

Sapphire Solar Farm
Environmental Impact Statement



Volume 3 - Appendices

Appendix J
Water and Soil SEARs Responses

Appendix I. Water and Soil SEARs responses

The following table provides a response to Office of Environment and Heritage *Standard Environmental Assessment Requirements* for Water and Soils and Flooding and Coastal Erosion provided in the SEARs.

Water and soils	
<p>The EIS must map the following features relevant to water and soils including:</p> <ul style="list-style-type: none"> • Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map); • Rivers, streams, wetlands, estuaries; • Groundwater; • Groundwater dependent ecosystems; and • Proposed intake and discharge locations. 	<p>Maps provided for:</p> <ul style="list-style-type: none"> • The Acid Sulfate Soil Planning Map does not extend to the Site, however ASRIS mapping was used. • Rivers, streams, wetlands, estuaries; • Groundwater bores; and • Groundwater dependent ecosystems. <p>Proposed intake and discharge locations – Not applicable as the project proposes to take and discharge no water.</p>
<p>The EIS must describe background conditions for any water resource likely to be affected by the project, including:</p> <ul style="list-style-type: none"> • Existing surface and groundwater; • Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations; • Water Quality Objectives (as endorsed by the NSW Government) including groundwater as appropriate that represent the community’s uses and values for receiving waters; and • Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government. 	<p>Details provided for:</p> <ul style="list-style-type: none"> • Existing surface and groundwater quality and quantity; • Water Quality Objectives for Development site described; and • Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality for the protection of aquatic ecosystems. Compared with baseline water quality monitoring results for SWF. <p>No impacts to water quality are anticipated for the project. Hydrology described – no water take or release proposed at development site.</p>
<p>The EIS must assess the impacts of the project on water quality, including:</p> <ul style="list-style-type: none"> • The nature and degree of impact on receiving waters for both surface and groundwater; Demonstrating how the project protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are not currently being achieved. This should include an assessment of the mitigating effects of proposed 	<p>EIS assesses:</p> <ul style="list-style-type: none"> • The nature and degree of impact on receiving waters for both surface and groundwater. This includes an assessment of the mitigating effects of proposed stormwater and wastewater; and management during and after construction • No impacts to water quality are anticipated for the project • SWF monitoring of water quality is proposed to support SSF requirements.

<p>stormwater and wastewater management during and after construction; and</p> <ul style="list-style-type: none"> • Identification of proposed monitoring of water quality. 	
<p>The EIS must assess the impact of the project on hydrology, including:</p> <ul style="list-style-type: none"> • Water balance including quantity, quality and source; • Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas; • Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems; • Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplain that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches); • Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water; • Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options; and • Identification of proposed monitoring of hydrological attributes. 	<p>EIS assesses:</p> <ul style="list-style-type: none"> • Water balance including quantity, quality and source; • Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas; • Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems; • Impacts to natural processes and functions within rivers, wetlands and floodplain. No impact is determined so it is anticipated that the project has no significant effect on natural processes and functions; • No changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water are anticipated; and • Mitigating effects of proposed stormwater and wastewater management. <p>The Proposed Development will not have a significant impact on hydrology and no monitoring of hydrological attributes is proposed.</p>
<p>Flooding and coastal erosion</p>	
<p>The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005:</p> <ul style="list-style-type: none"> • Flood prone land; • Flood planning area, the area below the flood planning level; and • Hydraulic categorisation (floodways and flood storage areas). 	<p>Flood prone land is mapped in the EIS.</p> <p>As described within the Floodplain Development Manual 2005, the site contains no:</p> <ul style="list-style-type: none"> • Flood planning area; or • Floodways and flood storage areas.
<p>The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.</p>	<p>The EIS describes flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10, 1 in 20, 1 in 100, 1 in 200, 1 in 500 and 1 in 1000 year flood levels.</p> <p>Probable maximum flood was not modelled as it is not considered relevant to the flood risk characteristics or setting of the current proposal. Probable maximum flood</p>

	modelling is used to test engineering assumptions where structural failure represents a risk to life and property.
<p>The EIS must model the effect of the proposed project (including fill) on the flood behaviour under the following scenarios:</p> <ul style="list-style-type: none"> • Current flood behaviour for a range of design events as identified above. The 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change. 	<p>The EIS models the effect of the proposed project on the current and climate change flood behaviour under the following scenarios:</p> <p>1 in 10, 1 in 20, 1 in 100, 1 in 200, 1 in 500 and 1 in 1000 year flood levels.</p> <p>Methodology adopted reflected advice provided in Australian Rainfall and Runoff guidelines recommends applying a 5% change in design rainfall per degree of global warming under the RCP 6 climate change scenario (median greenhouse gas emissions). 2050 projected conditions using the CMIP 5 global climate models (latest global climate models) produced a mean change in temperature of 1.5 degrees Celsius.</p>
<p>Modelling in the EIS must consider and document:</p> <ul style="list-style-type: none"> • The impact on existing flood behaviour for a full range of flood events including up to the maximum probable maximum flood; • Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories; and • Relevant provisions of the NSW Floodplain Development Manual 2005. 	<p>The EIS models the effect of the proposed project on the current and climate change flood behaviour under the following scenarios:</p> <p>1 in 10, 1 in 20, 1 in 100, 1 in 200, 1 in 500 and 1 in 1000 year flood levels. Probable maximum flood was not modelled as it is not considered relevant to the flood risk characteristics of the current proposal. Probable maximum flood modelling is used to test engineering assumptions and is not considered appropriate prior to concept design.</p> <p>The flood modelling has been undertaken in accordance with relevant provisions for developers in the NSW Floodplain Development Manual.</p>
<p>The EIS must assess the impacts on the proposed project on flood behaviour, including:</p> <ul style="list-style-type: none"> • Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure; • Consistency with Council floodplain risk management plans; • Compatibility with the flood hazard of the land; • Compatibility with the hydraulic functions to flow conveyance in floodways and storage in flood storage areas of the land; • Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site; • Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses; 	<p>The EIS assesses the impacts on the proposed project on flood behaviour, including:</p> <ul style="list-style-type: none"> • Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure; • Compatibility with the flood hazard of the land; • Compatibility with the hydraulic functions to flow conveyance in floodways and storage in flood storage areas of the land; • Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site; • Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses; • Any impacts the development may have upon existing community emergency management

<ul style="list-style-type: none">• Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council;• Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council;• Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and SES; and• Any impacts the development may have on the social and economic costs to the community as consequences of flooding.	<p>arrangements for flooding. These matters are to be discussed with the SES and Council; and</p> <ul style="list-style-type: none">• Any impacts the development may have on the social and economic costs to the community as consequences of flooding. <p>The following requirements are not considered relevant to the flood characteristics of the Proposed Development due to the demonstrated non-significant effect on flooding:</p> <ul style="list-style-type: none">• Consistency with Council floodplain risk management plans;• Compatibility with the flood hazard of the land;• Compatibility with the hydraulic functions to flow conveyance in floodways and storage in flood storage areas of the land;• Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council; and• Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and SES.
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