XLINKS MOROCCO-UK POWER PROJECT

Preliminary Environmental Information Report

Volume 4, Appendix 1.2: Climate Change Risk Assessment

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Glossary

Term	Meaning
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Climate resilience	The capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance.
Converter Site	The Converter Site is proposed to be located to the immediate west of the existing Alverdiscott Substation site in north Devon. The Converter Site would contain two converter stations (known as Bipole 1 and Bipole 2) and associated infrastructure, buildings and landscaping.
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current to Alternating Current, or vice versa.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Flood Risk Assessment	A flood risk assessment is an assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the National Planning Policy Framework and Planning Practice Guidance.
HVAC Cables	The High Voltage Alternating Current cables which would bring electricity from the converter stations to the new Alverdiscott Substation Connection Development.
HVDC Cables	The High Voltage Direct Current cables which would bring electricity to the UK converter stations from the Moroccan converter stations.
Landfall	The proposed area in which the offshore cables make landfall in the United Kingdom (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Cornborough Range, Devon, between Mean Low Water Springs and the Transition Joint Bay inclusive of all construction works, including the offshore and onshore cable routes, and landfall compound(s).
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Proposed Development.
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore High Voltage Direct Current cables will be located.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Proposed Development	The element of the Xlinks Morocco-UK Power Project within the UK, which includes the offshore cables (from the UK Exclusive Economic Zone to landfall), landfall site, onshore Direct Current and Alternating Current cables, converter stations, road upgrade works and, based on current assumptions, the Alverdiscott Substation Connection Development.
Study area	This is an area which is defined for each environmental topic which includes the Proposed Development Draft Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Xlinks Morocco-UK Power Project	The overall scheme from Morocco to the national grid, including all onshore and offshore elements of the transmission network and the generation site in Morocco (referred to as the 'Project').

Acronyms

Acronym	Meaning
CCRA	Climate Change Risk Assessment
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
GHG	Greenhouse Gas
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IEMA	Institute of Environmental Management and Assessment
IPCC	Intergovernmental Panel on Climate Change
MOHC	Met Office Hadley Centre
PEIR	Preliminary Environmental Information Report
RCP	Representative concentration pathway
UK	United Kingdom
UKCP18	United Kingdom Climate Projections 2018

Units

Units	Meaning
%	Percentage
Km^2	Square Kilometres
kn	Knots
mm	Millimetres
m/s	Metres per second
°C	Degrees Celsius

1 CLIMATE CHANGE RISK ASSESSMENT

1.1 Introduction

1.1.1 This document forms Volume 4, Appendix 1.2 of the Preliminary Environmental Information Report (PEIR) prepared for the United Kingdom (UK) elements of the Xlinks Morocco-UK Power Project (referred to hereafter as ‘the Proposed Development’). The PEIR presents the preliminary findings of the Environmental Impact Assessment (EIA) process for the Proposed Development.

1.1.2 This climate change risk assessment (CCRA) assesses the potential adverse effects on the Proposed Development from climate change, in line with the UK’s guidance on climate change risk assessments.

1.2 Proposed Development Summary

1.2.1 The Proposed Development forms the UK elements (both onshore and offshore) of the wider Xlinks Morocco-UK Power Project (the ‘Project’) to develop a renewable energy generation facility in Morocco, connected via sub-sea electricity cables between Morocco and the UK.

1.2.2 For the purpose of the CCRA, the assessment of climate risk has been divided between the onshore and offshore elements of the Proposed Development. In summary, these comprise two converter stations with associated High Voltage Alternating Current (HVAC) Cables that provide connection to the grid, the Alverdiscott Substation Connection Development, onshore High Voltage Direct Current (HVDC) Cables, transition joint bays, highways improvements and offshore cables.

1.2.3 The onshore elements of the Proposed Development are proposed to be located within the administrative areas of Torridge District Council and Devon County Council in north Devon, between Cornborough Range and Alverdiscott.

1.2.4 The offshore elements of the Proposed Development are proposed to be located within the Bristol Channel and Celtic Sea, extending from the landfall at Cornborough Range to the limit of the UK Exclusive Economic Zone (EEZ), south west of the UK.

1.3 Methodology

1.3.1 The scope of the CCRA is defined in accordance with the Climate Change Committee (2021) recommendations. This report considers the climate-related physical risks on the Proposed Development and identifies the current and anticipated risks throughout its construction 50-year lifetime, including the construction, operation and maintenance, and decommissioning phases. This technical report evaluates the processes utilised for managing the risks through four key stages:

1. An assessment of the baseline climate to understand present-day vulnerability and assess current climate-related risks, opportunities, and levels of adaptation.

2. An assessment of future climate projections to understand the future vulnerability.
3. Identify vulnerability of the Proposed Development to climate change and undertake an assessment of their likelihood and severity.
4. Review potential adaptation and mitigation options.

1.4 Baseline Climate

1.4.1 To understand the impact of climate change on the Proposed Development, the baseline environment must be considered. The onshore elements of the Proposed Development are proposed to be located in north Devon, between Cornborough Range and Alverdiscott, with the offshore elements located within the Bristol Channel and Celtic Sea. Therefore, this necessitates the consideration of the offshore climate in addition to the onshore baseline environment.

1.4.2 Baseline onshore climate conditions have been sourced from Met Office observed data from Chivenor climate station, Devon. The observational data from Chivenor climate station has been collected and averaged over 30 years from 1981-2010 and reviewed alongside regional observational data averaged over the same period (Met Office, 2020).

1.4.3 Baseline offshore climatic conditions have been sourced from observational data collated within the UK Offshore Energy Strategic Environmental Assessment (Department for Business, Energy and Industrial Strategy (BEIS), 2022) and Intergovernmental Panel on Climate Change’s (IPCC) Sixth Assessment Reporting of the physical science (IPCC, 2021).

Onshore Baseline Climate

1.4.4 The south west of England experiences a temperate climate, with annual average maximum and minimum temperatures of 14.46°C and 7.68°C recorded at the Chivenor climate station respectively (Met Office, 2020). During the 1981-2010 baseline period, average maximum temperatures reach 20.6°C in July, and minimum temperatures fall to an average of 2.95°C in February. This is consistent with regional climate patterns for the south west of England and South Wales. In the summer months, regional temperatures often fall between 20.11°C and 9.88°C; in the winter months, regional temperatures range between 8.34°C and 2.13°C.

1.4.5 Precipitation recorded at the Chivenor climate station is lower than that reported for the regional annual total of 1,255.22 mm, at 910.09 mm a year. However, regional precipitation in the south west of England and south Wales exceeds the UK annual average, which totals 1,142.04 mm. Therefore, the south west of England and south Wales can be considered as a region that is exposed to high rainfall in comparison to the rest of the UK.

1.4.6 Annual average wind speeds recorded at Chivenor climate station are higher than the regional annual average, equalling 10.27 kn and 9.35 kn, respectively. Furthermore, it can be predicted that the Proposed Development Draft Order Limits will be susceptible to higher wind speeds throughout the year due to its coastal location.

Offshore Baseline Climate

1.4.7 Mean air temperatures range from lows of 7°C in January to 16°C in July, with surface air temperatures exceeding sea surface temperatures during the spring and summer months and falling below sea surface temperatures during the autumn and winter months (BEIS, 2022).

1.4.8 Precipitation generally falls 15 to 22 days per month during the winter, and 9 to 13 days per month during the summer (BEIS, 2022).

1.4.9 Higher wind speeds can be expected offshore in comparison with the onshore elements of the Proposed Development due to the lack of obstructions (both man-made and natural) in open water. Wind conditions are generally south-westerly and north-westerly throughout the year, although north-easterly winds become more frequent in late-winter and spring. During January, winds occasionally exceed 14 m/s (with 20-30% probability). In July, the chance of these higher wind speeds drops to 2% (BEIS, 2022).

1.4.10 Mean sea level is a crucial element of climate change-related risks for wind farms. Global mean sea level rose by 0.2 m between 1901 and 2018, and continues to rise (IPCC, 2021). Land adjacent to the coast and estuaries within the south west has been identified as vulnerable to storms and coastal flooding (Environment Agency, 2022).

1.5 Climate Change Projections

1.5.1 Climate change has been identified as an event that is already taking place in the UK, in both academic research and in all prior legislation and policy listed. The risks associated with rising temperatures, more frequent extreme weather patterns and rising sea levels are further investigated within this section.

Onshore Climate Projections

1.5.2 The Met Office Hadley Centre (MOHC) publishes both probabilistic climate change projections and downscaled global circulation model outputs for the UK at various spatial scales. This is called the UK Climate Projections 2018 (UKCP18) dataset, first published in November 2018 and at v2.9.0 (MOHC, 2024) at the time of writing. The projections are based on Representative Concentration Pathway (RCP) scenarios used by the IPCC. The RCP scenarios (four scenarios presented in the IPCC fifth Assessment report which are included within the UKCP18 database) describe different climatic futures, all of which are considered possible depending on the volume of GHG emitted. These provide the basis for future assessments of climate change and possible response strategies, thereby giving a low-high range in potential global GHG reduction initiatives and resulting rate of climatic effects over a given time period. The probabilistic projections published at a 25 km grid cell scale are considered the most useful for this assessment when considering the onshore elements, being designed to show a range of projection values that reflect uncertainty in modelled outcomes. The CP18 Overview Report (MOHC, 2018a) and supporting factsheets (MOHC, 2018b) for the wider regional and UK context have also been drawn upon.

1.5.3 The construction phase of the Proposed Development is expected to commence in 2026 and continue through to 2032. Therefore, the Proposed Development is expected to be fully operational by 2032 (operation of Bipole 1 and Bipole 2 commences in 2030 and 2032, respectively), and will operate as a key piece of energy infrastructure in the long term. Therefore, climate change projections for three periods throughout this century have been considered: average conditions during 2010-2039, 2040-2069 and 2070-2099. These projections have been utilised to consider the impact of climate change across all phases of the Proposed Development, including construction, operation and maintenance and decommissioning.

1.5.4 Over the past decade, annual average temperature and precipitation have gradually increased when compared to preceding observational data baseline periods. These variations are likely to amplify over this century, with the anthropogenic climatic changes expected to become increasingly apparent (MOHC, 2018a).

1.5.5 **Table 1.1**, **Table 1.2**, and **Table 1.3** show potential onshore climatic changes from the UKCP18 probabilistic dataset (averaged over the 2010-2039, 2040-2069 and 2070-2099 time periods) relative to the 1981-2010 baseline for the two 25 km grid squares local to the Proposed Development, as shown within **Figure 1.1**. The majority of the Onshore HVDC Cable Corridor lies within the western grid cell, however, the Converter Site and Alverdiscott Substation Connection Development lies within the eastern grid cell (see **Figure 1.1**).

1.5.6 The areas of the Proposed Development Draft Order Limits which are not located in the East of West grid cells within **Figure 1.1** correspond primarily with transportation for abnormal indivisible loads across key highway routes. These do not represent permanent features of the Proposed Development and no data for UKCP18 is available for this area. As such, the East and West grid cells which surround these areas should sufficiently represent potential hazards across the whole onshore Proposed Development Draft Order Limits.

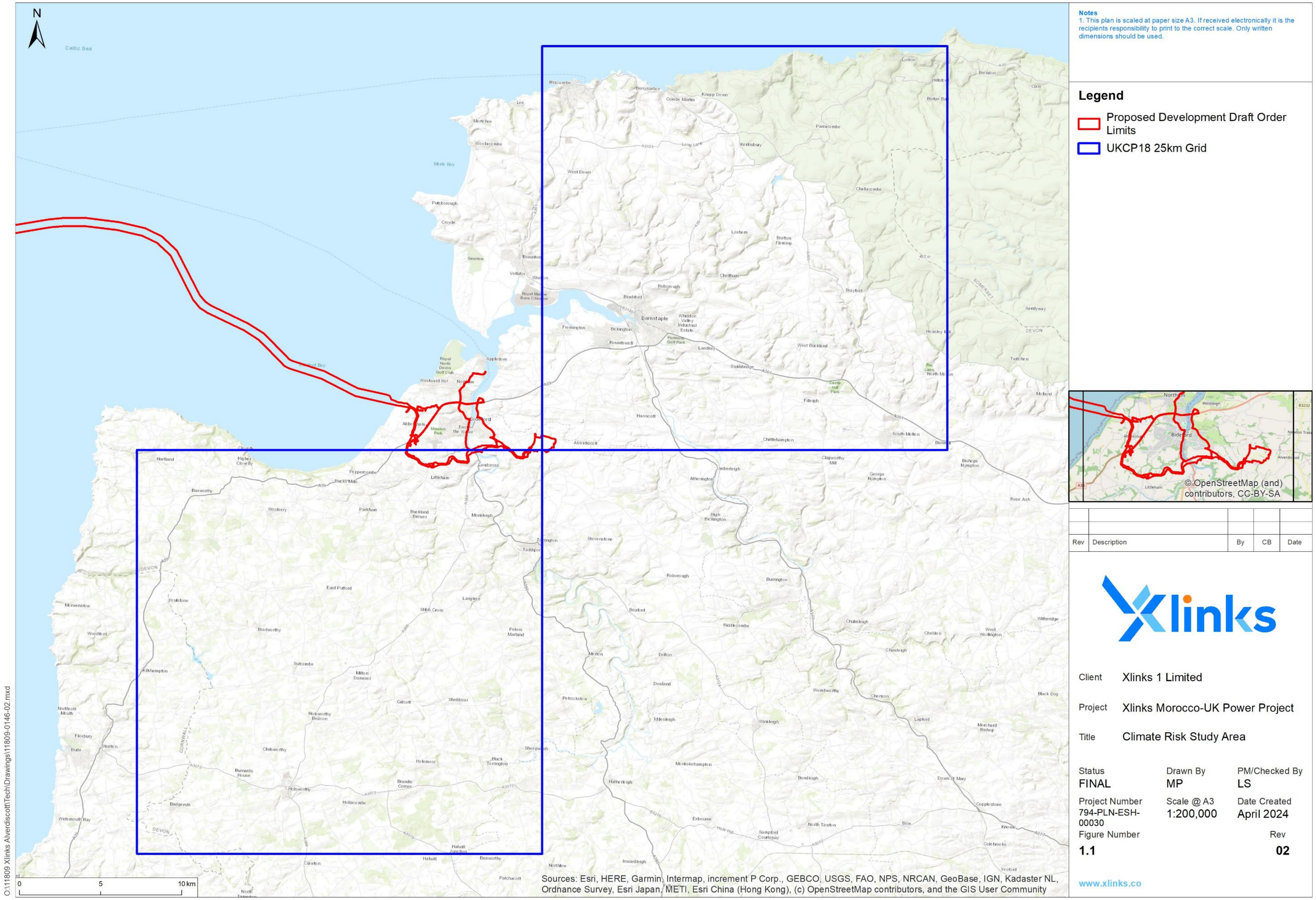

Figure 1.1: UKCP18 25km grid cells used within the assessment

1.5.7 The data presented here is for the emissions pathway RCP8.5, which is a high-emissions scenario assuming 'business as usual' growth globally with little additional mitigation. This is a conservative (worst-case) approach for the assessment.

1.5.8 In summary, the data within **Table 1.1, Table 1.2,** and **Table 1.3** show that across both grid cells precipitation is predicted to increase during the wettest season, however, rainfall is predicted to decrease during the driest season. Temperatures are anticipated to increase across the year, both during the coldest and hottest seasons. These trends will continue and amplify towards the latter half of the century.

1.5.9 The greatest difference between the grid cells relates to the precipitation during the driest season. Whilst both grid cells represent a predicted decrease in rainfall during this period, the western cell projects a more extreme reduction in rainfall. This trend amplifies towards the latter half of the century. It is understood that this difference arises due to a change in the driest season when compared to the baseline (i.e. a change from Summer to Spring within the western cell, resulting in a more extreme projected decrease in precipitation in the baseline driest season, Summer). Despite this, both cells still represent a projected decrease in precipitation during the driest periods.

1.5.10 The CCRA utilises both grid cells, which cover the onshore elements of the Proposed Development. The Onshore HVDC Cable Corridor sits within the western grid cell, whilst the Converter Site and Alverdiscott Substation Connection Development sit within the eastern grid cell.

Table 1.1: Climate parameter projections 2010-2039

Parameter†	Units	West 25 km cell (GR 237500 112500)			East 25 km cell (GR 262500 137500)		
		10th percentile	Median value	90th percentile	10th percentile	Median value	90th percentile
Precipitation – annual average	%	-4.55	-0.06	4.58	-4.26	0.38	5.14
Precipitation – driest season	%	-24.02	-7.84	8.65	-9.49	-0.14	9.37
Precipitation – wettest season	%	-6.73	4.09	15.78	-6.18	4.57	16.41
Precipitation – driest month	%	-18.22	1.83	22.13	-17.79	1.65	22.15
Precipitation – wettest month	%	-9.14	3.05	15.19	-12.74	6.92	27.14
Temperature – annual average	ºC	0.23	0.68	1.14	0.23	0.69	1.15
Temperature – hottest season average	ºC	0.25	0.89	1.56	0.25	0.89	1.55
Temperature – hottest season maximum	ºC	0.17	0.99	1.83	0.17	0.98	1.82
Temperature – coldest season average	ºC	-0.10	0.56	1.25	-0.10	0.57	1.26
Temperature – coldest season minimum	ºC	-0.11	0.58	1.30	-0.10	0.58	1.31
Temperature – hottest month average	ºC	0.08	1.03	2.03	0.07	1.03	2.03
Temperature – hottest month maximum	ºC	-0.14	1.15	2.47	-0.16	1.13	2.45
Temperature – coldest month average	ºC	-0.23	0.56	1.33	-0.22	0.57	1.35
Temperature – coldest month minimum	ºC	-0.25	0.58	1.42	-0.24	0.58	1.43

† daily mean, maximum or minimum, as applicable, averaged over time period specified

n.b. 10th and 90th percentile and median values for scenario RCP8.5.

Table 1.2: Climate parameter projections 2040-2069

Parameter†	Units	West 25 km cell (GR 237500 112500)			East 25 km cell (GR 262500 137500)		
		10th percentile	Median value	90th percentile	10th percentile	Median value	90th percentile
Precipitation – annual average	%	-7.16	-1.05	4.98	-6.49	-0.46	5.62
Precipitation – driest season	%	-45.32	-20.43	4.65	-14.84	-2.15	12.19
Precipitation – wettest season	%	-8.19	4.41	18.79	-7.49	4.55	18.76
Precipitation – driest month	%	-32.78	-4.12	21.79	-31.13	-3.18	21.64
Precipitation – wettest month	%	-12.24	6.62	27.52	-12.88	14.71	41.71
Temperature – annual average	ºC	0.83	1.74	2.66	0.84	1.75	2.68
Temperature – hottest season average	ºC	0.85	2.23	3.66	0.85	2.24	3.67
Temperature – hottest season maximum	ºC	0.79	2.53	4.29	0.78	2.51	4.27
Temperature – coldest season average	ºC	0.41	1.51	2.64	0.42	1.52	2.66
Temperature – coldest season minimum	ºC	0.43	1.66	2.97	0.44	1.67	2.98
Temperature – hottest month average	ºC	0.64	2.41	4.25	0.64	2.43	4.28
Temperature – hottest month maximum	ºC	0.50	2.77	5.05	0.48	2.74	5.01
Temperature – coldest month average	ºC	0.24	1.46	2.71	0.24	1.47	2.74
Temperature – coldest month minimum	ºC	0.30	1.62	3.01	0.30	1.64	3.04

† daily mean, maximum or minimum, as applicable, averaged over time period specified

n.b. 10th and 90th percentile and median values for scenario RCP8.5.

Table 1.3: Climate parameter projections 2070-2099

Parameter†	Units	West 25 km cell (GR 237500 112500)			East 25 km cell (GR 262500 137500)		
		10th percentile	Median value	90th percentile	10th percentile	Median value	90th percentile
Precipitation – annual average	%	-9.22	0.16	9.09	-7.90	1.31	10.11
Precipitation – driest season	%	-65.29	-38.54	-5.00	-21.32	-3.00	19.21
Precipitation – wettest season	%	-13.91	6.72	30.40	-11.45	8.12	30.69
Precipitation – driest month	%	-55.79	-21.15	16.25	-53.17	-18.62	17.06
Precipitation – wettest month	%	-11.34	17.84	49.03	-15.57	24.14	66.71
Temperature – annual average	ºC	1.92	3.49	5.09	1.93	3.50	5.11
Temperature – hottest season average	ºC	2.14	4.68	7.24	2.16	4.70	7.28
Temperature – hottest season maximum	ºC	2.19	5.31	8.47	2.18	5.28	8.44
Temperature – coldest season average	ºC	1.02	2.79	4.65	1.02	2.80	4.68
Temperature – coldest season minimum	ºC	1.04	3.03	5.24	1.04	3.04	5.25
Temperature – hottest month average	ºC	2.11	5.30	8.63	2.13	5.33	8.70
Temperature – hottest month maximum	ºC	2.13	6.11	10.25	2.12	6.07	10.19
Temperature – coldest month average	ºC	0.71	2.69	4.77	0.70	2.70	4.81
Temperature – coldest month minimum	ºC	0.86	3.04	5.38	0.86	3.05	5.42

† daily mean, maximum or minimum, as applicable, averaged over time period specified

n.b. 10th and 90th percentile and median values for scenario RCP8.5.

1.5.11 No clear trend for change in wind speed during this time period is shown in the regional projections data. Probabilistic projections do not provide wind speed data.

Offshore Climate Projections

1.5.12 Probabilistic local climate projections consistent with those referenced above and used to illustrate future possible onshore climate trends are not available for offshore regions. As such, the results of marine climate projections as set out within the UKCP18 Marine Report (Palmer *et al*., 2018) and interrogated within the UK Climate Risk Independent Assessment (CCRA3), Chapter 4: Infrastructure (Jaroszweski *et al*., 2021) have been used to examine future trends for wind speed, wave height and sea levels. The projections are based on RCP8.5, with data largely available for the end of the 21st century. Whilst this is outside of the initial lifetime of the Proposed Development, these projections display climate trends that will begin to be felt throughout this century.

1.5.13 It is virtually certain that sea surface temperatures will continue to increase in the 21st century, with global mean sea surface temperatures predicted to increase by approximately 2.9 °C by 2100 under RCP8.5. It is anticipated that the north Atlantic will warm at a slower rate in comparison to other oceans (IPCC, 2021).

1.5.14 The average wave height is predicted to decrease around much of the UK at a factor of about 10% to 20% over the 21st century, with average wave heights in the south west of the UK decreasing by approximately 0.2 m. Changes in maximum wave heights vary regionally, with changes in the order of +/- 1 m. However, there is uncertainty associated with modelled projections of maximum wave heights for offshore the south west of the UK (Jaroszweski *et al*.. 2021). Therefore, conservatively an increase in maximum wave height should be anticipated.

1.5.15 Given the close relationship between wave heights and wind speeds, average changes in wind speed are predicted to follow similar patterns to those predicted for average wave height, with a reduction in average wind speeds projected for the south west of the UK, including the Celtic Sea and Bristol Channel. Changes in maximum wind speeds associated with storm surges vary regionally, with changes in the order of +/- 1.5 m/s. However, there is little consensus between models regarding the extent and pattern of such winds in relation to climate change (Palmer *et al*., 2018). As such, conservatively an increase in maximum wind speed should be anticipated.

1.5.16 Global mean sea level will continue to rise throughout the 21st century, a change that is projected within all future climate change scenarios. Under RCP8.5, the UK can expect to see sea level rise of approximately 1 m by 2100. This change is regionally variable, with greater sea level rise projected for the south of the UK. The South West coastline can expect to see a mean sea level rise of approximately 0.7 m by 2100 (Palmer *et al.,* 2018).

1.6 Climate Risk and Resilience Scoping

1.6.1 Based on the information available for the Proposed Development, an initial screening exercise identified the relevant climate change risks on the Proposed Development based on information sourced from the UK Climate Independent Assessment (CCRA3) which are presented in **Table 1.5**.

1.6.2 Given the variability in the nature of the potential effects of climate change on the development, receptors have been identified on a risk-specific basis, whereby all receptors relate to the continued safe and effective operation of the Proposed Development. In line with IEMA (2020) guidance, the vulnerability and susceptibility have been considered in determining the severity of risk.

1.6.3 A high-level assessment of such risks has been undertaken, considering the hazard, potential severity of effect on the development and its users, probability of that effect, and level of influence the development design can have on the risk. The severity of effect score considers the potential consequences of the hazard and the sensitivity of the receptor(s) affected. Each element of the risk assessment has been scored on a scale of one to three, representing low, medium or high; the scores are then summed to give a combined risk score. **Table 1.4** defines each of these terms. A combined risk score of five or more when considering the factors in **Table 1.5** has been defined as an impact that would be a significant adverse/beneficial effect on the Proposed Development.

1.6.4 The assessment of effects has considered the measures adopted as part of the Proposed Development in determining the combined risk score. As detailed in paragraph **1.6.2**, a score of 5 or more is assessed as a significant effect which is presented in the 'significant effect' column. Should an effect be significant after primary mitigation further mitigation is presented where relevant to reduce the residual effect to negligible and not significant in EIA terms.

Table 1.4: Severity, probability and influence factor definitions

Factor	Score definitions
Severity: the magnitude and likely consequences of the impact should it occur.	**1 =** unlikely or low impact: e.g. low-cost and easily repaired property damage; small changes in occupiers' behaviour.
	2 = moderate impacts with greater disruption and/or costs
	3 = severe impact, e.g. risk to individual life or public health, widespread property damage or disruption to business
Probability: reflects both the range of possibility of climatic parameter changes illustrated in CP18 projections and the probability that the possible changes would cause the impact being considered	**1 =** unlikely or low probability of impact; impact would occur only at the extremes of possible change illustrated in projections
	2 = moderate probability of impact, plausible in the central range of possible change illustrated in projections
	3 = high probability of impact, likely even with the smaller changes illustrated as possible in the projections
Influence: the degree to which design of the proposed development can affect the severity or probability of impacts	**1 =** no or minimal potential to influence, outside control of developer, e.g. reliance on national measures or individuals' attitudes/actions; or hypothetical measures would be impracticable
	2 = moderate potential to influence, e.g. a mixture of design and user behaviour or local and national factors; measures may have higher costs or practicability challenges
	3 = strong potential to influence through measures that are within the control of the developer and straightforward to implement

1.6.5 **Table 1.5** shows the climate change risks to the Proposed Development during construction, operation and maintenance, and decommissioning that have been identified prior to any mitigation and the risk scores assigned, following the approach set out in Severity, probability and influence factor definitions. Appropriate mitigation has been identified as necessary to accordingly reduce the risk to an acceptable level and mitigate a potential significant effect.

Table 1.5: Climate risk scores for the Proposed Development

Risk	Potential Consequences	Design Considerations	Severity	Probability	Influence	Significant?
Construction						
Onshore						
Increased frequency of flood events resulting from increased precipitation intensity.	Risk to the health of workers on-site should a flood event occur during construction activities. Flooding of local road network could prevent access to site accesses.	• Flood Risk and mitigation is assessed within Volume 2, Chapter 3: Hydrology and Flood Risk of the PEIR. • Construction activities would be undertaken in line with relevant health and safety guidance. Contractors would consider adverse weather in the development of risk assessments and when scheduling works. Further measures to appropriately manage and respond to extreme weather events would be detailed within the Onshore Construction Environmental Management Plan(s) (On-CEMP(s)).				
Increased frequency and intensity of extreme weather (i.e. storms, drought).	Health impacts or injuries to the construction workforce. Delays to construction schedules due to unsafe working conditions during extreme weather events.	• Construction activities would be undertaken in line with relevant health and safety guidance. Contractors would consider adverse weather in the development of risk assessments and when scheduling works. Further measures to appropriately manage and respond to extreme weather events would be detailed within the On-CEMP(s) (e.g. toolbox talks).	1	1	1	No
Increases in average and extreme temperatures, both in winter and summer.	Health impacts to the construction workforce due to heat stroke during extreme temperature days.		1	1	2	No
Offshore						
Increases in average and extreme temperatures, both in winter and summer.	Health impacts to the construction workforce due to heat stroke during extreme temperature days.	• Construction activities would be undertaken in line with the Offshore CEMP(s) and with appropriate health and safety guidance, including consideration of weather conditions and extreme weather events.	1	1	2	No
Increased frequency and intensity of	Health impacts or injuries to the construction workforce.		1	1	2	No

Risk	Potential Consequences	Design Considerations	Severity	Probability	Influence	Significant?
extreme weather i.e. storms.						
Increased wind speeds and changes to wind patterns.	Health impacts or injuries to the construction workforce.		1	1	2	No
Operation and Maintenance						
Onshore						
Increased frequency of flood events resulting from increased precipitation intensity.	Damage to converter stations and associated electrical equipment, including onshore HVDC and HVAC Cables resulting in disruption to operations and power output.	• Flood Risk and mitigation is assessed within Volume 2, Chapter 3: Hydrology and Flood Risk of the PEIR. • The majority of the Onshore HVDC Cable Corridor is situated within Flood Zone 1. However, it comprises areas of Flood Zone 2 and 3, which are associated with the River Torridge and ordinary watercourses that form tributaries to the River Torridge. • The Converter Site is assessed has having low risk of fluvial flooding, surface water flooding and groundwater flooding. Volume 2, Chapter 3: Hydrology and Flood Risk of the PEIR, includes a drainage strategy to provide sufficient storage to avoid flooding during the 1 in 100 year storm event plus 50% allowance for climate change.				
Increase in mean sea level resulting in coastal flooding.	Increased mean sea levels may result in the increased frequency of coastal flooding, which may damage the associated electrical equipment, including power cables, resulting in disruption to operations	• Flood risk and mitigation is assessed in Volume 2, Chapter 3: Hydrology and Flood Risk of the PEIR.				
Changes to rainfall patterns, leading to increased precipitation during the wettest periods.	Damage to converter stations and associated electrical equipment, including onshore cables resulting in disruption to operations and power output.	• Converter stations and associated electrical equipment should be designed with durable materials in line with durability quality standards and guidance. • Power cables to be buried at an appropriate level below ground to limit and avoid potential risk.	1	1	2	No

Risk	Potential Consequences	Design Considerations	Severity	Probability	Influence	Significant?
Increased frequency and intensity of extreme weather (i.e. storms, drought).	Extreme storm events, including cold weather events, may cause structural damage to the converter stations and associated electrical equipment, including power cables, through increased loading and ice accretion, resulting in disruption to operations and power export. Increased risk of heat and drought stress to plants, as part of the landscaping and mitigation proposals. Increased water stress due to drought, as water supply would be required for operational employees.	• Converter station buildings will be built in line with current building regulations for structural design with a safety margin. • The design of the Proposed Development includes lightning protection across the Converter Site. • Power cables to be buried at an appropriate level below ground to limit and avoid potential risk. • The Proposed Development would select species that are resilient to warmer and drier conditions. • The Landscape and Ecology Management Plan would detail the design of the landscape plan, including planting specification. • Design of the operational buildings should incorporate measures to reduce water usage (e.g. water efficient controllers on taps and urinals).	1	1	2	No
Increases in average and extreme temperatures, both in winter and summer.	Consistently heightened temperatures could lead to efficiency losses due to overheating, or the failure of electrical equipment within the converter station. Thermal discomfort and heat stress for employees during the operation of the Converter stations.	• Appropriate cooling plant and ventilation systems will be designed to account for expected increasing ambient temperatures. • Converter stations and associated electrical equipment should be designed with durable materials in line with durability quality standards and guidance.	1	1	2	No
Earth movements and subsidence resulting from phases of	Damage to joint bays and onshore export cables, leading to disruption in operations.	• In soil types/ground where subsidence is likely, cable should be bedded in crushed limestone (or	1	1	2	No

Risk	Potential Consequences	Design Considerations	Severity	Probability	Influence	Significant?
drought and heavy rainfall.		similar) with a snake in the cable, to allow for settlement.				
Increased wind speeds and changes to wind patterns.	Converter buildings and infrastructure may be subject to physical damage from extreme wind forces.	• Power cables to be buried at an appropriate level below ground to limit and avoid potential risk. • Converter stations and associated electrical equipment should be designed with durable materials in line with durability quality standards and guidance.	1	1	2	No
Offshore						
Increased frequency and intensity of extreme weather i.e. storms.	Damage to undersea cabling (offshore HVDC cables) due to increase activity of waves leading to scour from sediment transfer.	• Construction method statements would be produced prior to construction which would confirm details of cable installation methodology, including scour protection and deposition of material arising from drilling, dredging and/or sandwave clearance.	1	1	1	No
Increase in sea surface temperatures and ocean acidification.	Increased temperatures and ocean acidification may lead to accelerated corrosion of submerged structures, such as the offshore HVDC Cables.	• Design to be in line with existing standards at this time, including appropriate anti-corrosion protective coatings where appropriate.	1	1	2	No
Increased wave height.	Degradation to undersea cabling (offshore HVDC Cables) due to scour from sediment transfer. Failure at cable joints may also occur as a result.	• Construction method statements would be produced prior to construction which would confirm details of cable installation methodology, including scour protection and deposition of material arising from drilling, dredging and/or sandwave clearance.	1	1	1	No
Changes in the tidal regime.	Degradation to undersea cabling (offshore HVDC Cables) due to scour from sediment transfer. Failure	• Construction method statements would be produced prior to construction which would confirm details of cable installation methodology, including scour protection and deposition of	1	1	1	No

Risk	Potential Consequences	Design Considerations	Severity	Probability	Influence	Significant?
	at cable joints may also occur as a result.	material arising from drilling, dredging and/or sandwave clearance.				
Decommissioning						
Onshore						
Increased frequency of flood events resulting from increased precipitation intensity.	Risk to the health of workers on-site should a flood event occur during decommissioning activities. Flooding of local road network could prevent access to site accesses.	• Flood Risk and mitigation is assessed within Volume 2, Chapter 3: Hydrology and Flood Risk of the PEIR. • Decommissioning activities would be undertaken in line with the relevant decommissioning plan and appropriate health and safety guidance in place at that time, including consideration of extreme weather events.				
Increased frequency and intensity of extreme weather (i.e. storms, drought).	Health impacts or injuries to the decommissioning workforce. Delays to decommissioning schedules due to unsafe working conditions during extreme weather events.	• Decommissioning activities would be undertaken in line with the relevant decommissioning plan and appropriate health and safety guidance in place at that time, including consideration of extreme weather events.	1	1	1	No
Increases in average and extreme temperatures, both in winter and summer.	Health impacts to the decommissioning workforce due to heat stroke during extreme temperature days.	• Decommissioning would be undertaken in line with appropriate health and safety guidance in place at that time	1	1	2	No
Offshore						
Increases in average and extreme temperatures, both in winter and summer.	Health impacts to the decommissioning workforce due to heat stroke during extreme temperature days.	• Decommissioning would be undertaken in line with appropriate health and safety guidance in place at that time, including consideration of weather conditions and extreme weather events.	1	1	2	No
Increased frequency and intensity of	Health impacts or injuries to the decommissioning workforce.		1	1	2	No

Risk	Potential Consequences	Design Considerations	Severity	Probability	Influence	Significant?
extreme weather i.e. storms.						
Increased wind speeds and changes to wind patterns.	Health impacts or injuries to the decommissioning workforce.		1	1	2	No
Increased wave height.	Risk to workers on decommissioning vessels should wave heights lead to unsafe conditions on vessels (resulting in capsizing).		1	1	2	No

1.6.6 When considering the proposed design considerations within the above **Table 1.5**, the potential risk posed to the Proposed Development would be reduced to an acceptable and non-significant level in EIA terms.

1.7 References

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