From: [redacted]
To: Cleve Hill Solar Park; Jones, Hefin
Cc: [redacted]
Subject: EN010085 - Cleve Hill Solar Park - The Applicant"s Deadline 3 Submission (email 7 of 7)
Date: 01 August 2019 23:23:28
Attachments: [redacted]

Dear Hefin,

EN010085 - Cleve Hill Solar Park - The Applicant's Deadline 3 Submission (email 7 of 7)

Please find attached the Applicant's Deadline 3 submission.

Please do not hesitate to get in touch if you have any queries.

Kind regards,

Mike

Michael Bird

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CLEVE HILL SOLAR PARK

OTHER DEADLINE 3 SUBMISSIONS
WRITTEN REPRESENTATION BY THE APPLICANT ON CO2 OFFSET AND SEQUESTRATION

August 2019
Revision A

Document Reference: 11.4.5
Submitted: Deadline 3

www.clevehillsolar.com

CLEVE HILL
SOLAR PARK

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1 INTRODUCTION

1. This document forms a written representation (WR) by Cleve Hill Solar Park Ltd ("the Applicant") in relation to the Development Consent Order ("DCO") application process for Nationally Significant Infrastructure Projects ("NSIPs") in support of its application for a DCO for the Cleve Hill Solar Park ("the Application"). This document has been prepared on behalf of the Applicant by Arcus Consultancy Services Ltd.

2. Submissions to the Examination by the Campaign to Protect Rural England Kent (CPRE Kent), Supporting Paper of Solar in Wetlands [REP2-068] and Supporting Paper of Solar Effects on Soil Carbon Recycling [REP2-069] as well as oral submissions presented at the Open Floor Hearings 1 and 2 held in July 2019 have suggested that managed realignment (MR) on the Application site would represent a better option than Cleve Hill Solar Park in order to achieve decarbonisation objectives.

3. This WR has been prepared to provide analysis of the carbon dioxide (CO_2) sequestration potential of saltmarsh following MR at Cleve Hill relative to the CO_2 emissions savings (CO_2 offset) predicted as a result of the Cleve Hill Solar Park. An exhaustive literature review has not been undertaken, as the references cited, which have been used to derive the values presented for CO_2 sequestration of saltmarsh, are considered to be sufficiently precautionary. A range of values is presented in the literature cited which have been characterised in this WR as high and low estimates of CO_2 sequestration.

4. For the purposes of this WR, CO_2 sequestration and CO_2 offset are treated as comparable, as both would result in less atmospheric CO_2 and therefore contribute to decarbonisation.

2 PARAMETERS

5. The parameters used in this WR are set out in Table 2.1 with references.

6. The CO_2 offset associated with Cleve Hill Solar Park is estimated in the Environmental Statement, Chapter 15 – Climate Change [APP-045], paragraphs 46-55. The estimate includes consideration of the emissions of carbon associated with the manufacture of plant to be used as part of the Cleve Hill Solar Park, which are based on research and data provided by the International Panel on Climate Change (IPCC). These are offset by the reduction in emissions of carbon associated with reduction in electricity generation elsewhere on the National Grid, assumed to be over a 40-year period, equivalent to[1] 68,000 te CO_2 yr^{-1}. An average carbon emission per unit of electricity generated and used by the National Grid was used in the estimation, whereas in practice it would be gas-fired power stations or coal-fired power stations whose usage would be reduced; the assessment is therefore highly conservative. For the solar PV arrays, the net balance of carbon emissions against off-set is an off-set of 59,000 te CO_2 yr^{-1}, over a 40-year lifetime.

7. The assessment does not consider any carbon savings associated with the energy storage facility, however in practice there would be one, associated with increased efficiency of grid management and reduced reliance on fossil fuels as a "back up" source. Paragraph 54 of Chapter 15 concludes that, "*The life-time emissions associated with the manufacture, construction and decommissioning of the solar and battery elements of the Development total approximately 500,000 teCO_2, therefore. Using the 68,000 te$CO2$/y emissions saving, as above, this would lead to a total CO_2 emissions saving of*

[1] A saving of 0.225 te CO_2 MWh^{-1} is used, based on data published by the Office of National Statistics for average grid-mix carbon emissions. The Cleve Hill Solar Park would generate an estimated 303,000 MWh of electricity each year, for an installed capacity of 330 MWp. Multiplying these identifies savings in emissions of CO_2 of 68,175 te CO_2 yr^{-1}.

approximately 1.2 million tonnes of CO_2 for a 25 year operational phase, or approximately 2.2 million tonnes of CO_2 for a 40 year operational phase".

Table 2.1 - Parameters Used

Parameter	Low Estimate	High Estimate	Source
CO_2 sequestration potential of UK saltmarsh (assumed to be relative to arable land)	0.64 tonnes (te) C per year (y^{-1}) per hectare (ha^{-1}) which is equivalent to* 2.35 te CO_2 yr^{-1} ha^{-1}	2.19 te C yr^{-1} ha^{-1} which is equivalent to* 8.03 te CO_2 yr^{-1}	Cannell et al. (1999) (cited in Burden et al. 2013, Carbon sequestration and biogeochemical cycling in a saltmarsh subject to coastal managed realignment[2])
Area of MR	200 ha		Statement of Common Ground between The Applicant and the Environment Agency, May 2019, Relevant Representation Comment EA-3 [AS-017]
Estimated CO_2 Offset of Cleve Hill Solar Park	59,000 te CO_2 yr^{-1}		Environmental Statement Chapter 15 - Climate Change [APP-045]

* Carbon (C) sequestration is presented in the literature cited as tonnes of C per hectare per year, which has been converted to tonnes equivalent of CO_2 to provide equivalence by multiplying by a ratio of 44/12 (molecular weight of carbon dioxide vs. carbon).

3 CO_2 SEQUESTRATION / OFFSET COMPARISON

3.1 Managed Realignment

8. The CO_2 sequestration potential of MR at Cleve Hill is presented in Table 3.1.

Table 3.1 - CO_2 Sequestration Potential of MR at Cleve Hill

CO_2 sequestration potential of MR at Cleve Hill	**Low Estimate**	**High Estimate**
	470 te CO_2 yr^{-1}	1,660 te CO_2 yr^{-1}

9. Burden et al. (2013) note that "*the soil carbon pool of the restored site was more similar to the agricultural site than the natural marsh, suggesting that there has been at best only a small overall increase in the carbon pool of the restored high-shore site in the 15 years since managed realignment*", and that "*the soil carbon pool of the restored site will ultimately converge with that of the natural marsh. Our calculations predict that this will take approximately 100 years.*"

3.2 Cleve Hill Solar Park

10. The estimated CO_2 offset of Cleve Hill Solar Park is presented in Table 3.2.

Table 3.2 - Estimated CO_2 Offset of Cleve Hill Solar Park

Estimated CO_2 Offset of Cleve Hill Solar Park	59,000 te CO_2 yr^{-1}

[2] Burden et al. (2013). Carbon sequestration and biogeochemical cycling in a saltmarsh subject to coastal managed realignment. Available at: https://www.researchgate.net/publication/260752831_1-s20-S0272771413000632-main [accessed 26/07/2019]

3.3 Assumptions

11. The assumptions used are:

- That the whole of the 200 ha MR site at Cleve Hill becomes saltmarsh upon the implementation of MR;
- No account of likelihood or timescales of implementation has been considered, noting here that the Cleve Hill Solar Park is anticipated (if consented) to be operational in c. 3 years, whereas MR is currently anticipated by the Environment Agency to be implemented from 2039[3];
- No CO_2 sequestration contribution is assumed from the land use change from arable to grassland proposed as part of the Cleve Hill Solar Park;
- No CO_2 emissions reduction is included for either scenario to address the potential CO_2 offset of cessation of CO_2 generating agricultural activities;
- No CO_2 offset contribution is assumed from the energy storage facility;
- The CO_2 offset contribution of the Development is itself based on conservative assumptions as set out in Chapter 15 - Climate Change of the ES [APP-045];
- The full lifecycle CO_2 emissions of delivering MR have not been considered here as the MR project is a strategic level plan and there is not enough detail available to reasonably predict the CO_2 implications of its construction; and
- This WR addresses CO_2. Both Cleve Hill Solar Park and MR would result in a range of other benefits and impacts which are not considered here.

4 CONCLUSION

12. Cleve Hill Solar Park is conservatively predicted in the Environmental Statement to offset 59,000 te CO_2 yr^{-1}. This is over 35 times greater than the high estimate of CO_2 sequestration potential of MR at Cleve Hill of 1,660 te CO_2 yr^{-1}.

13. Under the draft Medway Estuary and Swale Strategy, MR at Cleve Hill is not proposed to take place until 2039 in a no solar park scenario[4], so there is potential for c. 17 years of renewable energy generation with the associated decarbonisation benefits before MR would take place.

14. This WR therefore concludes that Cleve Hill Solar Park is a more effective use of the Cleve Hill site than MR in contributing to decarbonisation during the period 2019 to 2069.

15. In addition, it is noted that the Cleve Hill Solar Park meets the recommendations set out in REP2-068, and that REP2-069 does not describe the net carbon effect of changing agricultural land to a solar farm as is proposed for the Cleve Hill Solar Park.

[3] Statement of Common Ground between The Applicant and the Environment Agency, May 2019, Relevant Representation Comment EA-3 [AS-017]
[4] Environment Agency (2017). Draft Medway Estuary and Swale Strategy Consultation Document Benefit Area 6. Available at: https://consult.environment-agency.gov.uk/ksles/medway-estuary-and-swale-strategy/supporting_documents/MEASS%20Consultation%20Document%20%20BA06.pdf [accessed 26/07/2019].