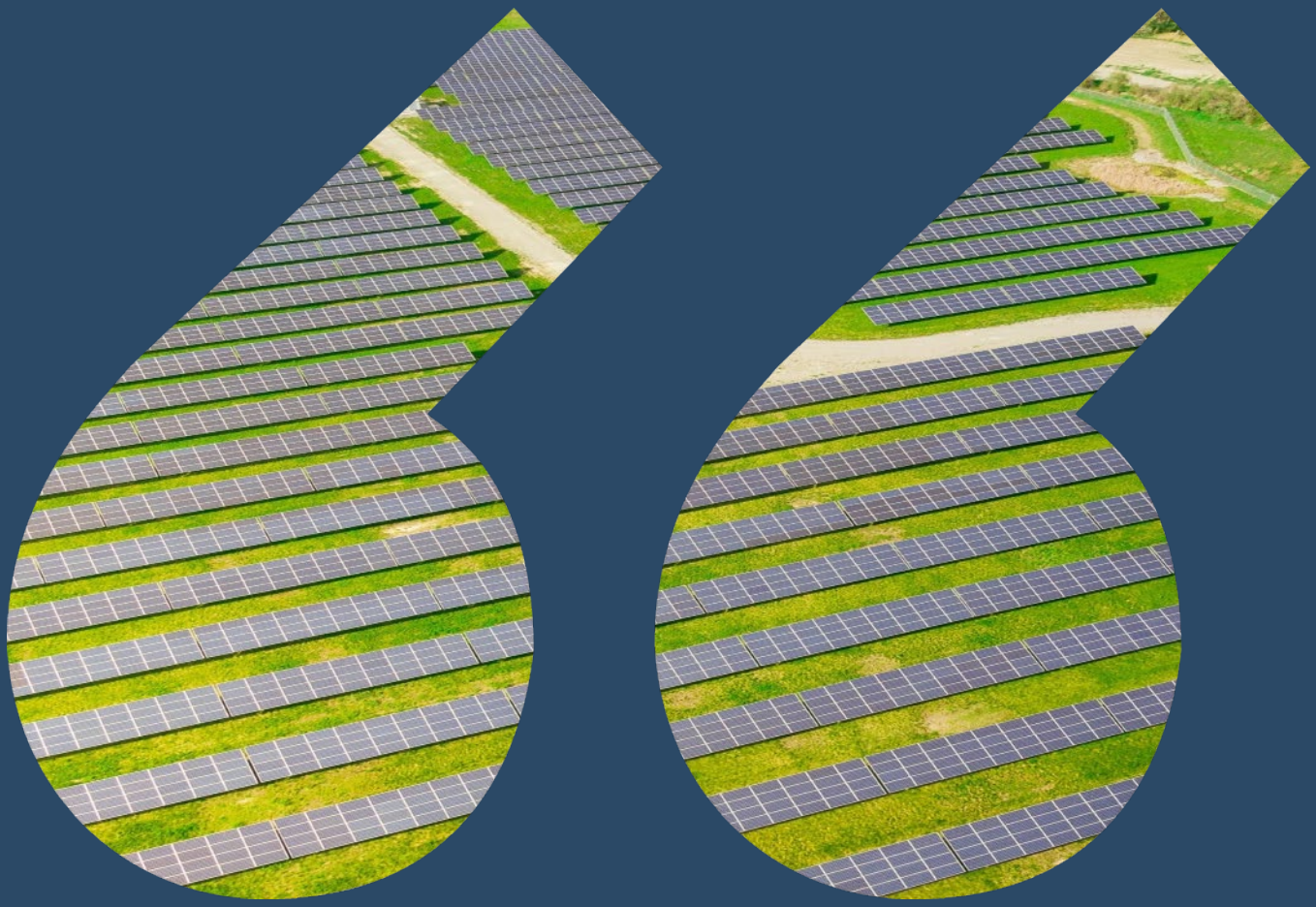

MERIDIAN SOLAR FARM

PEIR VOLUME III APPENDIX 5-1: CLIMATE CHANGE RISK ASSESSMENT

Meridian Solar

1. Climate Change Risk Assessment

1.1.1. This appendix presents the climate change risk assessment that has been completed for the Scheme. At this stage, the assessment considers the PEIR design and therefore will be revisited at the ES stage when the design is further advanced.

1.1.2. The assessment only covers the operational phase of the Scheme as the construction and decommissioning phases are considered short term that would result in minimal risks. The risks that are present during these phases would be mitigated through management plans such as the CEMP and the DEMP.

1.1.3. Tables 1 to 3 present the matrices the risk assessment has been completed against. These determine the level of likelihood, consequence and overall significance of the risks.

1.1.4. The assessment refers to 'Equipment/structures' as a receptor. This includes: solar PV modules, module mounting structures, electrical equipment (inverters, transformers, switchgears), equipment housing (on site substations), cabling, BESS, and pylons.

1.1.5. At the ES stage, this assessment will be more comprehensive once the design of the Scheme has been further development.

Table 1 CCRA Likelihood Matrix

Level of Likelihood	Definition of Likelihood
Very Unlikely	0–10% probability that the hazard will occur
Unlikely	10–33% probability that the hazard will occur
Possible, about as likely as not	33–66% probability that the hazard will occur
Likely	66–90% probability that the hazard will occur
Very Likely	90–100% probability that the hazard will occur

Table 2 CCRA Consequence Matrix

Level of Consequence of a Climate Risk Occurring	Definition of Consequence
Very Large	Permanent damage to structures/assets; Complete loss of operation/service; Complete renewal of infrastructure; Exceptional environmental damage; and/or Extreme financial impact.
Large	Extensive damage to structures/assets; Partial loss of operation/service over a broad area or critical function; Partial renewal of infrastructure; Large adverse effect on the environment, requiring remediation; and/or Major financial impact.
Moderate	Some infrastructure damage and partial loss of service over localised area; Minor infrastructure renewal; Adverse impact on the environment; and/or Moderate financial impact.
Minor	Localised infrastructure disruption and minor loss of service; No permanent damage, minor restoration work required; Slight adverse environmental effects; and/or small financial losses.
Negligible	No damage to infrastructure; No impacts on the environment; No adverse financial impact.

Table 3: CCRA Significance Matrix

Consequence of Climate Change Impact	Likelihood of Climate Change Impact				
	Very Unlikely	Unlikely	Possible	Likely	Very Likely
Negligible	Low (Not significant)	Low (Not significant)	Medium (Not significant)	Medium (Not significant)	Medium (Not significant)
Minor	Low (Not significant)	Low (Not significant)	Medium (Not significant)	High (Significant)	High (Significant)
Moderate	Low (Not significant)	Medium (Not significant)	High (Significant)	High (Significant)	Very High (Significant)
Large	Medium (Not significant)	High (Significant)	High (Significant)	Very High (Significant)	Very High (Significant)
Very Large	Medium (Not significant)	High (Significant)	Very High (Significant)	Very High (Significant)	Very High (Significant)

Table 4 Operational Phase CCRA – PV Area

Risk ID	Climate Hazard	Receptor	Impact	Embedded Mitigation	Likelihood	Consequence	Significance
1	Increase in mean summer temperatures/frequency of heatwaves	Equipment/structures	Damage to equipment/structures due to exceeding maximum temperature design thresholds causing a loss of operation	Equipment/structures would be designed to consider an increase in mean temperatures and frequency of heatwaves throughout the design life of the scheme. This could consider shade and HVAC for electrical equipment.	Unlikely	Moderate	Medium (Not significant)
2	Increase in mean summer temperatures/frequency of heatwaves	Operational efficiency	Excessive heat may lead to a decrease in the solar PV panels efficiency, leading to a decrease in output	Solar PV module design specification to account for projected increase in mean temperatures throughout the design life of the Scheme to ensure that efficiency is optimised.	Unlikely	Minor	Low (Not significant)
3	Increase in extreme rainfall events	Equipment/structures	Damage to equipment/structures due to flooding of the site and/or damage from heavy rainfall. Foundations may be negatively impacted due to changes in the soil moisture levels. Rainfall leading to breaching of the River Welland flood defences and flooding arising from failures of the drainage channel pumping stations	Equipment/structures would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the Site to protect the key infrastructure. Design mitigation measures could also consider raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
4	Increase in extreme rainfall events	Access roads	Access to the site compromised due to flooding of roads and transport	Access roads would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency access routes would be established as part of operational management procedures.	Unlikely	Minor	Low (Not significant)
5	Increase in extreme rainfall events	Workforce	Decrease in workforce safety due to flooding	Ensure that the welfare cabins within the Scheme Boundary are located in areas that are not susceptible to flooding. Mitigations would be in place to protect workface in case of emergency, accounted for through operational management procedures.	Unlikely	Moderate	Medium (Not significant)
6	Increase in extreme storms (rain and wind)	Equipment/structures	Damage to equipment/structures due to extreme rain, wind and flooding	Equipment/structures would be located in areas that are not susceptible to flooding and/or high winds. Tall trees or other objects that could fall in high winds would not be located near key equipment. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
7	Increase in extreme storms (rain and wind)	Access roads	Access to the Site compromised due to flooding and debris damaging roads and transport	Access roads would be located in areas that are not susceptible to flooding. Tall trees or other objects that could fall due to high winds would not be located near key access roads. Emergency access routes and road clearing processes would be included as part of operational management and health and safety procedures.	Unlikely	Minor	Low (Not significant)
8	Increase in extreme storms (rain and wind)	Workforce	Workforce safety compromised due to extreme rain, flooding, wind, and debris	Ensure that the on-Site welfare cabins are located in areas that are not susceptible to flooding and/or high winds. Mitigation measures would be in place to protect workface in case of emergency and considered as part of operational management procedures.	Unlikely	Moderate	Medium (Not significant)
9	Decrease in rainfall in the summer leading to drought	Workforce/ Scheme maintenance	Increase in dust affecting workforce welfare	Dust management would be included as part operational management procedures. This could include water bowsers on site or carrying out early grass seeding to minimise the dirt coverage within the Scheme.	Unlikely	Negligible	Low (Not significant)
10	Increase in mean summer temperatures/frequency of heatwaves	BESS	Increase in risk of fire due to overheating	The Battery Storage Safety Plan will mitigate the increased risk of fires due to heatwaves. This includes battery selection and design, storage environment, implementation of a battery management system (fire detection systems) and adjacent water storage tanks.	Very Unlikely	Large	Medium (Not significant)

Table 5 Operational Phase CCRA – Grid Connection Corridor

Risk ID	Climate Hazard	Receptor	Impact	Embedded Mitigation	Likelihood	Consequence	Significance
1	Increase in mean summer temperatures/frequency of heatwaves	Equipment/structures	Damage to equipment/structures due to exceeding maximum temperature design thresholds causing a loss of operation	Equipment/structures would be designed to consider an increase in mean temperatures and frequency of heatwaves throughout the design life of the scheme. This could consider shade and HVAC for electrical equipment and design considerations for the overhead line.	Unlikely	Moderate	Medium (Not significant)
2	Increase in extreme rainfall events	Equipment/structures	Damage to equipment/structures due to flooding of the site and/or damage from heavy rainfall. Foundations may be negatively impacted due to changes in the soil moisture levels. Rainfall leading to breaching of the River Welland flood defences and flooding arising from failures of the drainage channel pumping stations	Equipment/structures would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the Site to protect the key infrastructure. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
3	Increase in extreme rainfall events	Access roads	Access to the Site compromised due to flooding of roads and transport	Access roads would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency access routes would be established as part of operational management procedures.	Unlikely	Minor	Low (Not significant)
4	Increase in extreme storms (rain and wind)	Equipment/structures	Damage to equipment/structures due to extreme rain, wind and flooding	Equipment/structures would be located in areas that are not susceptible to flooding and/or high winds. Tall trees or other objects that could fall in high winds would not be located near key equipment. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
5	Increase in extreme storms (rain and wind)	Access roads	Access to the Site compromised due to flooding and debris damaging roads and transport	Access roads would be located in areas that are not susceptible to flooding. Tall trees or other objects that could fall due to high winds would not be located near key access roads. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency Access routes and road clearing processes would be included as part of operational management and health and safety procedures.	Unlikely	Minor	Low (Not significant)

Table 6 Operational Phase CCRA – Inter-Array Areas. Scenario 1: Overhead

Risk ID	Climate Hazard	Receptor	Impact	Embedded Mitigation	Likelihood	Consequence	Significance
1	Increase in mean summer temperatures/frequency of heatwaves	Equipment/structures	Damage to equipment/structures due to exceeding maximum temperature design thresholds causing a loss of operation	Equipment/structures would be designed to consider an increase in mean temperatures and frequency of heatwaves throughout the design life of the scheme. This could consider shade and HVAC for electrical equipment.	Unlikely	Moderate	Medium (Not significant)
2	Increase in mean summer temperatures/frequency of heatwaves	Overhead cables	As temperatures rise, cables may experience thermal expansion, which can cause strain on the infrastructure, leading to sagging or tension problems. Prolonged heat can also degrade cable insulation more quickly, increasing the likelihood of electrical faults or short circuits. Additionally, higher temperatures can lead to the risk of fires.	To mitigate these impacts, overhead cables would be made from more heat-resistant materials. Vegetation management practices, such as clearing dry vegetation and creating defensible space around cables, would help reduce fire risks.	Unlikely	Moderate	Medium (Not significant)
3	Increase in extreme rainfall events	Equipment/structures	Damage to equipment/structures due to flooding of the site and/or damage from heavy rainfall. Foundations may be negatively impacted due to changes in the soil moisture levels. Rainfall leading to breaching of the River Welland flood defences and flooding arising from failures of the drainage channel pumping stations	Equipment/structures would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the Site to protect the key infrastructure. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
4	Increase in extreme rainfall events	Access roads	Access to the Site compromised due to flooding of roads and transport	Access roads would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency access routes would be established as part of operational management procedures.	Unlikely	Minor	Low (Not significant)
5	Increase in extreme storms (rain and wind)	Equipment/structures	Damage to equipment/structures due to extreme rain, wind and flooding	Equipment/structures would be located in areas that are not susceptible to flooding and/or high winds. Tall trees or other objects that could fall in high winds would not be located near key equipment. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
6	Increase in extreme storms (rain and wind)	Access roads	Access to the Site compromised due to flooding and debris damaging roads and transport	Access roads would be located in areas that are not susceptible to flooding. Tall trees or other objects that could fall due to high winds would not be located near key access roads. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency Access routes and road clearing processes would be included as part of operational management and health and safety procedures.	Unlikely	Minor	Low (Not significant)
7	Increase in extreme storms (rain and wind)	Overhead cables	Strong winds and flying debris can cause physical damage to cables or supporting structures, leading to power outages or disruptions in service. Lightning can also directly damage the cables or their insulation, causing electrical surges or even fires	Cables and structures would be designed to withstand extreme wind speeds, and other storm-related factors. This includes reinforcement of cable supports and using water-resistant materials. Also, surge protection systems and grounding would be implemented to mitigate the effects of lightning strikes.	Unlikely	Moderate	Medium (Not significant)

Table 7 Operational Phase CCRA – Inter-Array Areas. Scenario 2: Underground

Risk ID	Climate Hazard	Receptor	Impact	Embedded Mitigation	Likelihood	Consequence	Significance
1	Increase in mean summer temperatures/frequency of heatwaves	Equipment/structures	Damage to equipment/structures due to exceeding maximum temperature design thresholds causing a loss of operation	Equipment/structures would be designed to consider an increase in mean temperatures and frequency of heatwaves throughout the design life of the scheme. This could consider shade and HVAC for electrical equipment.	Unlikely	Moderate	Medium (Not significant)
2	Increase in mean summer temperatures/frequency of heatwaves	Underground cables	Consistent higher temperatures can lead to significantly elevated ground temperatures, impacting the operational capacity of underground cables due to increased heat dissipation requirements.	High temperature resistant insulation would help mitigate overheating risks.	Unlikely	Minor	Low (Not significant)
3	Increase in extreme rainfall events	Equipment/structures	Damage to equipment/structures due to flooding of the site and/or damage from heavy rainfall. Foundations may be negatively impacted due to changes in the soil moisture levels. Rainfall leading to breaching of the River Welland flood defences and flooding arising from failures of the drainage channel pumping stations	Equipment/structures would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the Site to protect the key infrastructure. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
4	Increase in extreme rainfall events	Access roads	Access to the Site compromised due to flooding of roads and transport	Access roads would be located in areas that are not susceptible to flooding. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency access routes would be established as part of operational management procedures.	Unlikely	Minor	Low (Not significant)
5	Increase in extreme rainfall events	Underground cables	Heavy rainfall can lead to flooding, inundating underground cable trenches and causing damage through water intrusion and potential buoyancy issues.	To mitigate flooding impacts on underground cables, waterproof cable insulation would be used and well-sealed joints, and waterproof ducts considered in flood-prone areas.	Unlikely	Moderate	Medium (Not significant)
6	Increase in extreme rainfall events	Underground cables	Increased rainfall and soil instability due to climate change can trigger land movements, which may disrupt underground cables by displacing them or damaging their protective coverings.	Land and soil movements caused by increased rainfall and soil instability can displace or damage cables. To prevent this, soil assessments would be conducted before installation and protective encasements would be used, if required.	Unlikely	Moderate	Medium (Not significant)
7	Increase in extreme storms (rain and wind)	Equipment/structures	Damage to equipment/structures due to extreme rain, wind and flooding.	Equipment/structures would be located in areas that are not susceptible to flooding and/or high winds. Tall trees or other objects that could fall in high winds would not be located near key equipment. Where this is not possible, flooding prevention measures and shelters would be designed on the Site to protect the key infrastructure. Design mitigation measures would include raising the solar PV panels above the predicted flood line.	Unlikely	Moderate	Medium (Not significant)
8	Increase in extreme storms (rain and wind)	Access roads	Access to the Site compromised due to flooding and debris damaging roads and transport	Access roads would be located in areas that are not susceptible to flooding. Tall trees or other objects that could fall due to high winds would not be located near key access roads. Where this is not possible, flooding prevention measures would be designed on the site to protect the key access routes. Emergency Access routes and road clearing processes would be included as part of operational management and health and safety procedures.	Unlikely	Minor	Low (Not significant)