



CLEVE HILL SOLAR PARK

OTHER DEADLINE 2 SUBMISSIONS CLIMATE CHANGE CHAPTER CLARIFICATION NOTE

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SOLAR PARK

CLEVE HILL SOLAR PARK – DCO APPLICATION (EN010085)

ENVIRONMENTAL STATEMENT

CLARIFICATION NOTE - CLIMATE CHANGE

Introduction

1. The Climate Change chapter of the Environmental Statement (ES) was submitted with the Application in November 2018. The future baseline section in the chapter referred to the United Kingdom Climate Projections 2009 (UKCP09). On 26 November 2018, following the Application submission, the United Kingdom Climate Projections 2018 (UKCP18) was published.
2. In order to take account of this new information, and to address comments in the Planning Inspectorate's Section 51 advice on acceptance of the Application, and in the Rule 6 letter, this clarification note has been produced to supplement the ES Climate Change chapter (Examination Library Reference [APP-045](#)).
3. As set out in the latest UK Climate Projections Newsletter (April 2019)¹, it is expected that the UKCP18 data and information portals will be refined and augmented on an ongoing basis.
4. The same section numbering has been used, but only sections requiring updates have been reproduced in this clarification note.
5. This note reports changes to section 5.2, Assessment Methodology and section 5.3 Baseline Conditions. No changes are required to the assessment and findings reported in the ES chapter.

15.2 Assessment Methodology and Significance Criteria

6. Following its publication on 26 November 2018, UKCP18 now provides the most up to date assessment of how the climate of the UK may change over this century.
7. UKCP18 uses scenarios for future greenhouse gas emissions called Representative Concentration Pathways (RCPs)²:
 - RCP 2.6 estimates a global average temperature increase of 1.6°C by 2100 and represents a scenario where greenhouse gas emissions are significantly reduced;
 - RCP 4.5 estimates a global average temperature increase of 2.4°C and assumes that no further emission reductions are achieved by 2030, but emissions do not increase further;
 - RCP 6.0 estimates a global average temperature increase of 2.8°C, and assumes varying levels of mitigation are implemented with some further increase in concentrations; and
 - RCP 8.5 estimates a global average temperature increase of 4.3°C by 2100 and represents a scenario whereby greenhouse gas emissions continue to increase.
8. The four RCPs attempt to capture a range of potential alternative futures and outcomes linked to global temperature increases and include a wide variety of assumptions on socioeconomic development and commitment to emissions reductions. The sensitivity of the scenario responses is much more pronounced in the second half of the 21st century,

¹ UKCP18 Newsletter (April 2019). Available at:
<https://www.metoffice.gov.uk/research/collaboration/ukcp/newsletters> [accessed 06/06/2019]

² Lowe, J.A. et al. (2018) UKCP18 Science Overview Report. The Met Office. Available at
<https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf>
[Accessed 15/05/2019].

where the responses diverge more rapidly than in the first half of the century. Over the anticipated 40-year operational lifetime of the Development the choice of scenario is therefore not as influential on the outcome of the assessment. Where a scenario must be chosen to determine the future baseline, the medium emissions scenario RCP 6.0 is used, where it is available.

9. Projections are reported for 20-year time period through to 2100. The 2020-2039 and 2040-2059 periods provide the most relevant projections covering the majority of the expected operational phase of the Development.
10. Projected climatic changes at the 50% probability level (central estimate) are utilised, unless otherwise indicated. This is the level where there is as much evidence pointing to a lower outcome as a higher one.
11. The UK Climate Projections User Interface tool³ has been used unless otherwise stated. The Land projections: probabilistic projections (25 km) have been used to determine temperature and cloud cover whilst wind speed has been calculated using the Land projections: probabilistic projections (12 km). A bounding box to identify the Development site area has been used, with the following National Grid Reference coordinates:
 - North – 196450;
 - South: 136450;
 - East – 643000; and
 - West - 569400.

15.2.1 Assessment Limitations

12. It is important to note that climate change projections are based on global models for a range of greenhouse gas emissions scenarios and generally consider regional responses to climate change rather than local.
13. Downscaling adds another level of uncertainty. There may be more detail, but the uncertainty of the science may be higher. As understanding of the climate system and ability to model it improves it is likely that future projections will be refined on an ongoing basis.
14. The probabilities presented and the estimated ranges are based on a set of modelling, statistical and dataset choices with expert judgement playing an important role. However, as some potential influences on future climate are not yet known some choices could change as the science develops⁴.

15.3 Baseline Conditions

15.3.1 Current Climate Baseline

15. The State of the UK Climate 2017⁵ provides the latest report on observed climate data for the UK. Key findings include:
 - The decade 2008-2017 has been on average 0.3°C warmer than the 1981-2010 average and 0.8°C warmer than 1961-1990. Nine of the ten warmest years have occurred since 2002 and all since 1990.
 - In the last few decades there has been an increase in annual average rainfall. Seven of the wettest years for the UK have occurred since 1998.
 - In context of seasonal changes, of note is that two recent winters (2013/14 and 2015/16) have the highest rainfall in the dataset. There has also been a run of

³ <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>

⁴ Lowe, J.A. et al. (2018) UKCP18 Science Overview Report. The Met Office. Available at: <https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf>

⁵ International Journal of Climatology, volume 38, Number S2 (July 2018) ed. Radan Huth. Wileyprovid

recent wet summers with only 2013 in the last ten being below the 1981-2010 average. UK summers for the last decade have been on average 20% wetter than 1961-1990 (17% than 1981-2010).

- There is no compelling evidence for trends in storminess as determined by maximum gust speeds over the last four decades.
 - In terms of extremes the amount of rain from extremely wet days has increased by 17% for the decade 2008 to 2017 compared with the 1961-1990 period, with changes largest for Scotland. The hottest day of the year for the last decade has been on average 0.8°C above the 1961-1990 reference. The lowest temperature of the year has increased by 1.7°C a much larger increase than the equivalent change in the mean UK temperature.
 - Mean sea level around the UK has risen by approximately 1.4 mm/year from the start of the 20th century, when corrected for land movement.
16. Climate projections show that trends over the 21st century in the UK are towards warmer and wetter winters and hotter, drier summers, with an increase in frequency and intensity of extremes.
17. The climate parameters considered most relevant to the assessments referenced within this chapter are wind speed, temperature, sea level rise and cloud amount.

15.3.2 Future Baseline – Climate Projections Relevant to the Assessment

18. The climate parameters considered relevant to the assessments referenced within this CCIA are temperature, wind speed, sea level, storm surges, and cloud amount. In addition to these, changes in temperature could potentially affect environmental receptors considered elsewhere in this ES, although not directly considered to inform assessment within this CCIA. It should be noted that climate change does not necessarily mean warming of the climate at a specific location. Changes in local climate depend in a complex way on global temperature rise, and in the UK are expected to include a rise in the frequency of more extreme weather events, and average or long-term statistics would not capture this.

15.3.2.1 Temperature

19. Observations show an annual warming in the UK in recent decades with more warming predicted in the summer than in the winter. In summer there is a pronounced north/south contrast, with greater increases in maximum summer temperatures over the southern UK.
20. For period 2020-2039 projected changes to annual mean temperature (relative to 1981-2000) is projected at +1.0°C (50% probability level) for RCP 6.0.
21. For the period 2040-2059 projected changes to the mean annual temperature in the southeast of England (compared to 1981-2000 baseline) is projected at +1 to 2 °C (50% probability) for RCP 6.0.

15.3.2.2 Wind Speed

22. Global projections over the UK show an increase in near surface (10 m height) wind speeds for the second half of the 21st Century for the winter season which is accompanied by an increase in frequency of winter storms.
23. For southeast England, predicted wind speeds for 2020-2039 under RCP 6.0 are slightly skewed towards a reduction in wind speeds. This is the same for the period 2040 – 2059.

15.3.2.3 Sea Level Rise

24. This section is based on predictions presented in the UKCP 18 Marine Report⁶.
25. Sea level for a particular region generally differs from the global mean. Local sea level is affected by ocean circulation and by geographical variations in the temperature and/or salinity of the water column. Sea level around the UK rose approximately 1 millimetre/year (mm/year) in the 20th Century, corrected for land movement.
26. Coastal time-mean sea level changes around the UK were predicted for the given RCP scenarios. The table below shows the results for the medium scenario between 2020 – 2100. Results for RCP 6.0 are not included because the scenario exhibits a similar global mean sea level rise at 2100 to RCP 4.5 and has poorer data availability in the model database than the other scenarios.

Table 2 Projected ranges of sea level rise in London under RCP 2.6, RCP 4.5 and RCP 8.5 relative to baseline period of 1981 - 2000

Year	Sea Level Change (metres) - London relative to 1981-2000		
	RCP 2.6 (m)	RCP 4.5 (m)	RCP 8.5 (m)
2020	0.07	0.07	0.07
	-	-	-
	0.13	0.13	0.13
2040	0.13	0.14	0.16
	-	-	-
	0.26	0.27	0.29
2060	0.19	0.22	0.26
	-	-	-
	0.40	0.44	0.52
2080	0.24	0.30	0.39
	-	-	-
	0.55	0.63	0.80
2100	0.29	0.37	0.53
	-	-	-
	0.70	0.83	1.15

15.3.2.4 Storm Surges

27. This section is based on predictions presented in the UKCP18 Marine Report⁷.
28. Simulations to predict the change in sea level extremes due to atmospheric storminess were modelled using five simulations. There is no evidence to suggest there will be a significant change in future storm surges as a result of atmospheric contributions. It was concluded that extreme sea levels will only increase in the 21st Century due to the increase in mean sea levels.

15.3.2.5 Cloud Amount

29. Cloud cover is a key meteorological factor influencing the amount of solar radiation reaching the Earth's surface.
30. For southeast England, predicted cloud cover for 2020-2039 under RCP 6.0 show a reduction in cloud cover of between 5% - 10% (at the 50th percentile). This is the same for the period 2040-2059.

⁶ Palmer et al., (2018). UKCP 18 Marine Report. Met Office Hadley Centre, Exeter, UK. [Online] Available at: <https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Marine-report.pdf> (Accessed 03/01/2019)

⁷ Palmer et al., (2018). UKCP 18 Marine Report. Met Office Hadley Centre, Exeter, UK. [Online] Available at: <https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Marine-report.pdf> (Accessed 03/01/2019)