decision.

Alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the Secretary of State's decision.

It is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made to the Secretary of State (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives which are particularly relevant). Therefore, where an alternative is first put forward

by a third party after an application has been made, the Secretary of State may place the onus on the person proposing the alternative to provide the evidence for its suitability as such and the Secretary of State should not necessarily expect the applicant to have assessed it.'

- 4.3.4. Chapter 3.10 of the Revised (Draft) NPS for Renewable Energy Infrastructure (EN-3)² ('Revised (Draft) NPS EN-3') identifies a range of factors which may influence the siting of a proposed solar farm: irradiance and site topography, proximity to dwellings, site capacity, grid connection, agricultural land classification and land type, PRoWs, security and lighting, and accessibility. These are identified to provide the SoS with information on the criteria that applicants may consider when selecting a development site. The Revised (Draft) NPS EN-3 also notes at paragraph 3.3.5 that *'It is for applicants to decide what applications to bring forward and the government does not seek to direct applicants to particular sites for renewable energy infrastructure...'* (except in relation to offshore wind).
- 4.3.5. The Revised (Draft) NPS EN-3 does not impose a policy requirement on applicants for solar projects to demonstrate the alternatives that have been considered nor does it require them to undertake a sequential site analysis. This is opposed to the EIA Regulations, which requires an ES to report on any alternatives which have been considered (As included in this chapter). With respect to agricultural land, the Revised (Draft) NPS EN-3 does, however, require applicants to *'explain their choice of site'* (paragraph 3.10.16).

4.4. The 'do nothing' Alternative

- 4.4.1. The 'do nothing' alternative considers the future conditions at the Site, should the Proposed Development not progress. The Site is not allocated for any specific land use within the adopted Local Plan, therefore under the 'do nothing' scenario, it is assumed the Site would remain in agricultural use and the beneficial and adverse effects outlined in this PEIR relating to the Proposed Development would not occur.
- 4.4.2. The generation of solar energy is one of the key elements towards the UK achieving net zero carbon. Under current legislation and policy, the UK Government is obligated to reduce carbon emissions and is legally bound to achieve net zero carbon emissions by 2050. These obligations underpin the need for renewable energy, such

² Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147382/NPS_EN-3.pdf
Accessed: August 2023

as solar. The Proposed Development will have an export capacity of 190MW which could supply the approximate annual domestic needs of 44,800 homes (equivalent to an approximate saving of 35,500 tonnes of CO₂ per year in England). Should the Proposed Development not be taken forward, its energy-generating potential and potential carbon savings will not be recognised.

4.5. Consideration of Alternative Locations or Uses

4.5.1. In line with the guidance provided in Chapter 3.10 of the Revised (Draft) NPS EN-3 (as above), the following factors should be considered when informing site selection: irradiance and site topography, proximity to dwellings, site capacity, grid connection, agricultural land classification and land type, PRowS, security and lighting, and accessibility.

Grid Connection

4.5.2. The Proposed Development must be located near to existing grid infrastructure to ensure a viable development capable of generating renewable electricity that can be exported to the grid can come forward. An existing suitable grid connection point was identified at the Drax Power Station site, with sufficient capacity to connect a large-scale solar photovoltaic farm of the scale of the Proposed Development.

4.5.3. On identification of the grid connection to the Drax Power Station, comprising a 132Kv substation, the Applicant conducted a rigorous site search for suitable land closest to the connection that balances proximity with environmental constraints and the ability to deliver a large-scale solar facility, consistent with the opportunity presented by the grid connection. This process involved:

- Review of Land Availability and Suitability;
- Selection and Assembly of Land; and
- Refinement of Land.

4.5.4. A search of suitable land within 5km of the grid connection (refer to Appendix 4.1 Opportunities and Constraints Mapping for Site Selection) was conducted to find an appropriate site. The key considerations in this process are provided below.

Review of Land Availability and Suitability

Solar Irradiation

- 4.5.5. The amount of electricity generated on-Site is directly affected by irradiance levels. Irradiance can be affected by surrounding topography, with an uncovered or exposed site of good elevation and favourable south-facing aspect more likely to increase year-round irradiance levels.
- 4.5.6. The land within North Yorkshire, and the more localised site selection area surrounding the grid connection, is considered as having potential to locate a large-scale solar development due to the large open area of undeveloped land, characterised by gently undulating topography, which would provide uniform exposure to irradiance, and generally sparse settlement patterns. Given the rural nature of the immediate vicinity, there are numerous areas of vast open space, namely agricultural fields, within a 5km radius of the connection point. The nature of this landscape means many of these fields are devoid of overshadowing from vegetation (which is generally constrained to field or property boundaries) or tall buildings. Further, the topography within the 5km search radius is relatively flat, with nominal elevation changes. As such, overshadowing from topography will not affect solar irradiation.

Topography and Natural Landforms

- 4.5.7. Irregular and numerous topographic levels would be a hindrance for development of a contiguous solar farm, with a flat and undulating topography favoured. As above, the topography within the site selection area is relatively flat, with the elevation changing minimally throughout the 5km radius. In addition to this not resulting in overshadowing from topography which would affect solar irradiation, the flat nature of the topography within the search area itself, generally supports development of the Proposed Development.
- 4.5.8. There are two rivers which bisect the 5km search radius. The River Ouse to the north of the grid connection point and its tributary the River Aire to the south. The flow of these rivers is shown in Appendix 4.1. Bringing forward the Proposed Development on either side of the river opposite to the grid connection point would result in unnecessary complexity for the Proposed Development's engineering solution. This would have additional disbenefits, likely resulting in potential program delays with unknown commercial implications, which ultimately could be avoided if the Proposed Development was located elsewhere nearby. As such, it was decided to dismiss the search area north of the River Ouse and south of the River Aire as possible site

locations as part of the site selection process.

- 4.5.9. As such, whilst typography was generally not an issue in the site selection process, due to the two rivers acting as barriers to development of land to the far north and south of the grid connection point, these areas were removed from the site selection process.

Agricultural Land Classification

- 4.5.10. Agricultural Land Classification ('ALC') considers grades 1, 2 and 3a agricultural land to be Best Most Versatile ('BMV') land. Overarching NPS for Energy (EN-1) (July 2011)³ ('NPS EN-1') states that applicants should seek to minimise impacts on BMV agricultural land and preferably use land of lower quality, except where this would be inconsistent with other sustainability considerations (such as irradiance and other environmental constraints).
- 4.5.11. The Revised (Draft) NPS EN-3 paragraphs 3.10.13 to 3.10.19 discuss the siting of solar farms on agricultural land in more detail, recognising that agricultural land is likely to be used for the siting solar farms and that when this occurs, the applicant should explain their choice. The Revised (Draft) NPS EN-3 continues and states that consideration may be given as to whether the proposal allows for continued agricultural usage.
- 4.5.12. The ALC map included in Appendix 4.1 Opportunities and Constraints Mapping for Site Selection demonstrates the area around the Drax Power Station to contain extensive areas of Grades 1 and 2 agricultural land, with smaller areas of Grade 3.
- 4.5.13. In 2017, Natural England published maps showing the likelihood of BMV in an area as shown on Figure 14.1, with a 5km radius from the grid connection area shown. The majority of the land is considered as having a high likelihood of BMV, meaning that more than 60% by area will be BMV.
- 4.5.14. There are modest areas shown as moderate likelihood of BMV, and of low likelihood of BMV. These maps provide the only published information about land quality for a wider area.
- 4.5.15. Available soil information, from the 1:250,000 Soil Maps of England and Wales

³ Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarchingnps-for-energy-en1.pdf

(SSEW,1983) shows considerable variation of soils locally, and there is no clear correlation with available ALC grades. Soils of the 712i Foggathorpe 2 association, described as slowly permeable seasonally waterlogged stoneless clayey and fine loamy over clay soils, are those mapped as undifferentiated Grade 3 on the provisional ALC, and appear, where surveyed, to be a mix of Subgrades 3a and 3b, with some Grade 2.

- 4.5.16. These various sources indicate that within the 5km search area, the area to the northwest of Camblesforth is likely to be the lowest quality, but still containing BMV agricultural land.
- 4.5.17. After that, the area to the west is likely to be the poorest available, but still mostly BMV. Land to the south and to the east is likely to be the highest quality.
- 4.5.18. Study of aerial images does not assist in identifying land quality. Current land uses, or intensity of land uses, does not affect ALC grade. Smaller fields and parkland areas are situated to the south of Drax Power Station, and more scattered residential properties in the area shown as more likely to be a 3a/3b mix between Camblesforth and Selby, all factors which could affect suitability for large-scale solar. Overall, therefore, BMV agricultural land is considered very likely to be involved in this area.
- 4.5.19. However, it should be noted that the areas of undifferentiated Grade 3 land include the built up areas of Camblesforth, Carlton, the A1041 and adjacent properties, as well as numerous isolated patches of woodland. Due to this, the location of the Site on Grade 2 BMV agricultural land was inevitable. To ensure minimal soil damage arising during the construction, operation and decommissioning of the Proposed Development, a Soil Resource and Management Plan will be submitted with the DCO.
- 4.5.20. While the Proposed Development has been designed to allow for sheep grazing to take place on-Site, the Applicant acknowledges that the Site would limit the use of BMV agricultural land and full assessment of the impact to BMV agricultural land is included in Chapter 14 Soils and Agricultural Land of the PEIR.

Proximity to Dwellings

- 4.5.21. Due to the size of large-scale solar development, the site selected for solar development may have a significant zone of visual influence; therefore, the proximity to existing sensitive receptors is an important consideration to ensure visual amenity

and glint and glare impacts are minimised.

4.5.22. Human settlements within the 5km search area radius include:

- Drax Village is located approximately 1km south east of the connection point;
- Camblesforth, with the A645 to the south and south east and the A1041 to the south west is located approximately 2km south west of the connection point;
- Carlton, west of the A1041, is approximately 3.5km south of the grid connection point; and
- Barlow is located approximately 1.7km northwest of the grid connection point.

4.5.23. In addition to these settlements, the landscape is interspersed with a number of isolated dwellings, farms and other agricultural businesses with large land holdings, located away from major roads.

4.5.24. In determining the location of the Proposed Development, the impact of human settlements and other development has been taken into consideration. This focused the site selection area onto land in the south and west of 5km search radius.

Availability of Land

4.5.25. Immediately surrounding the grid connection point is the Drax Power Station, owned and operated by Drax Group. Drax Group also owns and operates the majority of land to the north of the grid connection point, but this is committed for their own development needs.

4.5.26. Directly east of the grid connection point, on land between the River Ouse and River Aire, there is a narrow section of land that could potentially be feasible for development. This land was however removed from the site selection exercise on two grounds. Firstly, this area is ALC Grade 1 land and as per the Revised (Draft) NPS EN-3 paragraph 3.10.14, '*poorer quality land [agricultural land] should be preferred to the higher quality land*'. Secondly, this land hosts an onshore windfarm, which makes development of the Proposed Development in this area impractical due to the restrictions on the location of the solar panels and electrical infrastructure. As such, due to these restrictions, this area was discounted from the site selection exercise.

4.5.27. The land immediately adjacent to the west of the grid connection was considered in

the site selection process. This comprises a broadly triangular area of land between the Drax Power Station and the disused railway corridor running in a north west - south east direction to the east, the A1041 to the west, and the settlement of Camblesforth to the south. As demonstrated by the mapping provided in Appendix 4.1, a review of this area of land identified a number of constraints as follows:

- The presence of the settlement of Camblesforth immediately to the south;
- The presence of the consented scheme (submitted in June 2021 prior to the scoping exercise undertaken for the Proposed Development, and consented in July 2022) at Land North and South of Camela Lane, Camblesforth; and
- The presence of Barlow Common Local Nature Reserve ('LNR') and several Sites of Importance for Nature Conservation.

4.5.28. Considering the land constraints above and the severance caused by the proposed solar farm, the ability to deliver a contiguous large scale solar farm on the balance of the land between the disused railway and the A1041 was compromised. Consideration was therefore given to land beyond the A1041. The ability to integrate any remaining viable parcels east of the A1041 with land west of the A1041 was considered technically complex and therefore ruled out. Consideration was therefore given to assembling a contiguous site west of the A1041 where the land was far less constrained and sensitively located away from Camblesforth and the surrounding population, businesses and recreational uses.

Capacity of the Site

4.5.29. In order to maximise the irradiance levels at a solar site, and therefore ensure efficient generation of energy, the layout (orientation and spacing) must be optimal within the footprint of the selected solar site. As demonstrated in Appendix 4.1 Cumulative Schemes map, there are several consented and validated solar schemes within the site selection area. The presence of these schemes therefore removes these areas of land from those that may be potentially chosen as suitable for the Proposed Development, further reducing the land available for site selection.

4.5.30. As identified in Chapter 3 Site and Development Description of the PEIR, the Site comprises a developable area of 475.68ha which will comprise solar PV panels and ancillary infrastructure, access routes, ecological enhancements, and landscaping. This area is considered to be of a suitable size so as to ensure adequate space for

solar PV provision that may generate energy for the desired export capacity (190 MW).

Accessibility

- 4.5.31. Section 5.14 of NPS EN-1 discusses the traffic and transport impacts projects can have on their surroundings, including through increased congestion. Section 2.54 of the Revised (Draft) NPS EN-3 acknowledges that solar farms are generally located on sites served by a minor road network. There is no explicit requirement in Revised (Draft) NPS EN-3 for an applicant to site their proposed development in order to reduce impacts on local communities and the local highway network during construction or operation. Rather, it notes that an applicant should work with the local highway authority and other energy infrastructure developers to reduce any potential impacts (including cumulative) during construction and ensure that the roads and bridges of the local highway network can handle construction traffic loads.
- 4.5.32. In considering traffic and transport impacts, the Applicant identified that the land to the west of the grid connection point had an existing network of relatively extensive single track roads and farm tracks that could be utilised without resulting in the need to construct new roads through hedgerows. This existing road network would be well-suited and result in less environmental impact than if the Site was to be positioned in the south of the search area, where the extent of the road network is extremely limited.

Security and Lighting

- 4.5.33. As the local area considered during the site selection process is predominantly rural the proposed security and lighting, as discussed in Chapter 3 Site and Development Description of the PEIR, will be designed to account for the local sensitivities such as absence of a lit footprint, such as in an urban centre, or passive surveillance from existing built development and CCTV.
- 4.5.34. During construction, lighting will be limited to the construction compounds only, with temporary lighting at the grid connection works. The lighting of the on-Site Substation would be in accordance with Health and Safety requirements, particularly around any emergency exits.
- 4.5.35. Lighting would be designed to limit any impact on sensitive receptors by directing

lighting downward and away from the Order Limit boundaries and existing vegetation. During operation, no part of the Proposed Development would be continuously lit; manually operated and motion detection lighting would be utilised for operational and security purposes.

Environmental Constraints

- 4.5.36. NPS EN-1 section 5.7 discusses flood risk and states in paragraph 5.7.13 that projects should in the first instance be located in Flood Zone 1. If no reasonable location can be found, then the project can be located in Flood Zone 2. Again, if no reasonable location can be found in Flood Zone 2, then nationally significant energy infrastructure projects (subject to the Exception Test), can be located in Flood Zone 3. As outlined in Chapter 9 Water Environment of the PEIR), the entirety of the search area, except for isolated strips of land or built environments, are located in Flood Zone 3. Therefore, when determining location, Flood Zone 3 land was unavoidable.
- 4.5.37. NPS EN-1 section 5.3 discusses biodiversity and geological conservation and sets out policies to protect and conserve biology. When determining the location of the Site, the Applicant considered statutory and non-statutory ecological designated sites. Within the search area, the River Derwent Special Area of Conservation and Site of Special Scientific Interest ('SSSI') is located in the northeast of the search area, and the Eskamhorn Meadows SSSI comprises for individual fields and are located approximately 2.7km south of the search radius. Isolated areas of Sites of Importance for Nature Conservation ('SINCs') and located in the south, south west and west of the search radius and a Local Nature Reserve ('LNR') is located in the northwest quadrant of the search radius. Two non-statutory designated nature reserves are located directly west and 3.25km west of Drax, both north of the A1041. The location of surrounding statutory and non-statutory designated ecological sites in relation to the Site are shown in Chapter 8 Biodiversity of the PEIR. To preserve and reduce impact on the nature reserves, the land surrounding the statutory and non-statutory designated sites was removed from consideration during the site selection process.
- 4.5.38. Other ecological features such as isolated pockets of woodland, hedgerows, and unnamed streams were also avoided during the site selection phase in order to ensure biological conservation and protection. In doing this, it was noted that the southern section of the search area has a large percentage of dense and

interconnected hedgerows. These would have been significantly impacted for the Site to be developed in this area.

- 4.5.39. NPS EN-1 discusses the historic environment and states that the project should consider the impact on heritage assets. The Applicant considered heritage assets when determining the location of the Proposed Development and noted that there are 4 Schedule Monuments within the search area. One is located within the conurbation of Barlow approximately 3km northwest of the grid connection, another is located approximately 1.4km north of the grid connection, and two are located east of the grid connection near the town of Drax approximately 1.4km and 2.3km east of the grid connection.
- 4.5.40. The search area includes numerous Listed Buildings situated within the human settlements, including 2 Grade I Listed building located within the north of the town of Camblesforth approximately 2km southeast of the grid Connection, and the other approximately 3.4km south of the grid connection. The Grade I Listed south of the grid connection is Carlton Towers (ref. 1295955) and is associated with the Carlton Estate which comprises large gardens east of the A1041 and the town of Carlton in the south of the search area. The Carlton Estate and Grade I Listed Towers would likely be significantly affected if the solar farm was located on the surrounding land and therefore land immediately surrounding the Carlton Estate was dismissed from the site selection assessment.

Existing Planning Applications

- 4.5.41. In addition to the above environmental and technical constraints that reduced the feasible location for the Site to be west of Drax, the Applicant also considered the other planning applications submitted within the search radius.
- 4.5.42. The development of a ground-mounted solar farm including associated infrastructure (ref. 2021/0788/EIA) was submitted to the Council in June 2021 and was granted consent in July 2022. This proposal is to be located on the intervening land between the west the A1041 and the old railway line. This land makes up the majority of the available Grade 3 undifferentiated agricultural land within the search area, and therefore preventing the Site from being located on this land, and on agricultural land of lower value.

Summary of Site Selection Process

- 4.5.43. Overall, the Applicant's site selection assessment was thorough and took into consideration social, environmental, technical, and economical factors. The Proposed Development's location was restricted to a 5km search radius around the grid connection due to technical and economic factors. Within the 5km radius, the extent of the Drax Power Station, existing onshore windfarm, and the River Ouse and River Aire prevented the Proposed Development from being located in the north and east of the grid connection.
- 4.5.44. The environmental factors such as areas of biodiversity importance (including hedgerows), heritage assets, and the existing access tracks to more remote fields, focused the site selection assessment to the western section of the search radius.
- 4.5.45. Within the western section of the search radius, the development of a ground-mounted solar farm including associated infrastructure (ref. 2021/0788/EIA) was submitted prior to the site selection assessment being completed and therefore this area was removed from the search radius. Although the remaining search area is comprised of Grade 2 BMV agricultural land, due to the search area being predominantly Grade 1, 2, and 3 (undifferentiated) agricultural land, and taking into consideration the consented solar farm (ref. 2021/0788/EIA) is situated on the remaining Grade 3 land, the Site had to comprise BMV land. However, the urgent need for large scale renewable energy projects as outlined within Part 4 of EN-1 and other Government policies should outweigh the minimal damage to BMV soils arising from the temporary nature of the Proposed Development.

Selection and Assembly of Land

- 4.5.46. This section considers the land west of the A1041 in terms of environmental opportunities and constraints and iterative process towards selecting the final red line boundary, that will form the basis of the Order Limits for the DCO.
- 4.5.47. The site area was initially identified based on the optimal layout considering the most efficient layout and orientation that would maximise the output of the solar farm. From this position, the site was refined considering environmental constraints and opportunities. Each of these aspects are explained below.

Description of Initial Redline Boundary

- 4.5.48. The preliminary Site boundary is as presented in the request for a Scoping Opinion

(refer to Appendix 2.1 of the PEIR), shown in Figure 4.1 Scoping Redline Boundary. The preliminary Site boundary extended to 757.46ha of land, comprising the following areas:

- Solar Development Area (now referred to as the 'Solar Farm Zone'): 550.93ha;
- Underground Cable Connection Area: 196.7ha; and
- Underground Grid Connection Cable Area (now referred to collectively as the Underground Cable Corridor): 9.87ha.

4.5.49. The preliminary Site boundary comprised land to the southwest of the village of Camblesforth and to the north of the village of Hirst Courtney, and extended to the east of Drax Power Station. Residential properties were located close to, but outwith, the north western boundary. The main part of the site sat within a wider area of land bound 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 M62 motorway and A63 extended on east – west alignments in the southern and northern extents of the Site, respectively. Public Rights of Way ('PRoW') crossed the Site and the wider landscape, often following farm tracks or rural lanes. The Trans Pennine Trail long distance walking and cycling route extended south from Selby and in close proximity to the western and southern parts of the Site boundary.

Iterative Site Evolution and PEIR Design Fix

4.5.50. Numerous iterations to the Site boundary have occurred as the design of the Proposed Development has evolved since submission of the request for a Scoping Opinion.

4.5.51. These design changes, taking into account environmental and transport constraints, are considered below and are demonstrated on Figure 4.2 Design Evolution Plan.

April 2022 – March 2023

4.5.52. Due to the characteristics of the Proposed Development, including its limited height, retention and enhancement of field boundary vegetation and visually permeable appearance, it is considered highly unlikely that the threshold for Residential Visual Amenity would be met as a result of the Proposed Development. Assessment has determined that there are close range views of the Site from a limited number of residential properties that lie adjacent to the Site but there are no views from the

cores of local settlements. Where potential views from adjacent properties have been identified, the Site boundary has been pulled back from these properties to reduce the potential effects to visual amenity of receptors on the north side of Hirst Courtney and in the south and western fringes of Camblesforth and along the north western boundary towards Burn. Due to the low level of noise emitted by the Proposed Development when operational, noise impacts on residential properties are not considered to be significant and therefore no amendments to the Site boundary were made in response to potential noise effects.

- 4.5.53. In the eastern section, the Site area was extended in response to a more accurate understanding of where the cable connection route would possibly be placed. The cable connection was directed down the highway with the option to utilise third party land to allow HDD under the railway.
- 4.5.54. The Site boundary around Hagg Bush and Tranmoor Cottages was pulled back in response to non-statutory consultation feedback and visibility lines from the residents minimising the landscape impact from these particular residential receptors.
- 4.5.55. The full width of Hardenshaw Lane was incorporated to the redline boundary, utilising the full width of the existing track, whereby previously the redline had only included the tarmacked track. This change provides better site access for construction, operational, and decommissioning vehicles.

March 2023 – April 2023

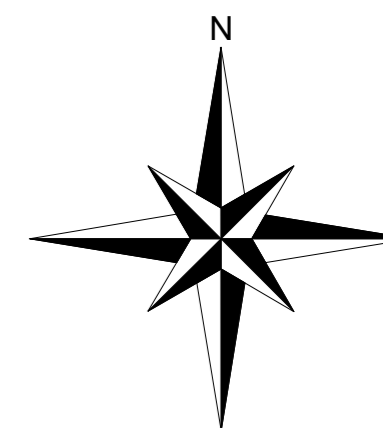
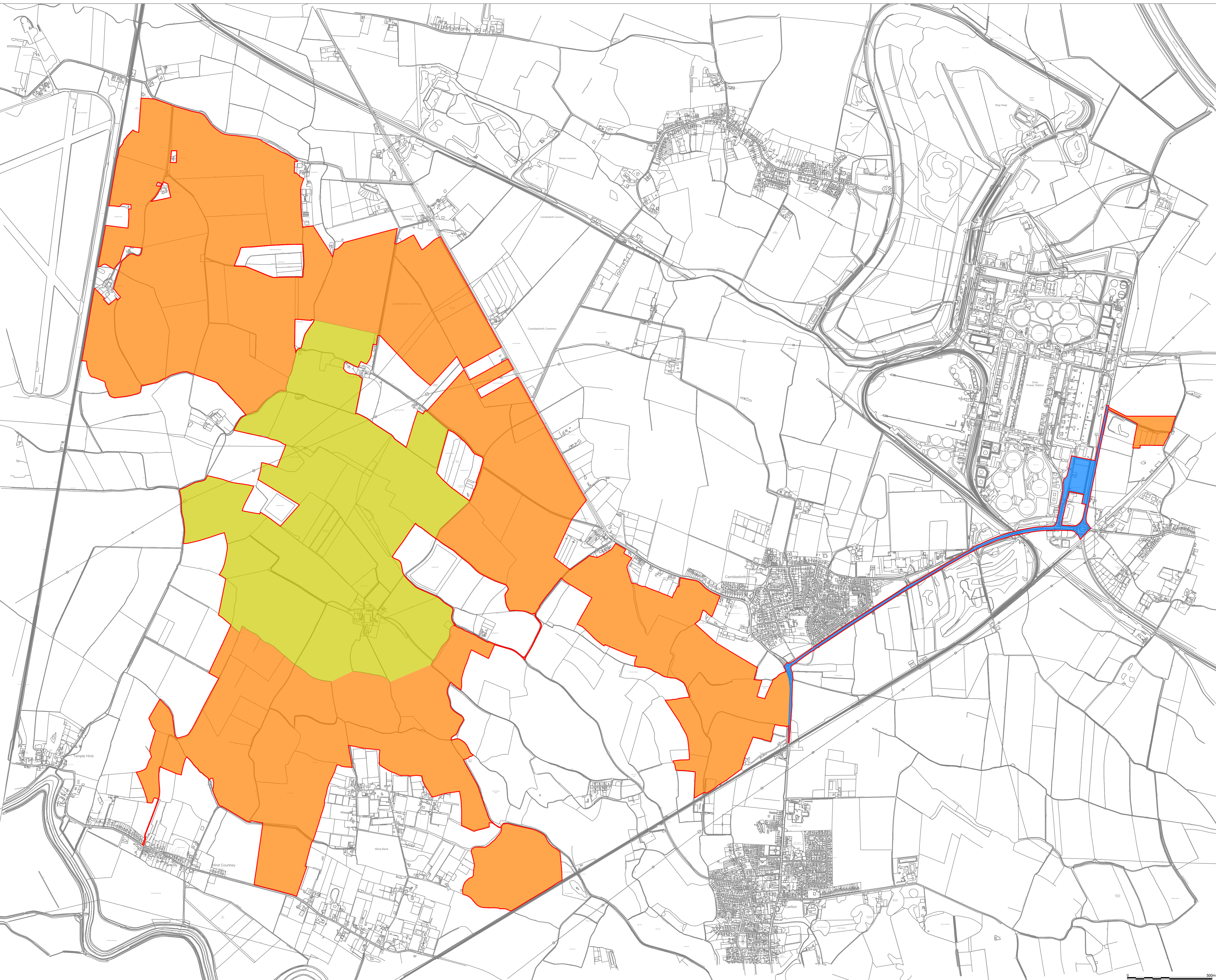
- 4.5.56. Jowland Winn Lane track (junction and a length of the road) and the ditch at Hardenshaw Lane were incorporated into the Site to improve access to the Site and allow for the potential need to widen these access points for abnormal loads.
- 4.5.57. A section of Station Road was reviewed to ensure that it avoided the shared access and third-party rights; after this review the area was removed from the Site boundary.
- 4.5.58. A further area along Stockwith Lane was incorporated into the Site boundary in order to provide flexibility to be able to widen the existing culvert to manoeuvre vehicles in this area.

April 2023 – June 2023

- 4.5.59. The area around Rabbit Hill Plantation was removed from the Site boundary to reduce the visual impact of the Proposed Development on surrounding residential properties.
- 4.5.60. A small, wooded area to the east of the proposed Substation was removed from the Site boundary.

Figure 4.1 Scoping Redline Boundary

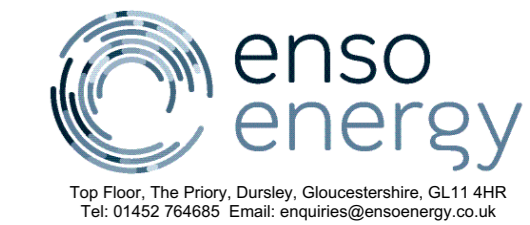
- KEY**
- Site Boundary
 - Underground Cable Connection
 - Underground Grid Connection Cable
 - Development Area



Revisions:
First Issue- 03/05/2022 JS

ALL DIMENSIONS TO BE CHECKED ON SITE WORK
TO FIGURED DIMENSIONS ONLY REPORT
DISCREPANCIES TO THE OFF AT ONCE BEFORE
PROCEEDING COPYRIGHT ACT APPLIES.

© Enso Energy Ltd. Crown Copyright. All rights reserved.
© 2022 Emapsite license number 0100031673



Project Title:
Helios Renewable Energy Project

Drawing Title:
Site Location Plan

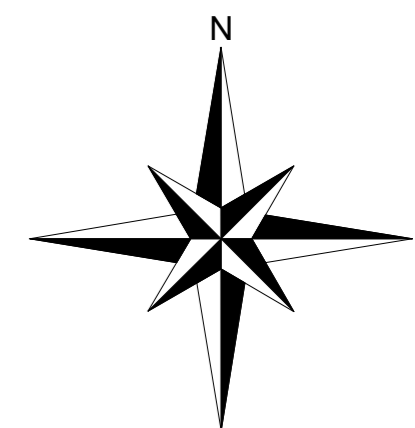
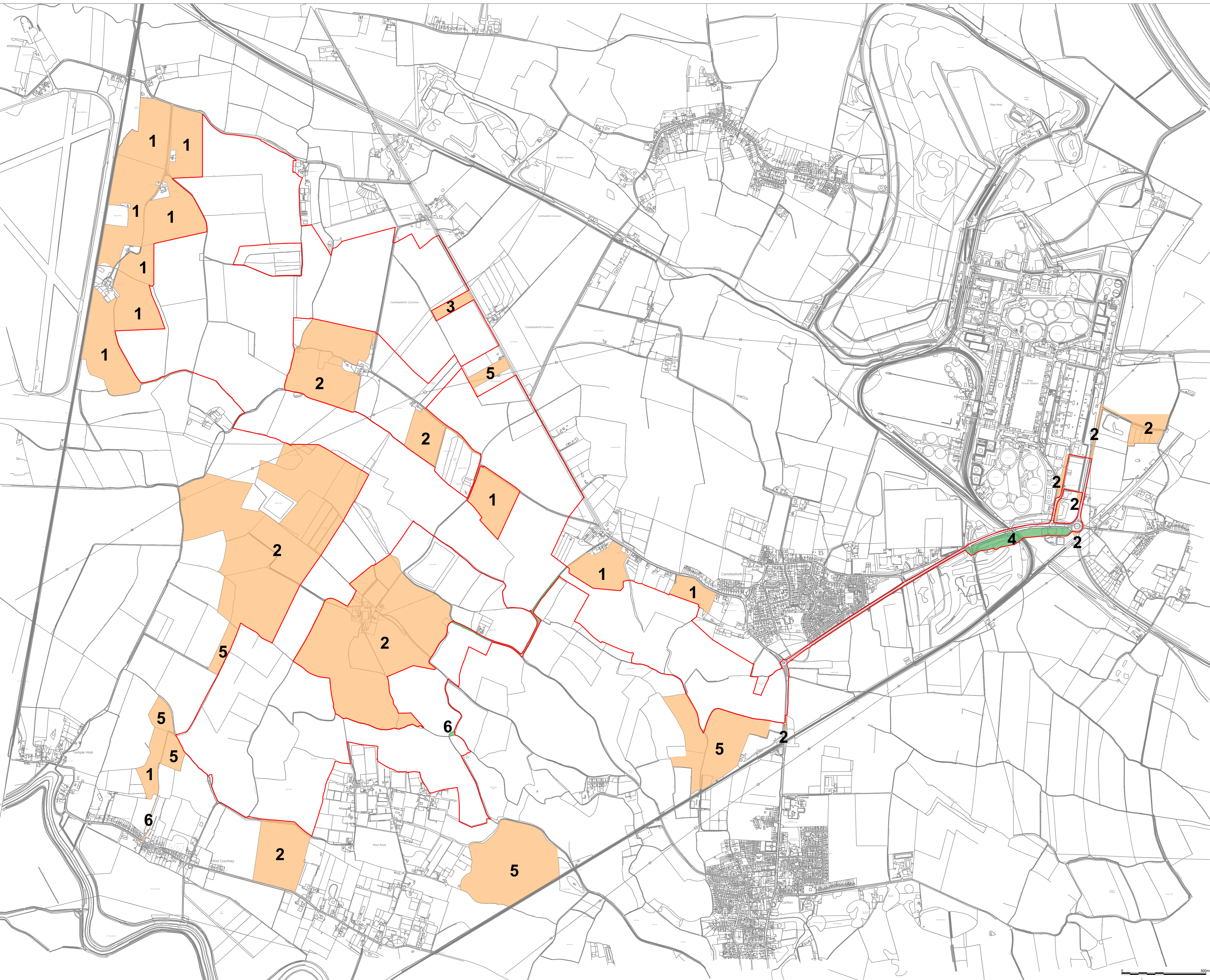
DRWG No: DX-01-P01	Rev: -	Sht no: -
Drawn by : JS	Checked by: KL	
Scale: 1:10,000 @ A1	Date: 03/05/2022	



Figure 4.2 Design Evolution Plan

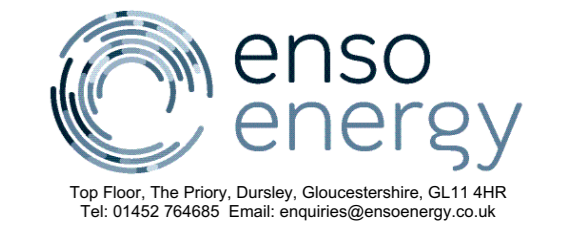
- KEY**
- Site Boundary
 - Areas Added
 - Areas Removed

- Main reasons:**
- 1 - Distance from receptor(s).
 - 2 - No longer required.
 - 3 - Woodland.
 - 4 - Grid connection corridor.
 - 5 - Constrained area for solar panel placement.
 - 6 - Access requirement.



Revisions:
First Issue- 24/07/2023 JS

ALL DIMENSIONS TO BE CHECKED ON SITE WORK
TO FIGURED DIMENSIONS ONLY REPORT
DISCREPANCIES TO THE OFF AT ONCE BEFORE
PROCEEDING COPYRIGHT ACT APPLIES.
© Enso Energy Ltd. Crown Copyright. All rights reserved.
© 2023 Emapsite license number 0100031673



Project Title:
Helios Renewable Energy Project

Drawing Title:
Design Evolution Plan

DRWG No: DX-01-P46	Rev: -	Sht no: -
Drawn by : JS	Checked by: KL	
Scale: 1:10,000 @ A1	Date: 24/07/2023	



4.6. Design Evolution

Environmental Constraints and Design Mitigation

- 4.6.1. As outlined below, the existing constraints and opportunities on the Site and within the local environment, and the character of the surrounding area and landscape, have informed the design of the Proposed Development inclusive of the embedded mitigation incorporated into the design of the Development:

Environmental Constraints

Flood Risk

- 4.6.2. As shown in Appendix 4.1 Site Selection Mapping: Flood Map, the Site is predominantly located within Flood Zones 2 and 3. Flood Zone 3 is defined as being at the highest risk of flooding from fluvial sources (>1% chance in any given year), whereas Flood Zone 2 has a 0.1-1% chance of flooding in any given year. The Flood Risk Assessment ('FRA') (refer to Appendix 9.1 of the PEIR) states that floodwaters spread out over the floodplain and flood depths and extent vary across the Site.
- 4.6.3. The Site has varying risk of flooding from other sources. Surface water flood risk is considered to range from High to Very Low, with the majority of the Site being at very low risk with areas of elevated risk associated with isolated low points and the route of on-site ordinary watercourses where surface waters could collect. The risk of groundwater flooding ranges from High to Very Low due to the presence of groundwater bearing superficial and bedrock deposits and low-lying nature of the Site indicating shallow groundwater may be present. The risk of flooding from overwhelmed sewers and artificial sources (such as reservoirs) is considered to be Low to Very Low.
- 4.6.4. There are extensive agricultural land drains through large parts of the main part of the Site. These systems likely consist of mole drains or tile drains (clay or plastic perforated pipes) installed to improve the agricultural quality of the land and reduce waterlogging. The topography across the main part of the Site is relatively flat and low lying. Site levels range between approximately 3m Above Ordnance Datum ('AOD') to 6m AOD. The western area of the main part of the Site and along the southernmost boundary are at the highest elevation and levels fall predominately towards the northeastern boundary. The lowest area of the main part of the Site is

the easternmost area.

- 4.6.5. The underlying ground conditions of the Site appear to have variable permeability; however, due to the low-lying nature of the Site and presence of superficial and principal aquifers, high groundwater is likely to be present.
- 4.6.6. The southern, central, and western area of the main part of the Site and areas of the underground cable and grid connection fall within a Groundwater Source Protection Zone – Zone III Total Catchment ('SPZ3')⁴. The northern area of the main part of the Site falls predominately outside of a Groundwater Source Protection Zone. However, a small, isolated Groundwater Source Protection Zone – Zone I Inner Protection Zone ('SPZ1')⁵ is present in the northern area of the main part of the Site approximately 100m to the west of Bales Wood and approximately 400m to the east of Hagg Bush Cottages.
- 4.6.7. The Site has direct hydrological connectivity to the Humber Estuary Ramsar Site, Special Protection Area ('SPA'), SAC and SSSI from the River Ouse. The River Ouse and Lendall Drain/Common Drain to the north of the Site are assessed by the Environment Agency through the River Basin Management Plan, which has summarised that the waterbody has a 'Moderate' ecological and physio-chemical quality status; the river supports good Hydromorphological Supporting Elements; and its chemical status is classified as a 'fail'.
- 4.6.8. In order to mitigate effects due to the environmental constraints outlined above, the design of the Proposed Development has evolved through an iterative process to embed mitigation measures. Some of these design measures include:
- Ancillary control equipment, BESS facility and 132kv Substation are restricted to areas of very low surface water flood risk as shown on Figure 3.2 Parameter Plan of the PEIR;
 - Solar PV arrays within the areas of elevated flood risk will be rotated to the horizontal position ('the stow position') to ensure the solar PV panels are raised above the flood level during times of flood risk;
 - A minimum of a 0.3m freeboard between the combined fluvial and tidal design

⁴ The area around a supply source within which all the groundwater ends up at the abstraction point.

⁵ The inner zone – SPZ1 is defined as the zone with a 50 day travel time of pollutant to source and have a 50m default minimum radius.

flood level and the stow position of the solar PV array;

- Solar PV panel supports in flood risk areas will be securely piled into the ground and designed to allow for the effect of flowing water pressures and to be resistant to inundation during a flood events;
- On-Site buildings will have floor levels raised at least 0.3m above existing ground level with appropriate damp proof course protection;
- Suitably designed earth flood defence bunds are proposed around ancillary control equipment, BESS facility and 132kv Substation located in areas of elevated tidal and fluvial flood risk;
- BESS units will be raised 0.3m above ground which provides additional protection from the ingress of surface water;
- On-Site watercourses are retained within the Proposed Development. 7m minimum buffer zone distances have been established from the edge of a bank of any Internal Drainage Board ('IDB') managed ordinary watercourses for all infrastructure (with the exception of fence crossings, culverts and access tracks);
- The land will be sown with the appropriate seed mix upon construction of the solar PV panels to reduce the risk of soil erosion, enhance potential for runoff 'interception losses' (from infiltration / evapotranspiration) and reduce the overland flows;
- Interception swales will be located at low points across the Site to intercept extreme flows which may already run off-Site; and
- Opportunities are sought within the development parcels for crossings of ordinary watercourses to be formed from single span structures, clear of the watercourse channels, wherever feasible.

4.6.9. Following design mitigation measures outlined above there are no significant adverse effects anticipated with respect to flood risk or environmental quality.

Ecological Enhancements and Biodiversity Net Gain

4.6.10. The Site is not located within any statutory designated site for nature conservation. There are ten International and European statutory designated sites within 10km of the Site, and three UK statutory designated sites located within a 5km radius of the Site boundary. These are:

4.6.11. International:

- River Derwent SAC - 2.22km north-east;
- Lower Derwent Valley SAC - 6.47km north-east;
- Lower Derwent Valley SPA - 6.47km north-east;
- Lower Derwent Valley Ramsar site - 6.55km north-east;
- Humber Estuary SAC - 6.64km east;
- Humber Estuary SPA - 6.64km east;
- Humber Estuary Ramsar site - 6.64km east;
- Skipwith Common SAC - 8.50km north;
- Thorne Moor SAC - 9.09km south; and
- Thorne & Hatfield Moors SPA - 9.09km south.

4.6.12. National:

- Barlow Common LNR - 480m north;
- Eskamhorn Meadows SSSI - 2.08km south-east; and
- River Derwent SSSI - 2.22km north-east.

4.6.13. The Site is not located within a non-statutory designated site for nature conservation. There are fifteen non-statutory designated sites within 2km of the Site, as well as four previous non-statutory designated sites within this search area.

4.6.14. Two non-statutory designated sites are positioned directly adjacent to the Site boundary. These include Sand Pitt Wood and Barffs Close Plantation North Yorkshire Site of Importance for Nature Conservation ('NY SINC') and Field near Primrose Hill, Cat Babbleton NY SINC. Two previously allocated non-statutory designated sites are also located at the Site boundary. Jowland Whin near Quosquo Hall NY Deleted SINC ('NY Deleted SINC') and Kerrick Spring Wood NY Deleted SINC.

4.6.15. Within the Site there are three habitats of Principal Importance (known as priority habitats) as defined within the NERC Act and the UK Biodiversity Action Plan, these are deciduous woodland, hedgerows and ponds. Furthermore, there are two habitats within the Site that are listed in the Local Biodiversity Action Plan, comprising arable farmland and ditches. A range of habitats also surround the Site's environs including

a traditional orchard directly adjacent to the Site boundary, lakes, open mosaic habitat, rivers and streams, coastal and floodplain grazing marsh, lowland fens, wood pasture and parkland, canals and mudflats.

- 4.6.16. Habitats within the Site predominantly comprise of arable fields that are bounded by a combination of hedgerows, tree lines, grassland field margins, woodlands, and ditches. One dry pond is located within the Site.
- 4.6.17. A range of species have also been identified within the Site following baseline surveys, including 49 species of breeding birds including, corn bunting, greenfinch, house martin, and house sparrow. Two mature trees within the Site were noted to have high potential bat roosting features during the extended habitat survey. It is also considered that the limited suitable habitats within the Site may potentially support low numbers of reptile species; most notably grass snake. The 2km area surrounding the Site supports a range of other species including invertebrates, non-breeding birds, commuting and foraging bats, water voles, otters, amphibians (Great Crested Newt, common toad, common frog, and smooth newt), and brown hare.
- 4.6.18. A range of design options have been chosen to avoid and mitigate potential effects on receptors outlined above. These include:
- Retaining identified higher value habitat features such as hedgerows, ditches, and woodlands;
 - Focusing the large majority of the built development proposals within lower ecological value agricultural land;
 - Grid connection works will largely comprise of minor excavation impacts to existing arable and developed land (existing tracks, roads and Drax grid connection compound);
 - Minor hedgerow removal may be required to enable access; however, where possible, access tracks for the Proposed Development will utilise existing ditch crossing points, existing gaps in hedgerows and existing field entrance gates etc;
 - Sensitive, or high value ecological features outside the Site have been protected as part of the design which sets in place buffer zones and other safeguarding measures;
 - The provision of 5m 'buffer zones' either side of hedgerows and ditches, which will be subject to habitat creation during the construction phase;

- The Proposed Development has been designed to maintain a stand-off buffer of at least 15m wide between the solar PV layout and broadleaved semi-natural woodlands;
- 30m buffers will be maintained surrounding the on-Site pond and adjacent ponds during the construction process;
- The Proposed Development may require temporary lighting during construction, maintaining dark corridors along boundary habitats including woodland edges and hedgerows; and
- Biodiversity Net Gain ('BNG'), not legally required until November 2025, will be delivered through habitat enhancement provision embedded within the Proposed Development and provided as part of the construction phases, this will include the creation of new habitats of high ecological value, such as meadow grassland and tussocky grassland creation, hedgerow, woodland belt, and scrub planting.

4.6.19. The range of design options outlined above aim to reduce or avoid potential effects in ecological receptors.

Landscaping

4.6.20. The Site Context and Designations Plan in Appendix 4.1 demonstrates that the Site occupies a broad and extensive cluster of connected parcels defined by the existing agricultural field-scape, with a narrow projection of land to the east that comprises the proposed grid connection route.

4.6.21. The landscape of the study area is predominantly characterised by open agricultural land, however a number of towns and villages are present, most notably including Selby, the principal settlement within the study area which is located approximately 1.5km north of the Site at its closest point. Several smaller settlements are dispersed throughout, including built up areas of Camblesforth, Carlton, and Drax which are directly adjacent to the Site as shown on Appendix 4.1.

4.6.22. The topography of 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, 46m AOD and Brayton Barff 55m AOD).

- 4.6.23. The Site and study area are well served by a network of PRowS which cross the Site and the wider landscape, often following farm tracks or rural lanes, including:
- PRow 35.18/16 and 35.17/U8106/50, a semi-continuous route through the south-eastern part of the Site between Carlton and the western edge of Camblesforth;
 - PRow 18/U975/70 (Stockwith Lane) and 35.18/U974/70 (Race Lane);
 - PRow 35.38/2/1, which extends across a short section of an arable field within the Site between Old Lane and Brick Lands Lane;
 - An intricate cluster of PRow within the Site's north-western extent (14/12/1, 14/20/1, 14/11/3, 14/14/1, 14/13/1, 14/14/2, 14/8/3, 14/11/4 and 17/1/1); and
 - PRow 18/2/2 and 18/14/1, which cross a central point within the Site's Main Parcel.
- 4.6.24. The Site is not designated in landscape terms, and there are no national designations for landscape or scenic beauty within the study area. Kerrick Spring Wood, located adjacent to the Site's south-eastern boundary is designated Ancient Woodland. There are several Conservation Areas within the study area, the nearest of which is 2km north within Selby.
- 4.6.25. Listed Buildings are dispersed throughout the study area, including most notably:
- Manor Farmhouse (Grade II) located in Temple Hirst, approximately 815m from the Site;
 - Church of St Mary (Grade II*) located in Carlton, approximately 760m from the Site;
 - Carlton Towers (Grade I) located in Carlton, approximately 1.46km from the Site; and
 - Camblesforth Hall (Grade 1) and an associated Dovecote (Grade II) located within Camblesforth, approximately 250m from the Site.
- 4.6.26. The visual appraisal carried out within Chapter 7 Landscape and Views of the PEIR identified the following sensitive receptors on visual amenity:
- Users of PRowS;
 - Residents;
 - People travelling in vehicles;

- Walkers and cyclists;
- Cyclists;
- Users of the Trans Pennine Trail;
- Visitors to Hirst Courtney Cricket Club; and
- Visitors to Brayton Barff and Hambleton Hough.

4.6.27. The following design options have been embedded into the Proposed Development to reduce potential environmental effects on landscape and visual amenity:

- Proposed security fences will be to a maximum height of 2.1m above ground level and will be constructed from timber post and wire; similar in appearance to forestry fencing of a type to protect new planting from deer browsing. Therefore, not uncharacteristic in a rural environment, reducing the visual impact.
- The Proposed Development will retain the existing field boundary structure of ditches, hedgerows, trees and woodland blocks, with appropriate offsets to these features, avoiding loss or change to the existing landscape character;
- Seeding of existing arable fields under and around proposed solar PV panels with appropriate native grassland mixes to enhance biodiversity and support grazing, in keeping with the agricultural character of the area;
- Existing hedgerow field boundaries will be reinforced as part of the Proposed Development, particularly where fragmented, reducing effects on the landscape character;
- The Proposed Development will include the re-establishment of historic field boundary hedgerows that have been lost through agricultural intensification;
- Wetland/ditch field margins will be enhanced through appropriate native wetland seeding;
- The Proposed Development includes the provision of substantial buffers to settlements and individual properties, reducing the visual impact on nearby built development highlighted in Appendix 4.1;
- Creation of native woodland shelter belts to reinforce existing woodland habitats and screen views of the Proposed Development, further reducing the visual impact of the Proposed Development;
- Consideration of above and below ground utilities such as the gas pipeline and

overhead lines onsite, whereby proposed landscape features account for the easements provided in Chapter 3 Site and Development Description of the PEIR, Table 3.1;

- Provision of permissive paths within the south-eastern part of the Site to formalise access between PRow 18/6/1 and U8106/50 to the south of Camblesforth, improving the local PRow network; and
- The creation of a series of new habitat areas with a mosaic of native trees, grassland and wetland features to establish new habitats. Wetland features, including habitat ponds and scrapes to be planted with a diverse mix of native aquatic and wetland species providing a betterment to local landscape features.

4.6.28. As identified in Chapter 6 Cultural Heritage of the PEIR, there are several cultural heritage receptors within vicinity of the Site which have been considered as the landscaping proposals and placement of solar infrastructure have evolved. Where sensitive features are present, landscaping will provide screening to the solar infrastructure and will reinstate several historic field boundaries so as to reduce the potential effects on the setting of the cultural heritage receptors.

Accessibility

4.6.29. Whilst there are PRowS on-Site, as identified above, none will be diverted for the purposes of the Proposed Development and pedestrian access will not be affected.

Glint and Glare

4.6.30. The Solar Photovoltaic Glint and Glare Study provided at Appendix 2.5 finds that the potential effects of glint and glare to local receptors requires mitigation for the approach path towards runway 25 at Burn Airfield.

Consultation

4.6.31. The comments raised during the scoping consultation process regarding design have been set out in Table 4.1, which includes the Applicant's design response to the feedback raised.

Table 4.1: Design Response to Consultation Feedback

Scoping Opinion Feedback to Design Proposals	Applicant's Response
The Scoping Opinion requested that only slow and low growing species of trees and shrubs are planted beneath and adjacent to the existing overhead line to reduce the risk of growth to a height which compromises statutory safety clearances.	The Applicant has incorporated these measures into the landscape strategy design to minimize risk to human health.
Proposed screen planting should be sufficient to screen and reduce the overall of visibility of the proposed development	The mitigation strategy includes a number of tree belts that have been proposed to screen key views of the Proposed Development. The width of tree belts varies according to a number of constraints on the Site, including watercourse buffers, utilities and existing field pattern. However, in general, the aim has been to provide 15m wide tree belts, wherever possible.
The Scoping Opinion requires that effort should be made to retain and enhance PRoW where possible.	The Applicant confirms that all PRoWs will be retained and incorporated into the Site layout design and enhanced.

Conclusion

- 4.6.32. The Proposed Development, shown on Figure 3.2 Parameter Plan, has evolved iteratively as a result of technical environmental assessment, highways assessment, and consultation feedback such that it fully responds to the constraints and opportunities presented by the Site. The Proposed Development has subsequently been assessed as the subject of this PEIR.