CLEVE HILL SOLAR PARK

ENVIRONMENTAL STATEMENT
VOLUME 4 - TECHNICAL APPENDIX A4.1
SEQUENTIAL TEST ANALYSIS

November 2018
Revision A

Document Reference: 6.4.4.1
APFP Regulation: 5(2)(a)

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SEQUENTIAL TEST ANALYSIS

CLEVE HILL SOLAR PARK LTD

NOVEMBER 2018

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1 INTRODUCTION

1. A joint venture, formed by two solar industry specialists of Hive Energy Ltd and Wirsol Energy, (the 'Developer') is proposing to develop a c. 350 MW solar photovoltaic ('PV') array and energy storage facility 2 km northeast of Faversham in Kent (the Development) to connect to the existing Cleve Hill Substation (National Grid Building) located at Cleve Hill, Faversham, Kent, approximately 1.1 km northwest of the village of Graveney, which has availability for the connection of electricity generating capacity of 350 MW.
2. This Report is supported by two figures:
   - Figure 1 – Constraints
   - Figure 2 – Potentially Developable Land

1.1 PURPOSE OF THIS REPORT

3. This report presents a sequential test analysis which provides the process through which the site location of the Development has been determined. The assessment determines whether or not there is potentially preferable land on which to develop this solar PV array when considered against the requirements of the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG).
4. NPPF paragraph 170 states:
5. "Planning policies and decisions should contribute to and enhance the natural and local environment by: …
6. b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;"
7. with the following relevant definition:
8. "Best and most versatile agricultural land: Land in grades 1, 2 and 3a of the Agricultural Land Classification."[1]
9. PPG on "Renewable and Low Carbon Energy"[2] still, at the time of writing, reflects the 2012 version of NPPF, which required a sequential test to address the factors a local planning authority will need to consider, which include:

   "- encouraging the effective use of land by focussing large scale solar farms on previously developed and non agricultural land, provided that it is not of high environmental value;

   - where a proposal involves greenfield land, whether (i) the proposed use of any agricultural land has been shown to be necessary and poorer quality land has been used in preference to higher quality land; and (ii) the proposal allows for continued agricultural use where applicable and/or encourages biodiversity improvements around arrays."
10. Notwithstanding other factors, NPPF would allow development on land of ALC grade 3b, whereas to meet the requirements of PPG would require first proving there was no

[1] Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework. July 2018. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf [accessed on 27/10/2018].
[2] Ministry of Housing, Communities and Local Government (2015). Guidance: Renewable and Low Carbon Energy. Paragraph: 013 Reference ID: 5-013-20150327. Available at: https://www.gov.uk/guidance/renewable-and-low-carbon-energy#active-solar-technology [accessed on 27/10/2018].

suitable land of non-agricultural or worse ALC grade. Therefore, whilst meeting the requirements of the PPG will meet the needs of the 2018 version of NPPF, it is not necessarily the case the other way around.

11. This report seeks to demonstrate that the Development site meets the requirements of both PPG and NPPF with regard to the siting of a large scale solar farm.

1.2 BACKGROUND

12. A Needs Statement (DCO Document Reference 7.3) accompanies the DCO application and provides extensive detail on the need for the Development.

13. In order to meet the emission targets set by the Paris Agreement[3] in 2015 and the EU 2020 renewable energy targets set by the Renewable Energy Directive 2009/28/EC[4], the UK has a responsibility to increase the amount of renewable energy generated power available and reduce the dependence on fossil fuels for UK energy needs. In 2017, the UK government introduced the Clean Growth Strategy[5], a document which outlines plans to phase out the use of coal generated electricity and cut 1990 greenhouse gas levels by 80% before the year 2050. Through the closure of these power stations, an energy deficit will be created, therefore renewable energy installations will be needed to meet the shortage but also provide a low-carbon alternative to fossil fuels that can help achieve the emission targets.

14. The UK Government has set out energy policy for electricity production with two principal threads: to reduce the carbon footprint, and to keep prices down. The Development will generate electricity with a very low carbon footprint, as set out in Chapter 15: *Climate Change*, of the Environmental Statement. The Development will not, according to current financial arrangements in the electricity industry, be eligible for any financial support from the Government or elsewhere, and all income will be derived from sales of the electricity exported from the scheme, at wholesale prices. This means that low carbon electricity from the Development will be supplied at the lowest prices of any in the UK, helping to keep the retail price of electricity down.

15. It is important, therefore, to maximise generation of low carbon, low cost electricity, which is constrained by grid connection opportunities.

16. It is known, through the acceptance of a grid offer, that the existing substation at Cleve Hill has capacity to accept electrical input of at least 350 MW. The grid connection opportunity exists at Cleve Hill Substation, therefore, and hence the scope of this assessment is limited to consideration of alternative sites that could connect to Cleve Hill Substation.

1.3 STUDY AREA

17. The size of a suitable study area depends on the size of the electricity generating station. Large amounts of electrical power are much more efficiently transported at high voltage, because this leads to less loss in transmission along the cables. For a generating station

[3] United Nations Climate Change (2018). The Paris Agreement | UNFCCC. [online] Unfccc.int. Available at: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement [Accessed 11 Jul. 2018].
[4] European Commission (2018). EUR-Lex - 32009L0028 - EN - EUR-Lex. [online] Energy Directive. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0028 [Accessed 11 Jul. 2018].
[5] HM Government (2017). The Clean Growth Strategy: Leading the way to a low carbon future. [online] Assets.publishing.service.gov.uk. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf [Accessed 12 Jul. 2018].

of c. 350 MW, a 400 kV connection is recommended by Xero Energy, the electrical consultants advising on the Development[6], who state:

> *"A 400 kV underground cable circuit has a very high cost and a significant environmental impact (a wide cable swathe being needed, including the trench and an access road). The cost would likely render the project uneconomic. A 400 kV overhead line has a lower but still high cost and would require significant consents, which could delay the project, likely by some years. By placing the project as close to the point of connection to the existing system as possible, the economic viability is increased, while the environmental impact of the connection is minimised. A short connection to the transmission system is also more reliable. It is also worth noting that, were the connection more than a few hundred metres long, NGET would need to build a new 400 kV switching substation next to the solar power station, again increasing costs and environmental impact."*

18. Due to the increasing cost of making the connection to the electrical grid with increasing distance from the connection point, the maximum viable distance from the site to the point of electrical connection has been determined to be no more than 5 km.

19. The study area, a 5 km radius from the National Grid Substation within the existing Cleve Hill Substation, is shown in Figure 1. The Study Area covers parts of the local authorities of Swale Borough Council, Kent County Council and Canterbury City Council.

20. A 400 kV grid connection could be underground or overground and the route would be governed by environmental constraints, technical constraints and reaching land agreements. 400 kV cables are expensive and there is a clear incentive to keep the distance of the connection to a minimum.

21. For a potential solar site 5 km from the connection point, the actual grid connection distance could be substantially more than 5 km, e.g., 6 to 8 km. To assess viability, therefore, it has been assumed that the grid connection route would be along public highways which is representative of the potential constraints which could be encountered, and would need to be avoided along a route. This represents a potential increase in connection distance of 20 to 60% from the 'as the crow flies' route which is considered to be representative of the likely route.

22. Potential land located on The Isle of Sheppey and within the study area has been ruled out of further assessment due to the fact that land-based road connections from the substation are more than 5 km, and that the cost of routing the connecting cable infrastructure underneath or on the bed of the Swale Channel (within the SPA and Ramsar site) would render the Development unviable.

23. Potential land located to the west of Oare Creek and within the study area has been ruled out of further assessment due to the fact that land-based road connections from the substation are more than 5 km, and that the construction of an underground electrical cable within Oare Creek LNR and potentially within the Swale SPA/SSSI/Ramsar/South Bank of the Swale LNR is unlikely to be acceptable in environmental planning terms.

2 METHODOLOGY

24. There is no guidance relating to the preparation of a sequential test analysis of potentially developable land for solar PV development that meets the requirements of the NPPF and PPG. The methodology has therefore been informed by current practice for similar types of analysis and reporting.

[6] Xero Energy are the consultants advising on the technical and administrative aspects of grid connection for the Development.

25. The term 'sequential test' has been used as this reflects the terminology used by the Planning Inspector in the appeal decision relating to the application for a 38.43 hectare solar PV array at Valley Farm, Wherstead, Ipswich, Suffolk (appeal reference APP / D3505 / A / 13 / 2204826).

26. Land within the Study Area was examined to identify land on which solar development would not be viable and/or which has an Agricultural Land Classification (ALC) better than the Development site. These areas are shown on Figure 1, and comprise, principally:

- Land within statutory wildlife designations (Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs), Ramsar sites, National Nature Reserves (NNRs), and Local Nature Reserves (LNRs));
- Land within nationally designated landscape designations (Areas of Outstanding Natural Beauty (AONBs));
- Urban land; and
- Land with ALC grade 1 or 2 (note that the available dataset does not distinguish between grade 3 better land (3a) and worse land (3b), but that site surveys have identified the large majority of the Development site as 3b.

27. Remaining land was examined with a view to selecting potentially developable sites. Land with a slope of greater than 3% if north facing, and 12% if south facing is not generally suitable for development of ground-mounted solar PV schemes. The aim in selecting these was that each should form a contiguous area, not contain settlements or farm buildings, and not include substantial forestry. Within the unconstrained land, potential commercial solar development areas (taken here to be a minimum of c. 20 ha) were identified, based on professional experience.

28. The identified PDL areas were examined sequentially in order of:

- Previously developed land;
- Non-agricultural land (of low ecological value);
- Decreasing ALC grade (i.e., the worst agricultural land was considered first); and, within each ALC grade,
- Decreasing order of size.

29. Commentary was made on each PDL area with respect to its suitability for selection.

30. It should be noted that the comparison between PDL areas assumes that a commercially viable arrangement for the use of the land could be secured by negotiation with the landowner(s) at each of them. In practice, this is unlikely to be the case. However, given that it is not reasonable to expect landowner negotiations to be carried out as part of a sequential test, the assumption is that the land is available for solar development at commercially viable rates.

3 DATA SOURCES AND LIMITATIONS

31. The conclusions of this report are based upon the information sources set out below and on the assumption that such information is accurate. The validity of this information has not been independently verified by Arcus, unless otherwise stated.

32. The work described in this Report was undertaken in October 2018 and is based on the information available at that time.

33. The following resources were used to aid in the production of this report:

- GIS datasets sourced from publically available data on Natural England's website (http://www.gis.naturalengland.org.uk/pubs/gis/GIS_Selection.asp?Type=2). This included:
  - Areas of Outstanding Natural Beauty (AONB);

  - Special Protection Areas (SPA);
  - Special Areas of Conservation (SAC);
  - Ramsar Wetlands of International Importance (Ramsar);
  - Sites of Special Scientific Interest (SSSI);
  - National Nature Reserve (NNR);
  - Local Nature Reserve (LNR); and
  - Agricultural Land Classification (ALC).

4 SEQUENTIAL TEST ANALYSIS

34. Figure 1 shows an overview of the Study Area, the potential developable land and land with hard constraints.

35. Remaining land, after excluding the constraints set out in Figure 1, is shown with a yellow outline on Figure 2, with an aerial photo background. Figure 2 also shows topographic constraints, and forestry and built development is shown on the underlying aerial photo. The remaining, available areas include other, smaller-scale land uses that are not compatible with solar development, such as houses, gardens, roads and agricultural buildings.

36. Within the remaining unconstrained land, Potentially Developable Land (PDL) areas for solar farm sites (taken here to be a minimum of c. 20 ha) were identified, based on professional experience.

37. These are shown on Figure 2, with numbering corresponding to the comments in Table 1.

38. Table 1: Land Potentially Suitable for Solar PV Development

39. Land Parcel as shown on Figure 2	40. Area (ha)	41. ALC grade	42. Comment
PDL 1	454	3	The Development site.
PDL 2	81	3	Abbey Fields, excluding the solar development within the PDL.
PDL 3	46	3	Land between the A2 and A299, either side of Staple Street Road
PDL 4	91	3	Land southeast of Graveney
PDL 5	43	3	Land between Dargate and Yorkletts. Excludes areas of forestry, access land and topographic constraints.

43. All PDL areas are identified as having ALC grade 3. As noted above, the available dataset does not distinguish between grades 3a and 3b.

44. The PDL areas are considered below.

4.1 PDL AREA 1

45. This PDL area is the location selected for the Development. From the analysis above, the PDL has an area of 454 ha. Following site specific surveys, consultation and design of the Development through the DCO application and EIA process, these 454 ha have translated into 232 ha proposed for the installation of solar PV modules, and the design within these areas has led to a capacity of 350 MWp. If this ratio of PDL area to final area, and final area to electrical capacity is typical (which it is, in the experience of the

author), then these factors can be applied to the other PDL areas identified to estimate realistic production capacity; this has been done below, for comparison.

46. Site specific ALC survey[7] concluded that over 95% of the site was ALC grade 3b.

47. The grid connection from PDL area 1 to Cleve Hill Substation is within PDL area 1 and the Development substation has been located as close as practicable to the existing Cleve Hill Substation (National Grid Building) to facilitate the most viable connection.

4.2 PDL AREA 2

48. This PDL has an area of 81 ha, and therefore may, subject to site specific surveys and consultation, be suitable for a solar farm of capacity 62 MWp. The PDL area has similar characteristics to the Development site, in that it is bordered by the Saxon Shore Way and is very low lying land, at risk of tidal flooding but defended by flood defences. Access to this site would either be off Sandbanks Lane, to the north, or through the outskirts of Faversham, to the south. This PDL area would have been larger, but excluded the existing 5 MW Abbey Fields Solar Farm, a relatively small solar farm to the south of the PDL area.

49. PDL 2 is c. 2.1 km, at its nearest point, from the existing Cleve Hill Substation (National Grid Building) at its closest point. A grid connection from PDL area 2 to Cleve Hill Substation along Sandbanks Lane and Seasalter Road, would be distance of c. 4 km.

4.3 PDL AREA 3

50. This PDL has an area of 46 ha, and therefore may, subject to site specific surveys and consultation, be suitable for a solar farm of capacity 35 MWp. Access would be taken from either side of Staple Street Road.

51. PDL 3 is c. 2.9 km, at its nearest point, from the existing Cleve Hill Substation (National Grid Building). A grid connection from PDL area 3 to Cleve Hill Substation underground along Staple Street Road, Head Hill Road and Seasalter Road, would be a distance of c. 5.2 km.

4.4 PDL AREA 4

52. This PDL has an area of 91 ha, and therefore may, subject to site specific surveys and consultation, be suitable for a solar farm of capacity 70 MWp. Access would be taken from Monkshill Road.

53. PDL 4 is c. 1.45 km, at its nearest point, from the existing Cleve Hill Substation (National Grid Building). The grid connection from PDL area 4 to Cleve Hill Substation along Monkshill Road and Seasalter Road, would be a distance of c. 2.4 km.

4.5 PDL AREA 5

54. This PDL has an area of 43 ha, and therefore may, subject to site specific surveys and consultation, be suitable for a solar farm of capacity 33 MWp. Access would be taken from Monkshill Road.

55. PDL 5 is c. 3.2 km, at its nearest point, from the existing Cleve Hill Substation (National Grid Building). A grid connection from PDL area 5 to Cleve Hill Substation underground along Monkshill Road and Seasalter Road, would be a distance of c. 4.7 km.

[7] Land Research Associates (2017). Soils and Agricultural Land Use and Quality of Land at Cleve Hill Farm, Faversham, Kent. Provided as Technical Appendix A13.1 to the Environmental Statement for the Development. Note that the site surveyed was not exactly the same as PDL area 1, but represented the large majority of PDL area 1.

4.6 SELECTION

56. The only land potentially available for large scale electricity production within the Study Area is the land within the PDL areas, all of which is in ALC 3.

57. As the Development site (PDL area 1) has ALC grade 3b across 97% of the site, this site would be selected either equally or in preference to all alternatives, to meet the requirements of NPPF and PPG.

58. Additionally, PDL 1 is the largest single PDL area and is the closest to the existing Cleve Hill Substation.

5 CONCLUSIONS

59. The sequential analysis described in this report has identified that the selection of the Development site meets the requirements of NPPF and PPG for the following reasons:

    1. There are no suitable sites comprising land that is previously developed land or non-agricultural land of low ecological value;
    2. There are no suitable sites comprising land that is ALC grades 5 or 4; and
    3. All potentially suitable sites are grade 3, with the Development site having been surveyed and found to be predominantly grade 3b.

60. Additionally, the Development site is the largest site of those assessed, and the closest to the Cleve Hill Substation, thus maximising benefit and minimising environmental impact in respect of those two aspects.

FIGURES

CLEVE HILL SOLAR PARK

ARCUS

- DCO Application Boundary
- Cleve Hill Substation (National Grid Building)
- 5 km radius of Cleve Hill Substation
- Special Protection Areas
- Special Areas of Conservation
- Ramsar Sites
- Sites of Special Scientific Interest
- National Nature Reserves
- Local Nature Reserve
- Access Land

Agricultural Land Classification

- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban

1:40,000 Scale @ A3

0 1 2 km NORTH

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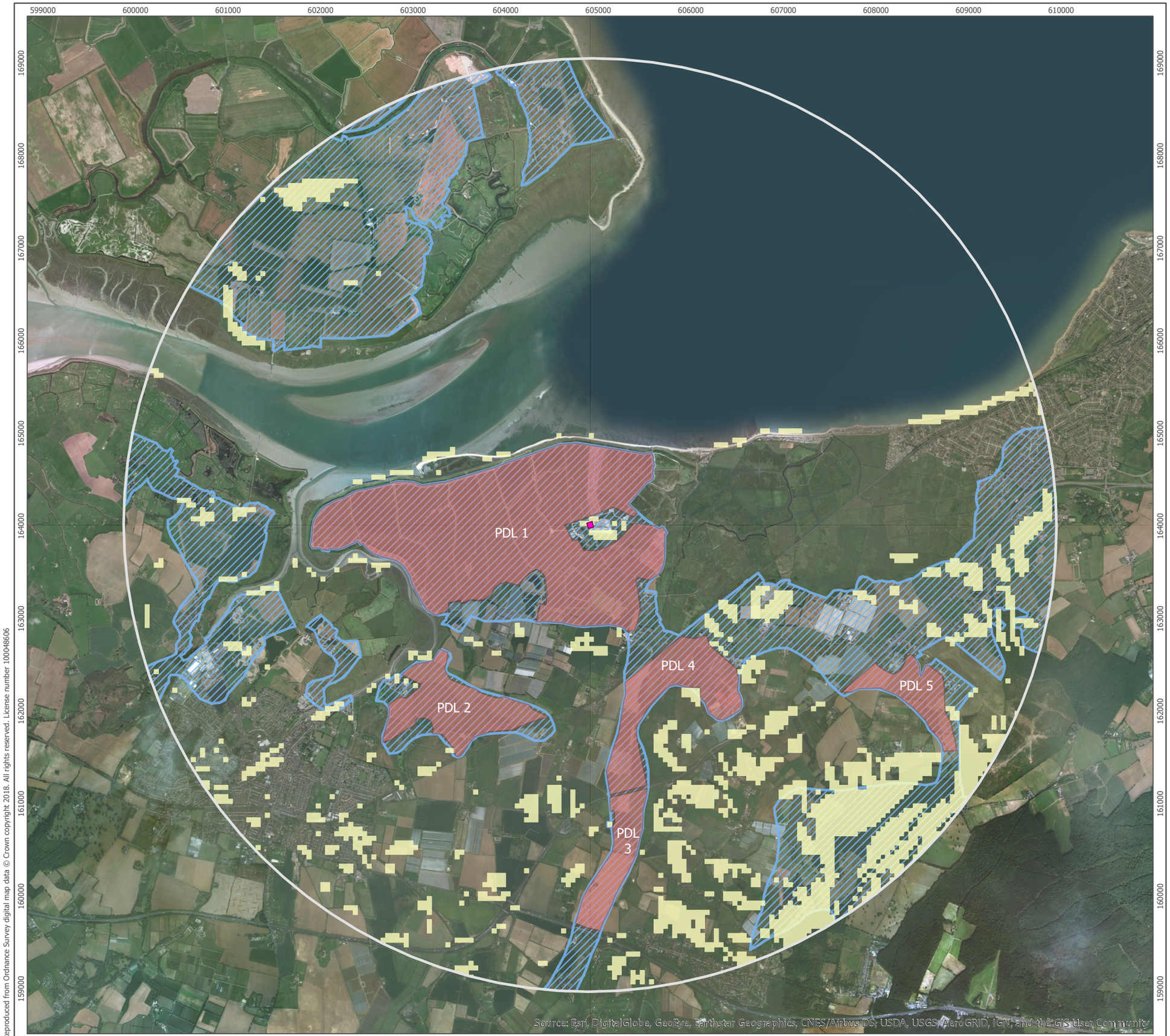
Checked By: MB	Date: 01/11/2018

Constraints
Figure 1

Cleve Hill Solar Park
Sequential Test Report

P:\Projects\Environment\Environment EIA\2238 Cleve Hill.aprx\2238-REP-305 Fig01 Constraints



CLEVE HILL SOLAR PARK

ARCUS

- Cleve Hill Substation (National Grid Building)
- 5 km radius of Cleve Hill Substation
- Unconstrained Areas
- Potentially Developable Land
- Topographical Constraints

1:40,000 Scale @ A3

0 1 2 km

NORTH

Produced By: SC	Ref: 2238-REP-306
Checked By: SC	Date: 13/11/2018

Potentially Developable Areas
Figure 2

Cleve Hill Solar Park
Sequential Test Report

P:\Projects\Environment\Environment EIA\2238 Cleve Hill.aprx\2238-REP-306 Fig02 Potentially Developable Land