Proposed Solar PV Development

Byers Gill Solar
EN010139

6.4.5.2 Environmental Statement Appendix 5.2 Climate Change Resilience Assessment

Planning Act 2008

APFP Regulation 5(2)(q)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Climate change resilience assessment

Risk ID	Climate hazard	Trend or Likelihood of Climate Hazard	Potential Climate Change Impact	Receptor	Potential Climate Change Risk to the Proposed Development	Construction/Operation Stage	Existing or embedded mitigation measure	Result of mitigation measure on resilience	Hazard Impact		Risk rating
									Likelihood	Consequence	
1	High temperatures	Mean daily summer temperatures are expected to increase by 1.1°C (from 14.9°C to 16°C) in the period between 2020 and 2049. Number of hot days (daily maximum temperature higher than 25°C) projected to increase from baseline 5.6 to 13.6 days per year in the period between 2020 and 2049.	Increase in annual temperature	All receptors	Overheating of electrical equipment Damage to materials Risk of overheating to workers	Construction	Detailed in the CEMP implemented by the Principal Contractor (PC). The PC will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions. An Outline CEMP is provided with the DCO Application as ES Appendix 2.6 (Document Reference 6.4.2.6)	Risk reduced through mitigation	Unlikely	Minor	Very Low
2	High temperatures	Mean daily summer temperatures are expected to increase by 1.1°C (from 14.9°C to 16°C) in the period between 2020 and 2049. Number of hot days (daily maximum temperature higher than 25°C) projected to increase from baseline 5.6 to 13.6 days per year in the period between 2020 and 2049.	Increase in summer temperature	Plant and vehicles, physical structures, materials, and access routes to sites and access routes to sites	Overheating of electrical equipment Damage to materials Risk of overheating to workers	Construction	Detailed in the CEMP implemented by the PC. The PC will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions. An Outline CEMP is provided with the DCO Application as ES Appendix 2.6 (Document Reference 6.4.2.6)	Risk reduced through mitigation	Unlikely	Minor	Very Low
3	High temperatures	Mean daily summer temperatures are expected to increase by 1.1°C (from 14.9°C to 16°C) in the period between 2020 and 2049. Number of hot days (daily maximum temperature higher than 25°C) projected to increase from baseline 5.6 to 13.6 days per year in the period between 2020 and 2049.	Increase in heat waves	Staff, visitors onsite	Increased heat stress/ heat exhaustion for workers.	Construction	The PC will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather. Equipment has cooling systems where necessary.	Risk reduced through mitigation and resilience incorporated into the design	As likely as not	Minor	Low
4	High temperatures	Mean daily summer temperatures are expected to increase by 1.1°C (from 14.9°C to 16°C) in the period between 2020 and 2049. Number of hot days (daily maximum temperature higher than 25°C) projected to increase from baseline 5.6 to 13.6 days per year in the period between 2020 and 2049.	Increase in heat waves	Plant and vehicles, physical structures, materials,	Overheating of electrical equipment Damage to materials	Construction	The PC will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather. Equipment has cooling systems where necessary.	Risk reduced through mitigation and resilience incorporated into the design	As likely as not	Minor	Low
5	High precipitation	Mean precipitation rates in the region are projected to change, increasing by 5.4% in the winter and decreasing by 4.2% in summer in the period between 2020 and 2049. Number of days with extreme precipitation (>25mm) is set to decrease from 1.3 days to 1.2 days between 2020 and 2049.	Increase to winter rainfall	Plant and vehicles, physical structures, materials, and access routes to sites and access routes to sites	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	Construction	Detailed in the CEMP, implemented by the PC. An Outline CEMP is provided with the DCO Application as ES Appendix 2.6 (Document Reference 6.4.2.6) The PC will monitor weather forecasts and receive Environment Agency's (EA) flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms, flooding. Infrastructure flood resilience detailed in the FRA (Document Reference 6.4.10.1).	Risk reduced through mitigation	As likely as not	Minor	Low
6	Low precipitation	Mean precipitation rates in the region are projected to change, increasing by 5.4% in the winter and decreasing by 4.2% in summer in the period between 2020 and 2049. Number of days with extreme precipitation (>25mm) is set to decrease from 1.3 days to 1.2 days between 2020 and 2049.	Decrease in summer rainfall	All receptors	None considered	Construction	None required	N/A			
7	Increase in storm intensity	It is an established fast that human-induced greenhouse gas emissions have led to an increased frequency and/or intensity of some weather and climate extremes since pre-industrial time, in particular for temperature extremes.	Stronger winds, heatwaves, heavy precipitation	Plant and vehicles, physical structures, materials, and access routes to sites	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high winds increasing dust (and other debris), storm surge and coastal erosion.	Construction	The Principle Contractor will monitor weather forecasts and receive EA flood warnings and alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions.	Risk reduced through extreme weather working policy detailed in the Outline CEMP	Unlikely	Moderate	Low
8	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 29.6 days per year in the period between 2050 and 2079.	Increase in summer temperature	All receptors (infrastructure, buildings, staff and workers)	Increase in air conditioning requirements Overheating of electrical equipment.	Operation	BESS systems would include HVAC systems and these would be contained within the individual equipment containers. An Outline Battery Fire Safety Management Plan will be in place during the operation phase. An Outline Battery Fire Safety Management Plan (oBFSMP) is provided with the DCO Application as ES Appendix 2.13 (Document Reference 6.4.2.13).	Risk reduced through mitigation measures	Unlikely	Moderate	Low
9	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 29.6 days per year in the period between 2050 and 2079.	Increase in heat waves	All receptors (infrastructure, buildings, staff and workers)	Increase in air conditioning requirements. Overheating of electrical equipment.	Operation	BESS systems would include HVAC systems and these would be contained within the individual equipment containers. A Battery Fire Safety Management Plan will be in place during the operation phase. An Outline Battery Fire Safety Management Plan (oBFSMP) is provided with the DCO Application as ES Appendix 2.13 (Document Reference 6.4.2.13).	Risk reduced through design	Unlikely	Moderate	Low
10	High precipitation	Mean precipitation rates in the region are projected to change, increasing by 8.75% in the winter and decreasing by 17.5% in summer in the period between 2050 and 2079. Number of days with extreme precipitation (>25mm) is set to decrease from 1.3 days to 1.2 days between 2050 and 2079.	Increase to annual rainfall	All receptors	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Deterioration to the access tracks and washing away of type 1 material. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration	Operation	All key infrastructure is located outside of the Flood Zones, and there are no permanent buildings on-site. All panels are being raised above the mean flood level, or moved out of the flood zone entirely. In addition. there will be an 8m buffer around the watercourses that crosses the site. Access tracks to be included within the maintenance schedule to avoid deterioration of access to site. Access tracks to be included within the maintenance schedule to avoid deterioration of access to site.	Risk reduced through design	Very unlikely	Moderate	Low

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									Likelihood	Consequence	
11	High precipitation	Mean precipitation rates in the region are projected to change, increasing by 8.75% in the winter and decreasing by 17.5% in summer in the period between 2050 and 2079. Number of days with extreme precipitation (>25mm) is set to decrease from 1.3 days to 1.2 days between 2050 and 2079.	Increase to winter rainfall	All receptors (infrastructure, buildings, staff and workers)	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Deterioration to the access tracks and washing away of type 1 material. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration	Operation	All key infrastructure is located outside of the Flood Zones, and there are no permanent buildings on site. All panels are being raised above the mean flood level, or moved. In addition. there will be an 8m buffer around the Beck that crosses the site as well. Access tracks to be included within the maintenance schedule to avoid deterioration of access to site.	Risk reduced through design	As likely as not	Minor	Low
12	Low precipitation	Mean precipitation is expected to decrease in summer from 2mm a day to 1.65mm in the period between the 2050 and 2079. Dry spells (10 days or more with no precipitation) are expected to increase from 2.7 days in the baseline period to 3.2 days for the period between 2050 and 2079.	Decrease in summer rainfall	All receptors (infrastructure, habitat mitigation, buildings, staff and workers)	Water shortages. Deterioration of structures or foundations due to decrease in soil moisture levels. Deterioration of habitat mitigation	Operation	An Outline Landscape and Ecology Management Plan (LEMP) is provided with the DCO Application as ES Appendix 2.14 (Document Reference 6.4.2.14) which details the required mitigation for landscape and habitat features impacted by low rainfall.	Risk reduced through design	As likely as not	Minor	Low
13	Increase in storm intensity	It is an established fast that human-induced greenhouse gas emissions have led to an increased frequency and/or intensity of some weather and climate extremes since pre-industrial time, in particular for temperature extremes.	Stronger winds, heatwaves, heavy precipitation	Built terrestrial assets, staff facilities and access	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration or tree falls. Structures damaged by strong winds directly, or indirectly via falling trees and	Operation	ES Appendix 10.1 FRA and Drainage Strategy (Document Reference 6.4.10.1) includes a number of adaptation measures that would be considered in the detailed design and operations management. Design takes into account potential falling trees and will be designed with stronger winds accounted for.	Risk reduced through design	As likely as not	Minor	Low
14	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 32.3 days per year in the period between 2050 and 2079.	Increase in annual temperature	All receptors	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks.	Decommissioning	Prevention measures will be covered in the Decommissioning Environmental Management Plan (DEMP), likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	Very unlikely	Minimal	Very Low
15	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 32.3 days per year in the period between 2050 and 2079.	Increase in summer temperature	Staff, visitors on-site	Increased heat stress/ heat exhaustion for workers.	Decommissioning	Prevention measures will be covered in the DEMP and health and safety plans and likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	Unlikely	Minimal	Very Low
16	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 32.3 days per year in the period between 2050 and 2079.	Increase in summer temperature	Built assets, materials, staff facilities and access routes to sites	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks.	Decommissioning	Prevention measures will be covered in the DEMP and health and safety plans and likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	Unlikely	Minimal	Very Low
17	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 32.3 days per year in the period between 2050 and 2079.	Increase in heat waves	Staff, visitors onsite	Increased heat stress/ heat exhaustion for workers.	Decommissioning	Prevention measures will be covered in the DEMP and health and safety plans and likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	As likely as not	Minimal	Low
18	High temperatures	Mean daily summer temperatures are expected to increase by 2.7°C (from 14.9°C to 17.6°C) in the period between 2050 and 2079. Number of hot days (daily maximum temperature higher than 25 °C) projected to increase from baseline 5.6 to 32.3 days per year in the period between 2050 and 2079.	Increase in heat waves	Built assets, materials, staff facilities and access routes to sites	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks.	Decommissioning	Prevention measures will be covered in the DEMP and health and safety plans and likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	As likely as not	Minimal	Low
19	High precipitation	Mean precipitation rates in the region are projected to change, increasing by 8.75% in the winter and decreasing by 17.5% in summer in the period between 2050 and 2079. Number of days with extreme precipitation (>25mm) is set to decrease from 1.3 days to 1.2 days between 2050 and 2079.	Increase to winter rainfall	Built assets, materials, staff facilities and access routes to sites	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	Decommissioning	Prevention measures will be covered in the DEMP and health and safety plans and likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	Unlikely	Minimal	Very Low
20	Low precipitation	Mean precipitation is expected to decrease in summer from 2mm a day to 1.65mm in the period between the 2050 and 2079. Dry spells (10 days or more with no precipitation) are expected to increase from 2.7 days in the baseline period to 3.2 days for the period between 2050 and 2079.	Decrease in summer rainfall	All receptors	None considered	Decommissioning	None considered	N/A			
21	Increase in storm intensity	It is an established fast that human-induced greenhouse gas emissions have led to an increased frequency and/or intensity of some weather and climate extremes since pre-industrial time, in particular for temperature extremes.	Stronger winds, heatwaves, heavy precipitation	Built assets, materials, staff facilities and access routes to sites	Damage to structures / materials / equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high winds increasing dust (and other debris), storm surge and coastal erosion.	Decommissioning	Prevention measures will be covered in the DEMP and health and safety plans and likely to be similar to CEMP. An Outline DEMP is provided with the DCO Application as ES Appendix 2.7 (Document Reference 6.4.2.7)	Risk reduced through mitigation	Unlikely	Minimal	Very Low

Likelihood Rating

Level	Descriptor	Description
A	**Very unlikely**	Event only occurs in exceptional circumstances and would not be expected to occur in the lifetime of the development.
B	**Unlikely**	Based on the current design, engineering and maintenance standards, the event is not expected to occur more than once during the lifetime of the development.
C	**As likely as not**	Event may occur at least once during the lifetime of the development.
D	**Likely**	Event is expected to occur several times during the lifetime of the development.
E	**Very likely**	Event is expected to occur many times during the lifetime of the development.

Consequence Rating

Level	Descriptor	Disruption	Public Perception	Financial	Safety	Damage
1	**Minimal**	Minpr service disruption within a single day <30 mins.	Short-term adverse local stakeholder reaction.	Insignificant financial loss.	Minor harm or near miss -no adverse human health effects or complaints.	No damage to assets.
2	**Minor**	Minor service disruption for multiple days or delays up to 2h on a single day.	Adverse local media reports over sustained period; localised stakeholder concern.	Additional operational costs. Minor financial loss.	Lost time injury or medical treatment, short term impact on persons affected.	No permanent damage. Some minor restoration work required.
3	**Moderate**	Service delays of up to 2h for multiple days or major delays (>2h) in a single day.	Significant local and /or regional reports including social media. National media interest creating public concern	Moderate financial loss.	Long-term injury or illness, porlonged hospitalisation or inability to work.	Widespread damage and loss of service. Damage recoverable by maintenance and minor repair. Partial loss of local infrastructure.
4	**Major**	Service closed for 1 day or major delays for multiple days.	Negative national reporting and public disputes with key stakeholders, utility companies or other government agencies such as the Environment Agency.	Major financial loss.	Single fatality/ multiple long-term injuries-emergency response.	Extensive damage requiring extensive repair.
5	**Catastrophic**	Service closed for multiple days.	Extensive and prolonged negative reporting nationally and or public disputes with key stakeholders.	Significantly high financial loss.	Multiple fatalities - emergency response.	Permanent damage and/or loss of service. Retreat and translocation of development.

Risk Rating

			Consequence				
			1	2	3	4	5
			Minimal	**Minor**	**Moderate**	**Major**	**Catastrophic**
Likelihood	**A**	**Very Likely**	Medium	Medium	High	Very High	Very High
	B	**Likely**	Low	Medium	Medium	Very High	Very High
	C	**As Likely as Not**	Low	Low	Medium	High	High
	D	**Unlikely**	Very Low	Very Low	Low	Medium	Medium
	E	**Very unlikely**	Very Low	Very Low	Low	Low	Medium