



Soil, Water and Stormwater Management Plan

WELLINGTON SOLAR FARM



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Plan Control

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ACRONYMS AND ABBREVIATIONS

ARI	Average Recurrence Interval
CoC	Conditions of Consent
CEMP	Construction Environmental Management Plan
EMS	Environmental Management Strategy
BOM	Australian Bureau of Meteorology
DCP	Development Control Plan
DP&I	(NSW) Department of Planning and Infrastructure
DRC	Dubbo Regional Council
EIA	Environmental Impact Assessment
EIS	Environment Impact Statement
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
ERSED	Erosion and Sediment
ESCP	Erosion and Sediment Control Plan
GDE	Groundwater Dependant Ecosystem
ha	hectares
IFD	Intensity – Frequency – Design (Rainfall IFD Data)
ISEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i> (NSW)
LGA	Local Government Area
MP	Management Plan
NOW	NSW Office of Water
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
POEO Act	<i>Protection of the Environment and Operations Act 1997</i>
HSEQ	Health, Safety, Environment and Quality Manager
SM	Site Manager
SMP	Stormwater Management Plan
SoC	Statement of Commitments
SWSMP	Soil, Water and Stormwater Management Plan
SWMS	Safety Work Method Statement
The Proponent	Lightsource BP
The Project	Wellington Solar Farm
WM Act	<i>Water Management Act 2000</i>

1 INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

Planning permission was received on 25 May 2018 for the construction and operation of a 174 megawatt (MW) photovoltaic (pv) solar farm with an energy storage facility, located 2 km north-east of Wellington within the Dubbo Local Government Area (LGA). The Wellington Solar Farm ('the Project') is a State Significant Development and represents an important contribution to renewable energy generation in New South Wales.

On December 11, 2019, a Modification Application (NGH 2019) was approved by the Department of Planning, Industry and Environment (DPIE) to expand the existing substation on Goolma Road and change the transmission connection to it. This was required to facilitate connection of the project to the substation.

On 3 April 2020, the second Modification Application (NGH 2019) was approved by DPIE to modify the solar panel layout, electrical and transmission connection routes, expand the battery storage facility and add an additional operations and maintenance building. In addition, the second Modification Application confirmed panel technology and the site access point relocation.

The Environmental Management Strategy (EMS) has been prepared to comply with the Conditions of Consent (CoC) from the New South Wales Minister for Planning and all applicable legislation, during the construction of the Project. The EMS has been prepared only for the construction component of the Project and will be updated to incorporate the operational aspects of the proposal following construction.

This Soil, Water and Stormwater Management Plan (SWSMP) has been prepared as part of the overall EMS. The purpose of this SWSMP is to describe how impacts on soil and water will be minimised and managed during construction of the Project.

The approved general layout as well as a regional context map are provided in Appendix A.

1.2 THE PROJECT

The Scope of Works under the contract includes all works necessary to design, construct, test, commission, energise, decommission, and train staff in the operation of a 170 MW_{AC} solar farm including energy storage (approximately 25 MW / 100 MW rated capacity), and inverter stations.

The Scope of Works consists of but is not limited to:

- Approximately 500,714 solar panels (up to 4.5 metres (m) in height) and approximately 33 inverter stations (up to 4 m in height).
- An energy storage facility (approximately 25 MW / 100 MW rated capacity) with up to 6 purpose-built blocks (which will be constructed at a later date outside the main construction period).
- Underground 33kV, 132 kV or 330 kilovolt (kV) transmission cables connecting the energy storage facility to the Transgrid substation.
- Internal access tracks, staff amenities, car parking, laydown area and security fencing.
- The substation expansion includes underground transmission cables and an additional substation bench (located on the western edge of the existing substation).
- The number of panels has increased from the estimated 440,000 in the EIS to 500,714.
- The number of inverter stations has decreased from 50 to 33.

During construction, the site will be accessed off Goolma Road, approximately 4.6 km north of the intersection with the Mitchell Highway. Key road works for the Project will involve upgrading the intersection of Goolma Road and the site access point with a Basic Right Turn (BAR) and Basic Left Turn (BAL) treatment.

The construction period will last for up to 12 months from the commencement of site establishment works and include a peak period of 6 months. Construction hours will be limited to Monday to Friday 7 am to 6 pm, and Saturday 8 am to 1pm.

The estimated Capital Investment Value of the Project is \$270 million.

1.3 SCOPE

This Soil, Water and Stormwater Management Plan (SWSMP) has been prepared to address the requirements of the mitigation and management measures listed in the Wellington Solar Farm Environmental Impact Statement (EIS), final amended Statements of Commitment (SoCs) listed in the Wellington Solar Farm Submissions Report and the Conditions of Consent (CoC) from the Minister for Planning. Additionally, it considers legislation and guidelines applicable to soil and water management during construction.

1.4 ENVIRONMENTAL MANAGEMENT SYSTEMS OVERVIEW

The overall Environmental Management System (EMS) for the Project is described in the EMS.

The SWSMP is part of the Lightsource BP environmental management framework for the Project, as described in the EMS. Mitigation and management measures identified in this SWSMP will be incorporated into site or activity specific Environmental Work Method Statements (EWMS) and progressive Erosion and Sediment Control Plans (ESCPs). ESCPs are designed for use as a practical guide and may be produced in conjunction with EWMS to provide more detailed site-specific environmental mitigation measures.

Used together, the EMS, management measures, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by Lightsource BP personnel and contractors.

The review and document control processes for this SWSMP are described in Section 9.

Management of the impacts to soil and water during operation of the Project are documented in this SWSMP.

2 PLANNING

2.1 RELEVANT LEGISLATION AND GUIDELINES

2.1.1 Legislation

Legislation relevant to soil and water management includes:

- *Protection of the Environment Operations Act 1997*
- *Water Management Act 2000*
- *Fisheries Management Act 2004*
- *Contaminated Land Management Act 1997*

Relevant provisions of the above legislation are explained in the register of legal and other requirements included in the EMS.

2.1.2 Guidelines and Standards

The main guidelines, specifications and policy documents relevant to this SWSMP include:

- *Managing Urban Stormwater – Soils and Construction Vols. 1 and 2, 4th edition* (Landcom 2004).
- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (NSW, March 2004)
- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge, 2003)
- *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI, 2003).
- *Guidelines for Watercourse Crossings on Waterfront Land* (NSW DPI, 2012)
- *Policies and Guidelines for Fish Habitat Conservation and Management* (NSW DPI, Update 2013)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZAST 2018)
- Floodplain Management Plan (NSW DPI);
- Controlled Activities Guidelines for water sharing plans (NSW DPI);
- Floodplain Development Manual (OEH)
- ANZECC Management Framework (Appendix B)
- ANZECC 2000 Sediment quality Guidelines (Appendix C)

2.1.3 Local Government

The Dubbo Regional Council's (DRC) Development Control Plan (DCP) will be used as a reference in the development of the Stormwater Plan.

2.1.4 Discovery of buried contaminants

The EIS determined that there was a very low risk that contamination associated with agricultural activities (e.g. pesticides) could be present on site. A protocol for discovering buried contaminants can be found in Appendix D. All staff on site will be made aware of this protocol.

2.1.5 Conditions of Consent

The EIS assessed impacts on soil and water during the construction of the Project. The SoC and the CoC detail the requirements of the SWSMP. Details of the SoC and CoC in relation to soil and water are provided below (Table 2-1).

Table 2-1 Location of information in this SWSMP addressing the CoC/SoC.

Item	CoC/SoC	Reference
Conditions of Consent		
Schedule 3 20	The Applicant must ensure that the development does not cause any water pollution as defined under section 120 of the <i>Protection of the Environment Operations Act 1997</i> (POEO Act).	Section 7
Schedule 3 21	Prior to the commencement of construction, the Applicant must prepare a detailed Stormwater Plan for the site to the satisfaction of the Secretary. Following the Secretary's approval, the Applicant must implement the Stormwater Plan.	Section 5.2
Statement of Commitments		
Land use (including mineral resources)		
RTS, Appendix A	A Rehabilitation Plan would be prepared to ensure the array site is returned to its pre-solar farm land capability. The plan would be developed with reference to base line soil testing and with input from an Agronomist to ensure the site is left stabilised, under a cover crop or other suitable ground cover. The plan would reference: <ul style="list-style-type: none"> • Australian Soil and Land Survey Handbook (CSIRO 2009) • Guidelines for Surveying Soil and Land Resources (CSIRO 2008) • The land and soil capability assessment scheme: second approximation (OEH 2012) 	Rehabilitation Plan
Soils		
RTS, Appendix A	The array would be designed to allow sufficient space between panels to establish and maintain ground cover beneath the panels and facilitate weed control.	Appendix A
RTS, Appendix A	As part of the EMS, a Soil and Water Management Plan (SWMP) (with erosion and sediment control plans) will be prepared, implemented and monitored during the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. These plans would include provisions to: <ul style="list-style-type: none"> • Carry out soil testing prior to any impacts, to inform any soil treatments and provide baseline information for the decommissioning rehabilitation. • Install, monitor and maintain erosion controls. • Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability. • Manage topsoil: In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. Stockpile topsoil appropriately so as to minimise weed infestation, maintain soil organic matter, maintain soil structure and microbial activity. • Minimise the area of disturbance from excavation and compaction; rationalise vehicle movements and restrict the location of activities that compact and erode the soils as much as practical. Any compaction caused 	This document ESCPs as part of the CEMP

Item	CoC/SoC	Reference
	<p>during construction would be treated such that revegetation would not be impaired.</p> <ul style="list-style-type: none"> Manage works in consideration of heavy rainfall events; if a heavy rainfall event is predicted, the site should be stabilised, and work ceased until the wet period had passed. 	
RTS, Appendix A	<p>A Spill and Contamination Response Plan would be developed as part of the overall Emergency Response Plan to prevent contaminants affecting adjacent surrounding environments. The plan would include measures to:</p> <ul style="list-style-type: none"> Respond to the discovery of existing contaminants at the site (e.g. pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements. Requirement to notify EPA for incidents that cause material harm to the environment (refer s147-153 <i>Protection of the Environment Operations Act</i>). Manage the storage of any potential contaminants onsite. Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation). Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. Prevent contaminants affecting adjacent pastures, dams, water courses and native vegetation. Monitor and maintain spill equipment Induct and train all site staff. 	Appendix A
RTS, Appendix A	<p>A Groundcover Management Plan would be developed in consultation with an agronomist and taking account of soil survey results to ensure perennial grass cover is established across the site as soon as practicable after construction and maintained throughout the operation phase. The plan would cover:</p> <ul style="list-style-type: none"> Soil restoration and preparation requirements Species election soil preparation Establishment techniques Maintenance requirements Perennial groundcover targets, indicators, condition monitoring, reporting and evaluation arrangements – i.e. Live grass cover would be maintained at or above 70% at all times to protect soils, landscape function and water quality. Any grazing stock would be removed from the site when cover falls below this level. Grass cover would be monitored on a fortnightly basis using an accepted methodology. Contingency measures to respond to declining soil or groundcover condition. Identification of baseline conditions for rehabilitation following decommissioning. 	GMP, as part of the EMS
RTS, Appendix A	<p>A protocol would be developed in relation to discovering buried contaminants within the proposal site (e.g. pesticide containers). It would include stop work, remediation and disposal requirements.</p>	Appendix D
Hydrology (surface and groundwater), water quality and water use		
RTS, Appendix A	<p>The maximum harvestable right for surface water of approximately 32.05 ML would not be exceeded.</p>	Section 7

Item	CoC/SoC	Reference
RTS, Appendix A	A water access license (WAL) would be obtained, should onsite ground water sources be used.	Section 7
RTS, Appendix A	The proponent would purchase water from Council if onsite requirements are not sufficient.	Section 7
RTS, Appendix A	As part of the CEMP, Department of Industry would be consulted regarding water quality impacts.	CEMP
RTS, Appendix A	Design waterway crossings and services crossing in accordance with the publications: <ul style="list-style-type: none"> • <i>Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings</i> (Fairfull & Witheridge, 2003); and • <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (NSW DPI, 2003). • <i>Guidelines for Watercourse Crossings on Waterfront Land</i> (NSW DPI, 2012). • <i>Guidelines for Laying Pipes and Cable in Watercourses on Waterfront Land</i> (NSW DPI, 2012). 	Section 7
RTS, Appendix A	All fuels, chemicals, and liquids would be stored at least 40 m from any waterways or drainage lines, not on sloping land and would be stored in an impervious bunded area	Section 7
RTS, Appendix A	The proposed network of access roads is to be constructed from gravel, and within the floodplain itself are to be constructed at the existing surface level so as not to result in adverse impact on flood behaviour.	Section 7
RTS, Appendix A	Any proposed crossings of existing watercourses should, where possible, consist of fords constructed flush with the bed of the watercourse to minimise any hydraulic impact.	Section 7
RTS, Appendix A	The refuelling of plant and maintenance would be undertaken in impervious bunded areas on hardstand areas only.	Section 7
RTS, Appendix A	All potential pollutants stored on-site would be stored in accordance with HAZMAT requirements and bunded.	Section 7
RTS, Appendix A	Roads and other maintenance access tracks would incorporate appropriate water quality treatment measures such as vegetated swales to minimise the opportunity of dirty water leaving the site or entering the waterways.	Section 7
Flooding		
RTS, Appendix A	The design of buildings, equipment foundations and footings for electrical componentry and panel mounts would be designed to avoid the 1% AEP flood level to minimise impacts from potential flooding including: <ul style="list-style-type: none"> • The solar array mounting piers are designed to withstand the forces of floodwater (including any potential debris loading) up to the 1% AEP flood event, giving regard to the depth and velocity of floodwaters; • The layout of the solar array mounting piers are designed to minimise encroachment within the areas of highest velocity and depth. This may necessitate solar module frame spans in excess of those proposed. • The mounting height of the solar module frames should be designed such that the lower edge of the module is clear of the predicted 1% AEP flood level. • All electrical infrastructure, including inverters, should be located above the 1% AEP flood level. • Where electrical cabling is required to be constructed below the 1% AEP flood level it should be capable of continuous submergence in water. 	Section 7

Item	CoC/SoC	Reference
	<ul style="list-style-type: none"> The proposed perimeter security fencing should be constructed in a manner which does not adversely affect the flow of floodwater and should be designed to withstand the forces of floodwater or collapse in a controlled manner to prevent impediment to floodwater. 	
RTS, Appendix A	The proposed network of access roads is to be constructed from gravel, and within the floodplain itself are to be constructed at the existing surface level so as not to result in adverse impact on flood behaviour.	Section 7
RTS, Appendix A	Any proposed crossings of existing watercourses should, where possible, consist of fords constructed flush with the bed of the watercourse to minimise any hydraulic impact.	Section 7
RTS, Appendix A	Detailed design of fencing to ensure no adverse impact on the flow of floodwater and ability to withstand floodwater, the design may include removable sections or collapsible panels.	Removed as per request by DPE.
RTS, Appendix A	<p>An Emergency Response Plan incorporating a Flood Response Plan would be prepared prior to construction covering all phases of the project. The plan would:</p> <ul style="list-style-type: none"> Detail who would be responsible for monitoring the flood threat and how this is to be done. Detail specific response measures to ensure site safety and environmental protection. Outline a process for removing any necessary equipment and materials offsite and out of flood risk areas (i.e. rotate array modules to provide maximum clearance of the predicted flood level). Consideration of site access in the event that some tracks become flooded. Establish an evacuation point. Define communications protocols with emergency services agencies. 	Fire Management and Emergency Response Plan, as part of the EMS

2.2 OBJECTIVES

The key objective of the SWMP is to ensure that impacts to soil and water quality are minimised. To achieve this objective, the following will be undertaken:

- Identifying sensitive receiving environments and ensuring appropriate environmental controls and procedures are implemented during construction activities.
- Minimising potential adverse soil and water impacts to the environment and rural community.
- Managing impacts if they occur through systematic analysis and further mitigation strategies.
- Meet the requirements of the CoC described in Section 2.1.5 of this SWSMP.
- Ensure best practice controls and procedures are implemented during site establishment, construction, and road work activities to avoid, minimise, or manage potential adverse impacts to soil and water within and adjacent to the Project site.
- Implement appropriate measures to address the mitigation measures detailed in the CoC and SoC.
- Ensure measures are implemented to comply with all relevant legislation and other requirements as described in Section 2.1 of this SWSMP.

2.3 TARGETS

The following targets have been established for the management of the soil and water impacts during construction of the Project:

- Ensure full compliance with the relevant legislative requirements during construction.
- Ensure full compliance with relevant requirements of the EIS and CoC during construction.
- Implement feasible and reasonable soil and water mitigation measures to protect soils from erosion, protect streams and waterbodies from pollution and reduce accessions to and pollution of ground water.
- Assess surface water and ground water impacts against criteria consistent with Australian and New Zealand Environment Conservation Council (ANZECC) guidelines (ANZG 2018) and the *Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition* (Landcom 2004).
- Reuse all captured dirty construction water onsite as part of the works.
- Minimise the use of raw and potable water onsite during construction.
- Stabilise and rehabilitate area of disturbance as soon as practicable.
- To achieve these targets, aim to:
 - Minimise mobilisation of fine sediment (<0.02 mm) from the site.
 - Retain all coarse (>0.02 mm) sediment on site.

3 EXISTING ENVIRONMENT

The following sections summarise what is known about factors influencing soils and water within and adjacent to the Project site.

3.1 TOPOGRAPHY AND SOIL CHARACTERISTICS

The majority of the site lies within the Bodangora Hydrogeological Landscape. The landscape is characterised by undulating low hills ranging from 300 to 500 m ADH. Gently inclined slopes range between 3 – 10%, and drainage lines are between 500 and 1,000 m apart. The landscape is characterised by high erosion hazards, low cover levels, and friable surface soils.

The eastern end of the site, spanning north to south and including the area approximately 350 m from the Goolma Road boundary to Goolma Road, lies within the Cumnock Hydrogeological Landscape. This landscape is characterised by rolling hills and medium angle slopes, with steeper erosional slopes.

The site is around 340 m AHD. Elevation at the site ranges from approximately 365 m AHD at the eastern end of the site to approximately 315 m AHD at the western end of the site.

Soils identified on site from existing reports include Red Dermosols (ASC) and Podzolic Soils / friable red duplex soil (Dr4.12 principal profile form) (OEH 2004). There is slight erosion hazard and no evident salting. The site occurs within the Bodangora (bz) soil landscape, which has the following limitations:

- High erosion hazard under cultivation and low cover levels.
- Moderate fertility.
- Friable surface soils.
- Moderate to high shrink-swell potential in subsoils.
- Aggregated clays may leak in earthworks.

eSpade (OEH, 2017) indicates that the proposal site has a moderate to very high salinity hazard. There is no potential for acid sulphate soils to occur at the proposal site.

3.2 RAINFALL AND SURFACE HYDROLOGY

The average annual rainfall for Wellington NSW is 615.5 mm, with the highest rainfall occurring in January (Table 3-1). Inundation of the Macquarie – Bogan River Basin based on local rainfall is difficult to predict, though during summer it is likely to be short lived. The site is within the Murray-Darling Basin. The Macquarie River is located approximately 2 km south of the site and flows in a north-west direction through Dubbo to the Barwon River. The confluence with the Bell River tributary is approximately 3 km southwest of the site. The development site is not mapped as being flood prone.

Two watercourses are located within the project site:

- Wuuluman Creek, a 3rd Order Stream runs through the centre of the development site towards the west.
- An ephemeral overland flow path runs from the centre of the development site and joins with Wuuluman Creek on the western edge of the site. This flows only after rain events.

Three dams occur within the proposal site, one dam is located along the eastern boundary, one is in the middle of the site and one is located in the middle of the western portion of the site.

Table 3-1 Mean rainfall and mean evaporation for Wellington Shire LGA

	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Ann.
Mean Rain fall	59.2	51.1	50.7	44.8	47.0	50.9	48.9	48.7	44.7	56.0	58.1	56.6	615.5
Mean Evap.	250	200	200	125	80	50	50	80	100	125	175	250	1600

Mean evaporation is from Bureau of Meteorology maps (http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation).

3.3 GROUNDWATER

Groundwater is expected to be around 11 m below the surface. Three bores exist within the development site (GW016647, GW016642 and GW016641). All three bores are private, installed for stock, irrigation and domestic purposes. Additional bores are located on properties adjacent to the site. The area is mapped as groundwater vulnerable, suggesting groundwater has the potential to be intercepted. However, there is no evidence of high water tables.

3.4 WATER USE AND SUPPLY

3.4.1 Construction water requirements

Water consumption during construction will be mainly used for dust suppression on unsealed roads and laydown areas. It is estimated that about 10 ML of non-potable water would be required during construction. Of this, approximately 0.1 ML will be stored in four large water tanks for firefighting, located at the site entrance. Potable water requirements are expected to be approximately 180KL/year, and would be sourced from a combination of:

- Onsite dams.
- Existing bores and wells onsite (license required).
- Dubbo Regional Council water filling station.

Three dams occur within the proposal site. The two dams to the west of the site are only filled after large rainfall events (from overland flow). The dam at the eastern boundary of the site holds about 250kL (0.25ML). Using the DPI Office of Water Maximum Harvestable Right Calculator with the property size at 493ha and eastern dam location as the parameters, the maximum harvestable right for the site is approximately 32.05ML per annum.

There are also a number of existing wells and bores in operation on site. There is a well at the existing dwelling. The water from the well provides approximately 35ML per annum which is currently pumped to tanks on the property. There is a licence to drill a bore, but it has not been used.

A second bore pumps water into two tanks in front of the old abattoir which hold about 13kL each. The water is used for stock and domestic and has no allocation attached. The water has been tested and is of good quality. To use this water, a Water Allocation License (WAL) would need to be obtained. If a WAL cannot be obtained or if on site supply is deficient, the proponent would purchase water from the Council allocation. It is noted that the Council stand pipe is no longer available. DRC have a water filling station with a key for which an application can be made and for which the Council would invoice, based on volume sourced. There is no limit on the amount of water that can be accessed in this manner, according to Council. If this water is required, water can then be trucked to site. This is the option that will be used, if on site sources are not sufficient. Under this arrangement, water is purchased from Council's allocation and no WAL is required.

4 ENVIRONMENTAL ASPECTS AND RISKS

4.1 CONSTRUCTION ACTIVITIES

Construction activities at the proposal site, such as excavation and earthworks, have the potential to disturb soils, cause erosion and subsequent sedimentation. The Project does not involve any extensive earthworks or landform reshaping. The following work would impact on soils:

- Construction of site compound.
- Construction of laydown and parking areas.
- Landscaping around the perimeter of the site.
- Construction of internal access tracks and associated drainage.
- The installation of the piles supporting the solar panels, which would be driven or screwed into the ground to a depth of approximately 1.5m (minimal soil disturbance).
- Substation bench preparation.
- Concrete or steel pile foundations for the inverter stations, onsite substation and maintenance building.
- Trenches up to 1000 mm deep for the installation of cables.
- Establishment of temporary staff amenities and offices for construction.
- Construction of perimeter security fencing.

4.2 IMPACTS AND RISKS

The potential for impact on soil and water will depend on a number of factors. Primarily impacts will be dependent on the nature, extent and magnitude of construction activities and their interaction with the natural environment. Potential impacts attributable to construction include:

- Exposure of soils during vegetation clearing and minor earthworks, creating the potential for off-site transport of eroded sediments and pollutants through surface runoff.
- Erosion of stockpiled excavated materials.
- Concentrated rainfall and tunnel erosion of soil directly underneath the solar array panels.
- Alteration of the sites hydrology through creating areas of compaction (i.e. access tracks).
- Degradation of topsoil quality from excavation and handling.
- Contamination of soils, surface and groundwater from accidental spills or oil leaks. This might include grease or fuel from machinery and vehicles, construction sites or compounds, or spills of other chemicals that may be used during the course of construction.
- Disturbance of unidentified contaminated land (agricultural chemical pits). This is considered a very low risk.
- Compaction of soils due to the sodicity of the soils and through the creation of internal hardstands and access roads.
- Slumping of trenches creating erosion hazards.
- Temporary flooding has the potential to interfere with construction and poses a safety risk for workers onsite.
- Dust generation.

The highest risk to the soil and water during construction is from excavation of soils for underground cabling and internal track creation. These activities disturb soils, potentially decreasing their stability and increasing susceptibility to erosion. Internal track creation would create areas of compaction, reducing soil permeability thereby increasing runoff and the potential for concentrated flows across the site. Sodic soils are susceptible to compaction.

Machinery and vehicles have potential to track sediments onto public roads. This has potential to create a risk to other road users through reduced road stability.

Temporary flooding has the potential to interfere with construction and poses a safety risk for workers onsite. Additionally, flooding has potential to impact the water quality of the site and downstream waterways through the washing away of construction equipment, fuels and chemicals stored onsite.

The proposal would not result in any substantial earthworks to level the ground as the array can be positioned on land with a 5 to 10% slope. The majority of ground disturbance would be in relation to levelling ground for structures such as the substation. Some disturbance would be required for the internal access tracks and to excavate trenches for the cables. The trenches would be backfilled to match the adjacent land surface. In the event of rainfall, concentrated flow of water from the installed solar panels may potentially cause erosion beneath the panels. Minor earthworks would be required to fill the farm dams and contour the area, so it matches the surrounding land surface.

Relevant aspects and the potential for related impacts will be considered in a risk assessment in the CEMP. Section 7 provides mitigation measures that will be implemented to avoid or minimise impacts to soils and water.

4.3 FLOOD RISKS

A Hydrological and Hydraulic Assessment was carried out as part of the EIS in order to define flood behaviour, guide design and assess the potential impact of the proposal infrastructure on existing flood behaviour.

The assessment provided the following information for construction-related risk:

- There will not be a significant impact on flood behaviour within the floodplain as a result of the infrastructure installation proposed. Flood levels and depths are predicted to remain relatively unchanged.
- The proposed works and infrastructure installation are not anticipated to adversely increase the velocity in any of the watercourses or their associated overbanks therefore ensuring the stability of their bed and banks and minimising erosion potential.
- The proposed works and infrastructure installation over Tributary 1 (northern most overland flow path) are not predicted to result in an adverse impact on the hydraulic function of that watercourse.

Maps depicting pre and post development flood levels, depths and velocities at 1% AEP are included in the Hydrological Hydraulic Assessment, Appendix E of the RTS. They show that there is predicted to be a very marginal increase in the extent of flooding in the 1% AEP.

5 STORMWATER PLAN

5.1 BACKGROUND

All watercourses on the site are ephemeral and only flow during rainfall events. Whilst there is no riverine flood threat, as with any location flooding from localised stormwater can occur. Modelling results suggest 1 in 100-year flood flows (1% AEP) would result in significant overbank flows along Wuuluman Creek, over 1m deep on the right overbank in the adjacent overflow channel (Footprint 2018).

Stormwater will be managed to:

- Protect downstream water quality.
- Minimise the potential for erosion and subsequent sedimentation.
- Provide adequate and appropriate drainage and pollution control measures to treat run-off from disturbed areas of the site.
- Prevent soil materials and sediment from entering drainage systems.

Where practicable, the above items will be implemented using the following principals:

- Run-off velocities will be minimised to reduce erosion.
- Contaminated water will be treated before it reaches waterways.
- Run-off will be directed away from disturbed site areas through control structures.

It is understood that factors such as unexpected ground conditions, surface level deviations from design plans, ongoing changes to construction planning, etc. may result in requirements for run-off controls to vary from original plans.

5.2 POTENTIAL IMPACTS OF PROPOSAL ON STORMWATER AND DRAINAGE

The proposal comprises an array of solar panels that would be mounted on a horizontal tracking structure and cover an area of 360 ha, a 132 kv substation, and related infrastructure. These additions would result in an increase in surface roughness over the site, which would transition from grazed/cropped pasture to a regular grid of steel piers.

Modelling results demonstrate that there is no significant impact on flood behaviour within the floodplain itself as a result of the proposed works. Flood levels, depths and velocities would remain relatively unchanged. Proposed works within and over Tributary 1 are unlikely to result in an adverse impact on the hydraulic function of the watercourse (refer to RTS, NGH 2018).

The modelling results show that the increase in floodplain roughness over the area of the proposed solar module arrays would likely result in localised increases in flood levels near the arrays, with an associated minor decrease in downstream flood levels. Results also demonstrate that there is predicted to be a very marginal increase in the extent of flooding in the 1% AEP events.

Additionally, the proposed works are not anticipated to adversely increase the velocity in any of the watercourses or their associated overbanks, therefore ensuring the stability of their bed and banks and minimising erosion potential.

5.3 STORMWATER DESIGN MEASURES

5.3.1 Road Network

The network of access roads would be constructed from gravel. Within the floodplain, all roads would be constructed such that their finished level is at the existing surface level.

5.3.2 Waterway Crossings

Any crossings of existing watercourses would be constructed in accordance with the following policies:

- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge, 2003)
- *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI, 2003).
- *Guidelines for Watercourse Crossings on Waterfront Land* (NSW DPI, 2012)

Specifically, waterway crossing would:

- Consist of fords constructed flush with bed of watercourse to minimise any hydraulic impact. This includes:
 - The deck of the crossing shall be at the natural bed elevation.
 - The crossing will have a vertical cut-off wall on the downstream side of the crossing to a minimum depth of one metre and minimum width of 100 millimetres.
 - Approaches to crossings will be sealed and incorporate appropriate roadside drainage, such as stabilised table drains where necessary.
- Consider the full width of the riparian corridor, including floodplains. The design would accommodate fully structured native vegetation.
- Minimise the design and construction footprint and extent of proposed disturbances within the watercourse and riparian corridor.
- Maintain existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse.
- Maintain natural geomorphic processes.
- Ensure the movement of sediment and woody debris is not inhibited.
- Not increase scour and erosion of the bed or banks in any storm events.
- Avoid being located on bends in the channel.
- Do not change the gradient of the bed except where necessary to address existing bed and bank degradation.
- Provide any necessary scour protection, such as rock rip-rap and vegetation.
- Ensure scour protection of the bed and banks downstream of the structure is extended for a distance of either twice the channel width or 20 metres whichever is the lesser.
- If cutting into banks, protect cuttings against scour.

5.3.3 Fencing

The flood impact assessment identified that the proposed fencing of the perimeter of the solar farm is not likely to have a significant detrimental impact on flood behaviour. Feasibility of utilising collapsible fencing has been investigated, however due to security concerns, and that the fencing is not considered likely to significantly effect flooding, this option is currently not being considered further.

6 ENVIRONMENTAL MANAGEMENT

6.1 ENVIRONMENTAL WORK METHOD STATEMENTS (EWMS)

EWMS are required for high risk activities, including:

- Clearing and grubbing.
- Topsoil stripping.
- Drainage works.
- Access track and hardstand construction.
- Tree removal.
- Filling in onsite farm dam.
- Stabilisation of disturbed areas and temporary drains.
- Construction of embankments.
- Construction of batters to assist retention of topsoil.

6.2 EROSION AND SEDIMENT CONTROL PLANS

ESCPs will be prepared by a suitably qualified person and will be reviewed by Lightsource BP prior to implementation. ESCPs will be prepared progressively and for all stages of works. The ESCPs will be prepared in accordance with *Managing Urban Stormwater - Soils and Construction Vols 1 and 2, 4th Edition (Landcom, 2004)* and the *NSW Dept of Water Controlled Activities Guidelines*. The ESCPs would generally contain the following, as relevant to the local conditions and work stage:

- Method of tree removal, leaving groundcover undisturbed.
- Controls during the filling in onsite farm dam.
- Erosion and sediment control measures required before clearing and grubbing of the site.
- Appropriate controls before the removal of topsoil and commencement of earthworks for the formation within the catchment area of each structure.
- How upstream 'clean' water will be managed and diverted around disturbed areas, so they are not polluted by potential 'dirty' or sediment-laden water resulting from the construction activities.
- Scour protection measures for haul roads and access tracks when these are an erosion hazard due to either their steepness, soil erodibility or potential for concentrating runoff flow.
- The methods for stabilising disturbed areas and temporary drains.
- The methods to minimise erosion during construction of embankments.
- The methods to minimise and monitor tunnel erosion that may occur underneath the solar arrays.
- The methods of constructing batters to assist retention of topsoil on the batter slopes.
- Temporary sediment trapping measures in median areas at regular intervals.
- The methods of maintenance of erosion and sediment controls.
- The details of the inspection and maintenance program for all erosion and sediment controls to ensure that no disturbed area is left without adequate means for containment and treatment of contaminated soil.
- Measures to minimise erosion and control sedimentation from stockpiles.
- Methods for managing any spills that may occur during construction.
- Additional controls to be implemented during heavy rainfall events.

The ESCP will include, but is not limited to:

- A marked-up site plan including:
 - Areas not to be disturbed (no-go zones).
 - Temporary work areas.
 - Access and haulage tracks.
 - Stockpile and storage areas.
 - Compound areas.
 - Location, number and type of each erosion and sediment control with example figures.
 - Notes and instructions of key management practices.
 - A legend.
- A detailed set of instructions for the contractor, including:
 - The order of installation of the various controls.
 - Sizing and design of sediment basin(s) and diversion(s) if required.
 - Instructions for inspecting the site regularly.
 - Instructions for the maintenance of all controls.
 - Instructions for stabilising and revegetating at various points during the works.
 - Any special requirements during certain higher-risk months.
 - Instructions for topsoil management.

The ESCPs will also show the construction boundaries and exclusion zones in addition to any other activities that may impact water quality. ESCPs will be updated progressively to reflect changes on site.

6.3 WATERWAY CROSSINGS

Waterway crossings and services crossing will be designed in accordance with the following publications:

- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge, 2003)
- Policy and Guidelines for Fish Friendly Waterway Crossings (NSW DPI, 2003)
- Guidelines for Watercourse Crossings on Waterfront Land (NSW DPI, 2012)
- Guidelines for Laying Pipes and Cable in Watercourses on Waterfront Land (NSW DPI, 2012)

Any waterway crossings will have specific design drawings prepared in accordance with these guidelines. Each crossing will have specific ESCP's prepared to guide the construction.

6.4 CHEMICAL AND FUEL STORAGE

Chemicals and fuels handled and stored on site have the potential to cause pollution to soil or water. The following commitments have been made regarding chemical and fuel storage during construction:

- All potential pollutants stored on-site would be handled and stored in accordance with HAZMAT requirements and bunded.
- Store and handle all dangerous or hazardous materials on site in accordance with AS1940-2004: The storage and handling of flammable and combustible liquids, or its latest version.
- All fuels, chemicals, and liquids would be stored at least 40 m from any waterways or drainage lines, not on sloping land and would be stored in an impervious bunded area
- Carry out refuelling of plant and equipment, chemical storage and decanting off site or at least 50m away from farm dams in impervious bunds.
- The refuelling of plant and maintenance would be undertaken in impervious bunded areas on hardstand areas only.

- Machinery would be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills
- Ensure that dry and wet spill kits are readily available.

Monitoring and inspections of chemical and fuel storage will be undertaken in accordance with compliance management requirements set out in Section 8.

7 ENVIRONMENTAL CONTROL MEASURES

The environmental requirements and control measures are identified in the various environmental documents including the EIS, SoC and CoC. Specific measures and requirements to address impacts on soil and water are outlined in Table 7-1. The objectives of these mitigation measures are to ensure best practice methods are used during construction and operation to minimise disturbance and negative impacts to soil and water within and surrounding the development.

Table 7-1 Soil and water management and mitigation measures

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
GENERAL				
Training will be provided to all Project personnel, including relevant sub-contractors on sound erosion and sediment control practices and the requirements from this plan through inductions, toolboxes and targeted training.	EMS	Pre-construction Construction Operation	Lightsource BP	Good practice
The Applicant must implement all reasonable and feasible measures to prevent and/or minimise any material harm to the environment that may result from the construction, operation, upgrading or decommissioning of the development.	EMS	Pre-construction Construction Operation Decommissioning	All staff	Good practice
DESIGN				
Ensure stormwater runoff from roof and impervious surfaces are collected internally, captured on-site or directed through appropriate infrastructure to erosion-controlled points of discharge.	SWSMP ESCP Design drawings	Design	Lightsource BP	Good practice
Ensure the substation is suitably bunded	Design drawings	Design Construction	Lightsource BP	Good practice
The array would be designed to allow sufficient space between panels to establish and maintain ground cover beneath the panels and facilitate weed control.	Design drawings	Design	Lightsource BP	SoC (RTS Appendix A)
Design waterway crossings and services crossing in accordance with the publications: <ul style="list-style-type: none"> • <i>Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings</i> (Fairfull & Witheridge, 2003); and • <i>Policy and Guidelines for Fish Friendly Waterway Crossings</i> (NSW DPI, 2003). • <i>Guidelines for Watercourse Crossings on Waterfront Land</i> (NSW DPI, 2012) 	SWSMP	Design	Lightsource BP	SoC (RTS Appendix A)

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
<ul style="list-style-type: none"> Guidelines for Laying Pipes and Cable in Watercourses on Waterfront Land (NSW DPI, 2012) 				
<p>The design of buildings, equipment foundations and footings for electrical componentry and panel mounts would be designed to avoid the 1% AEP flood level to minimise impacts from potential flooding including:</p> <ul style="list-style-type: none"> The solar array mounting piers are designed to withstand the forces of floodwater (including any potential debris loading) up to the 1% AEP flood event, giving regard to the depth and velocity of floodwaters; The layout of the solar array mounting piers is designed to minimise encroachment within the areas of highest velocity and depth. This may necessitate solar module frame spans in excess of those proposed. The mounting height of the solar module frames will be designed such that the lower edge of the module is clear of the predicted 1% AEP flood level. All electrical infrastructure, including inverters, will be located above the 1% AEP flood level. Where electrical cabling is required to be constructed below the 1% AEP flood level it will be capable of continuous submergence in water. The proposed perimeter security fencing will be constructed in a manner which does not adversely affect the flow of floodwater and will be designed to withstand the forces of floodwater or collapse in a controlled manner to prevent impediment to floodwater 	Design drawings	Design	Lightsource BP	SoC (RTS Appendix A)
PRE-CONSTRUCTION				
<p>As part of the EMS, a Soil and Water Management Plan (SWSMP) (with erosion and sediment control plans) would be prepared, implemented and monitored during the proposal, in accordance with Landcom (2004), to minimise soil (and water) impacts. These plans would include provisions to:</p> <ul style="list-style-type: none"> Carry out soil testing prior to any impacts, to inform any soil treatments and provide baseline information for the decommissioning rehabilitation. Install, monitor and maintain erosion controls. Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability. Vehicle hygiene protocol will address mud-tracking on to roads. 	<p>SWSMP</p> <p>BMP (Vehicle hygiene) Section 5.6</p>	Pre-Construction Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
<ul style="list-style-type: none"> Manage topsoil: In all excavation activities, separate subsoils and topsoils and ensure that they are replaced in their natural configuration to assist revegetation. Stockpile topsoil appropriately so as to minimise weed infestation, maintain soil organic matter, maintain soil structure and microbial activity. Minimise the area of disturbance from excavation and compaction; rationalise vehicle movements and restrict the location of activities that compact and erode the soils as much as practical. Any compaction caused during construction would be treated such that revegetation would not be impaired. Manage works in consideration of heavy rainfall events; if a heavy rainfall event is predicted, the site will be stabilised, and work ceased until the wet period had passed. 				
<p>Prior to the commencement of construction, the Applicant must prepare a detailed Stormwater Plan for the site to the satisfaction of the Secretary.</p> <p>Following the Secretary's approval, the Applicant must implement the Stormwater Plan.</p>	Stormwater Plan	Pre-Construction Construction	Lightsource BP Construction contractor	CoC (Schedule 3, Condition 21)
<p>A Spill and Contamination Response Plan would be developed as part of the overall Emergency Response Plan to prevent contaminants affecting adjacent surrounding environments. The plan would include measures to:</p> <ul style="list-style-type: none"> Respond to the discovery of existing contaminants at the site (e.g. pesticide containers or asbestos), including stop work protocols and remediation and disposal requirements. Requirement to notify EPA for incidents that cause material harm to the environment (refer s147-153 <i>Protection of the Environment Operations Act</i>). Manage the storage of any potential contaminants onsite. Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures and remediation. Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks. Prevent contaminants affecting adjacent pastures, dams, water courses and native vegetation. Monitor and maintain spill equipment. Induct and train all site staff. 	FMERP EMS	Pre-Construction Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
<p>A Groundcover Management Plan would be developed in consultation with an agronomist and taking account of soil survey results to ensure perennial grass cover is</p>	GMP	Pre-Construction	Lightsource BP	SoC (RTS Appendix A)

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
<p>established across the site as soon as practicable after construction and maintained throughout the operation phase. The plan would cover:</p> <ul style="list-style-type: none"> • Soil restoration and preparation requirements • Species election • Soil preparation • Establishment techniques • Maintenance requirements • Perennial groundcover targets, indicators, condition monitoring, reporting and evaluation arrangements – i.e. Live grass cover would be maintained at or above 70% at all times to protect soils, landscape function and water quality. Any grazing stock would be removed from the site when cover falls below this level. Grass cover would be monitored on a fortnightly basis using an accepted methodology. • Contingency measures to respond to declining soil or groundcover condition. • Identification of baseline conditions for rehabilitation following decommissioning. 	BMP	Construction	Construction contractor	
<p>An Emergency Response Plan incorporating a Flood Response Plan would be prepared prior to construction covering all phases of the project. The plan would:</p> <ul style="list-style-type: none"> • Detail who would be responsible for monitoring the flood threat and how this is to be done. • Detail specific response measures to ensure site safety and environmental protection. • Outline a process for removing any necessary equipment and materials offsite and out of flood risk areas (i.e. rotate array modules to provide maximum clearance of the predicted flood level). • Consideration of site access in the event that some tracks become flooded. • Establish an evacuation point. • Define communications protocols with emergency services agencies. 	FMERP	Pre-Construction Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
<p>A protocol would be developed in relation to discovering buried contaminants within the proposal site (e.g. pesticide containers). It would include stop work, remediation and disposal requirements.</p>	SWSMP	Pre-Construction Construction	Lightsource BP	SoC (RTS Appendix A)

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
As part of the CEMP, Department of Industry would be consulted regarding water quality impacts.	CEMP	Pre-Construction Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
CONSTRUCTION				
An ESCP shall be prepared as part of the CEMP. All erosion and sediment control measures shall be designed, implemented and maintained in accordance with relevant sections of "Managing Urban Stormwater: Soil and Construction Volume 1" (Landcom, 2004) ('the Blue Book') (particularly section 2.2) and "Managing Urban Stormwater: Soil and Construction Volume 2A – Installation of Services" (DECC, 2008)". The ESCP shall include stockpiles, stormwater run-off, trees, site boundaries, site access and storage areas.	ESCP	Construction	Lightsource BP Construction contractor	Good practice
Minimise any soil erosion associated with the construction, upgrading or decommissioning of the development in accordance with the relevant requirements in the <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom, 2004) Manual, or its latest version.	EWMS ESCP	Construction	Lightsource BP Construction contractor	Good practice
Proposed development design, operation and by-product management will be undertaken to avoid nutrient and sediment build up and minimise erosion, off site surface water movement and groundwater accession.	WMP ESCP Design drawings	Design Construction	Lightsource BP Construction contractor	Good practice
Minimise the likelihood of any environmental damage (erosion of the road verges) and provide for the reduction of velocity of run off for all-natural precipitation on the road verges.	Design drawings	Construction	Lightsource BP Construction contractor	Good practice
Roads and other maintenance access tracks would incorporate appropriate water quality treatment measures such as vegetated swales to minimise the opportunity of dirty water leaving the site or entering the waterways.	Design drawings	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
The proposed network of access roads is to be constructed from gravel, and within the floodplain itself are to be constructed at the existing surface level so as not to result in adverse impact on flood behaviour.	Design drawings TMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
Any proposed crossings of existing watercourses will consist of fords constructed flush with the bed of the watercourse to minimise any hydraulic impact.	Design drawings EWMS	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
Construction of waterway crossings or underground cables through waterways will be in accordance with DPI Fisheries Policy & Guideline document: <i>Policy and Guidelines for Fish Habitat Conservation and Management</i> (Update 2013)	Design Drawings SWSMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
A riparian buffer zone of 10-50m along Wuuluman Creek will be clearly delineated prior to works commencing. Works will be avoided within the riparian buffer zone.	BMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
Existing native riparian vegetation is retained to the greatest extent possible in an undamaged and unaltered condition.	BMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
All potential pollutants stored on-site would be stored in accordance with HAZMAT requirements and bunded.	EMS FMERP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
Store and handle all dangerous or hazardous materials on site in accordance with AS1940-2004: <i>The storage and handling of flammable and combustible liquids</i> , or its latest version.	EMS	Construction	Lightsource BP Construction contractor	Good practice
All fuels, chemicals, and liquids would be stored at least 40 m from any waterways or drainage lines, not on sloping land and would be stored in an impervious bunded area	SWSMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
Carry out refuelling of plant and equipment, chemical storage and decanting off site or at least 50m away from farm dams in impervious bunds.	Refuelling station	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
The refuelling of plant and maintenance would be undertaken in impervious bunded areas on hardstand areas only.	Induction and training	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
Machinery will be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery. All staff would be appropriately trained through toolbox talks for the minimisation and management of accidental spills	SWMS Toolbox talks	Construction	Lightsource BP Construction contractor	Good practice
Ensure that dry and wet spill kits are readily available.	Spill kits Induction and training	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)

Measure / Requirement	Where Addressed	When to implement	Responsibility	Reference
The development must not cause any water pollution as defined under section 120 of the POEO Act.	SWSMP	Construction	Lightsource BP Construction contractor	CoC (Schedule 3, Condition 20)
Vehicles leaving the site are in a clean condition and do not result in dirt being tracked onto the public road network.	Plant wash down Area	Construction	Lightsource BP Construction contractor	Good practice
The maximum harvestable right for surface water of approximately 32.05ML would not be exceeded.	SWSMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
A water access license (WAL) would be obtained, should onsite ground water sources be used.	SWSMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
The proponent would purchase water from Council if onsite requirements are not sufficient.	SWSMP	Construction	Lightsource BP Construction contractor	SoC (RTS Appendix A)
Rehabilitation works are to commence as soon as practicable to stabilise the land surface after works are completed in any area.	CEMP ESCP	Construction	Lightsource BP Construction contractor	Good practice
The proposed network of access roads is to be constructed from gravel and within the floodplain itself are to be constructed at the existing surface level so as not to result in adverse impact on flood behaviour.	CEMP SWSMP	Construction	Lightsource BP Construction contractor	Good practice (RTS Appendix E – Hydrological and Hydraulic Assessment)
Any proposed crossings of existing watercourses will consist of fords constructed flush with bed of watercourse to minimise any hydraulic impact.	CEMP SWSMP	Construction	Lightsource BP Construction contractor	Good practice (RTS Appendix E – Hydrological and Hydraulic Assessment)

8 COMPLIANCE MANAGEMENT

8.1 ROLES AND RESPONSIBILITIES

The Lightsource BP Project Team's organisational structure and overall roles and responsibilities are outlined in the EMS. Specific responsibilities for the implementation of environmental controls will be detailed in the CEMP.

8.2 TRAINING

All employees, contractors and utility staff working on site will undergo site induction training relating to soil and water management issues. Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management. Targeted training would address the requirements of the environmental control measures (Section 7), POEO Act and the *Water Management Act 2000*. It would also examine key techniques for erosion and sediment control and site stabilisation.

8.3 MONITORING AND INSPECTION

Regular monitoring and inspections will be undertaken in the lead up to, during and following construction. Monitoring and inspection requirements are outlined in Table 8-1.

Table 8-1 Monitoring and inspection requirements

Monitoring activity	Action Trigger	Responsibility
Daily		
Machinery will be checked daily to ensure there is no oil, fuel or other liquids leaking from the machinery.	Machinery present on site	EPC Contractor Lightsource BP
Weekly		
Ensuring waste bins are emptied weekly or when full, whichever is sooner, to minimise potential for pollution resulting from general waste or contaminated waste.	Full bin	EPC Contractor Lightsource BP
Monitor and maintain spill equipment.	Use or expiration of spill equipment	EPC Contractor Lightsource BP
After Rainfall		
Erosion and sediment controls	Post-rainfall or during prolonged/heavy rain	EPC Contractor Lightsource BP
Ensure sediment fences are appropriately cleaned out following large rainfall events or as required, and ensuring the sediment is appropriately reused or disposed.	Post-rainfall or during prolonged/heavy rain	EPC Contractor Lightsource BP
Monitor rehabilitated areas to evaluate stability and vegetation establishment.	Post-rainfall or during prolonged/heavy rain	EPC Contractor Lightsource BP
Monitor underneath solar arrays for evidence of tunnel erosion	Post-rainfall or during prolonged/heavy rain	EPC Contractor Lightsource BP
As required		

Monitoring activity	Action Trigger	Responsibility
Ensure that machinery arrives on site in a clean, washed condition, free of fluid leaks.	Machinery arrives on site	EPC Contractor Lightsource BP
Ensure that machinery leaves the site in a clean condition to avoid tracking of sediment onto public roads which may cause risks to other road users through reduced road stability. Vehicle hygiene protocol will address mud-tracking on to roads.	Machinery departs site	EPC Contractor Lightsource BP

Additional requirements and responsibilities in relation to inspections will be documented in the CEMP.

8.4 WATER QUALITY PARAMETERS

2018 ANZAST Water Quality Guidelines includes guidelines for chemical and physical parameters in water and sediment, as well as biological indicators. The guidelines are used as a general tool for assessing water quality and are the key to determining water quality objectives that protect and support the designated environmental values of our water resources, and against which performance can be measured.

Typical water quality parameters to be measured and associated discharge criteria are detailed in

Table 8-2. These parameters are based on Landcom's Blue Book (2004) and are mandatory except where receiving water quality is of a lesser standard. It also details the monitoring and analytical requirements by reference to authority publications e.g. *Approved Methods for Sampling and Analysis of Water Pollutants in NSW*, 2004.

Table 8-2 Discharge water quality criteria (Landcom's Blue Book).

Parameter	Criteria	Sampling method	Analytical method
pH	6.5 –8.5	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment.
Turbidity	TBA following correlation with TSS results	Grab Sample	Field analysis and confirmed as required with laboratory assessment, regularly updating correlations and having a factor of conservatism.
Total Suspended Solids	<50 mg/L	Grab Sample	Laboratory analysis.
Oil and Grease	No visible	Grab Sample	Field analysis and confirmed as required with laboratory assessment.

Monitoring would be conducted prior to any controlled discharge. All water sample results will be stored electronically as they are received. Water sample results will be collated into a spreadsheet for the site for the duration of construction. Water sample results will be used to manage the reuse of runoff or discharge waters off-site.

8.5 WEATHER MONITORING

Rainfall at the premises will be measured and recorded in millimetres per 24-hour period at the same time each day from the time that the site office associated with the work is established. Rainfall will be measured either electronically (tipping bucket) or through the use of rain gauges located at the compound.

Weekly and daily monitoring of the weather forecast by the Site Manager will occur. Actions as required to address the impending weather forecast would be programmed in a timely manner. Rainfall will be considered when scheduling works and controlling access to and through the site.

8.6 INCIDENT MANAGEMENT

All incidents will be managed in accordance with the incident response procedures contained in the EMS. These procedures are summarised below.

8.6.1 Incident Reporting

Typically, environmental incidents will be notified verbally to the Site Manager immediately. Lightsource BP would be notified in writing within 1 hour of any incident occurring. Incident reports will then be provided within 48 hours of the incident occurring, including lessons learnt from each environmental incident occurring, and proposed measures to prevent the occurrence of a similar incident.

8.6.2 DPE Notifiable Incidents

Lightsource BP will immediately notify the Secretary and any other relevant agencies of any incident on site. 'Immediately' has its ordinary dictionary meaning of promptly and without delay. Within 7 days of the date of the incident, Lightsource BP will provide the Secretary and any relevant agencies with a copy of the incident report, and such further reports as may be requested.

After the submission of an incident report, Lightsource BP will review and, if necessary, revise the strategies and plans required under the approval consent to the satisfaction of the secretary within 1 month of the submission of an incident report.

8.6.3 EPA Notifiable Incidents

The EPA will be notified of any environmental incidents or pollution incidents on or around the site via the EPA Environment Line (telephone 131 555) in accordance with Part 5.7 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). The circumstances where this will take place include:

- a) If the actual or potential harm to the health or safety of human beings or ecosystems is not trivial.
- b) If actual or potential loss or property damage (including clean-up costs) associated with an environmental incident exceeds \$10,000 (Material Harm).

Pollution incidents posing material harm to the environment should be notified to each 'relevant authority' as defined in Section 148 (8) of the POEO Act. 'Relevant authority' means:

- NSW EPA as the appropriate regulatory authority (ARA) on **131 555 (or (02) 9995 5555)**
- The NSW Ministry of Health **02 9391 9000**
- Safe Work NSW (formerly WorkCover) on **13 10 50**
- The local authority, Warren Shire Council on **02 6847 6600** (day time hours) or **02 6847 6600** (after hours)
- Fire and Rescue NSW on **000** or for Mobiles Only **112**
- Rural Fire Service North West Region on **02 6822 4422**

Lightsource BP will maintain all records relating to environmental incidents.

8.7 AUDITING

Audit requirements are detailed in the EMS and summarised below.

8.7.1 Internal Auditing

Environmental compliance audits by Lightsource BP will be conducted on all relevant aspects of the EMS and will be performed in accordance with recognised audit procedures. Monthly internal compliance audits will be conducted during the construction of the Project. Internal audits will verify that the Project is in compliance with conditions and that environmental control measures are effective. More frequent auditing may occur if environmental checks indicate major deficiencies with environmental management of the site. Audits will be planned, carried out and reported to provide assessment of the Project.

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Audits will be planned, carried out and reported to provide assessment of the Project.

8.7.2 External Auditing

An independent external audit is to be carried out within 6 months of the commencement of construction, or as directed by the Secretary.

Schedule 4, condition 5 of the CoC stipulates:

Within 6 months of the commencement of construction, or as directed by the Secretary, the Applicant must commission and pay the full cost of an Independent Environmental Audit (Audit) of the development....Within 3 months of commencing an Independent Environmental Audit, or unless otherwise agreed by the Secretary, a copy of the audit report must be submitted to the Secretary, and any other NSW agency that requests it, together with a response to any recommendations contained in the audit report, and a timetable for the implementation of the recommendations.

The recommendations must be implemented to the satisfaction of the Secretary

8.8 REPORTING

Reporting requirements and responsibilities are outlined in the EMS. Role relevant to reporting under this SWSMP are identified in Table 8-3.

Table 8-3 SWSMP reporting responsibility

Role	Responsibility
EPC Project Manager	Responsible for reporting pollution incidents.
EPC Health Safety and Environment and Quality Manager (HSEQ)	Reporting of pollution incidents.

9 REVIEW AND IMPROVEMENT

9.1 CONTINUOUS IMPROVEMENT

Continuous improvement of this SWSMP will be achieved by the ongoing evaluation of performance against the SWSMP environmental policies, objectives and targets to identify opportunities for improvement.

- The continuous improvement process will be designed to:
 - Identify areas of opportunity for improvement of environmental management and performance.
 - Determine the cause or causes of non-conformances and deficiencies.
 - Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies.
 - Verify the effectiveness of the corrective and preventative actions.
 - Document any changes in procedures resulting from process improvement.
 - Make comparisons with objectives and targets.

Review procedures are contained in the EMS.

9.2 SWSMP UPDATE AND AMENDMENT

This SWSMP will need to be revised whenever the construction program, scope of work, or work methods change, whenever the work methods and control structures are found to be ineffective, or if directed by the Principal. This will occur as needed and in accordance with the process outlined in the EMS.

A copy of the updated SWSMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure identified in the EMS.

9.3 DOCUMENT CONTROL

Document control procedures are detailed in the EMS and summarised below.

Lightsource BP will coordinate the preparation, review and distribution, as appropriate, of the SWSMP. During the Project, the environmental documents will be stored at the main site compound.

Lightsource BP will implement a document control procedure to control the flow of documents within and between stakeholders and sub-contractors.

The procedure will also ensure that documentation is:

- Developed, reviewed and approved prior to issue.
- Issued for use.
- Controlled and stored for the legally required timeframe.
- Removed from use when superseded or obsolete.
- Archived.

A register and distribution list will identify the current revision of particular documents or data.

REFERENCES

Australian and New Zealand Guidelines for fresh and marine water quality. (ANZECC, 2000). Volume 1- The guidelines. Accessed from <http://www.agriculture.gov.au/water/quality/guidelines/volume-1>

OEH, 2004, eSPADE. Accessed March 2019, from <http://www.environment.nsw.gov.au/eSpadeWebapp/>

OEH, 2017, eSPADE, accessed October 2017, from <http://www.environment.nsw.gov.au/eSpade2Webapp>

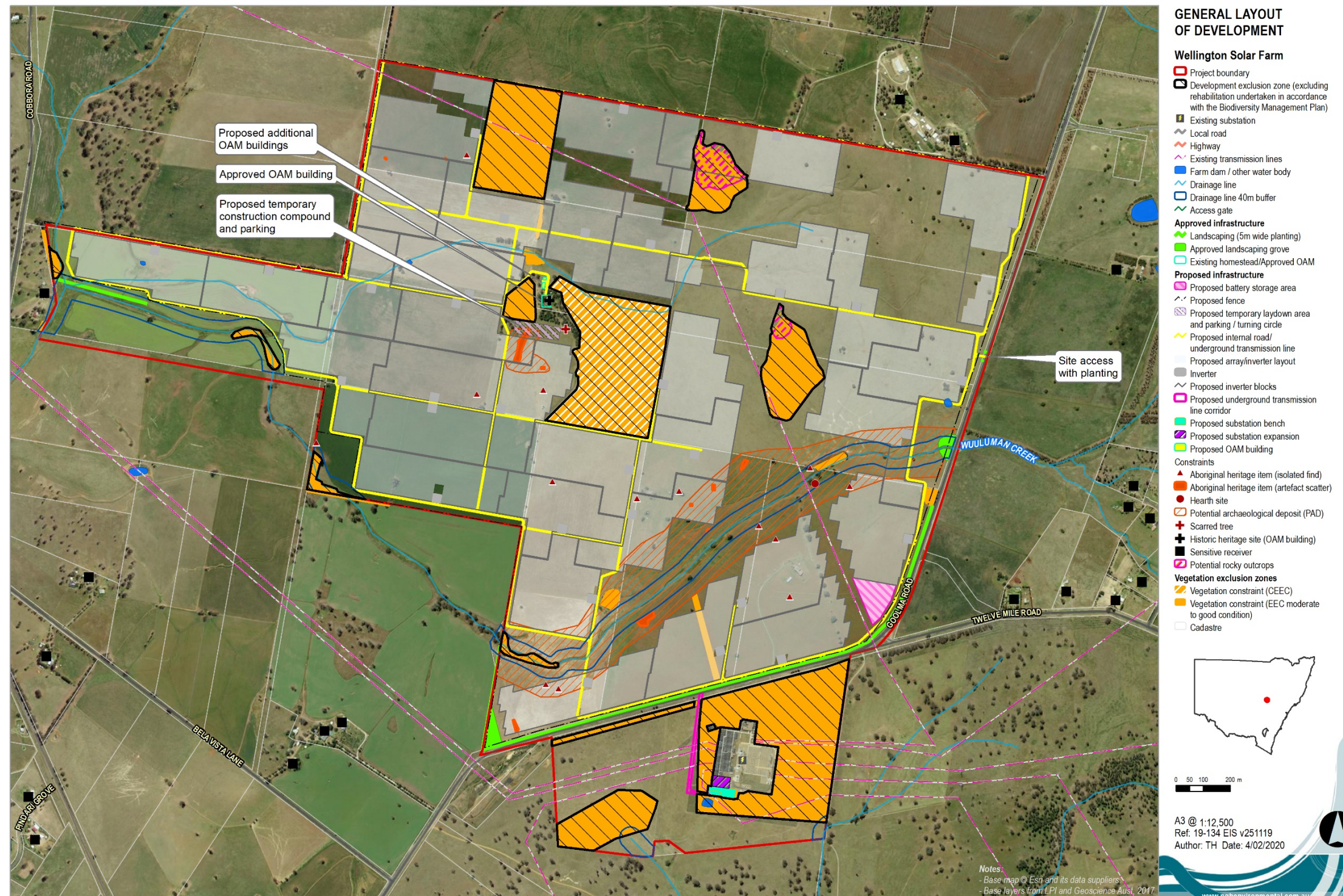
NGH Environmental 2017. *Wellington Solar Farm Environmental Impact Statement*. Prepared for First Solar.

NGH Environmental 2018. *Wellington Solar Farm Response to Submissions*. Prepared for First Solar.

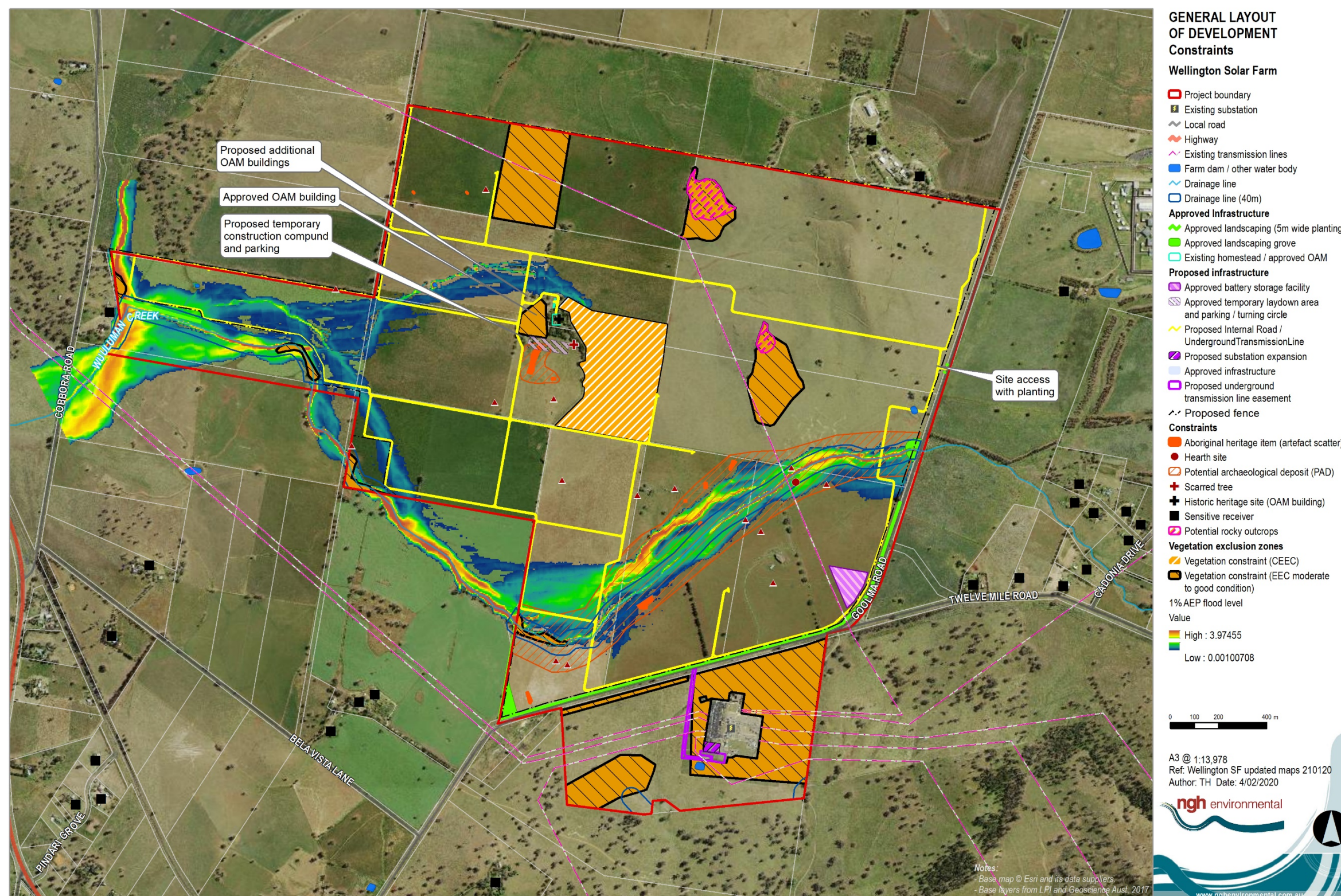
Footprint, 2018. *Proposed Solar Farm, Wellington New south Wales: hydrological and hydraulic Analysis*. Prepared for First Solar.

APPENDIX A SITE FIGURES

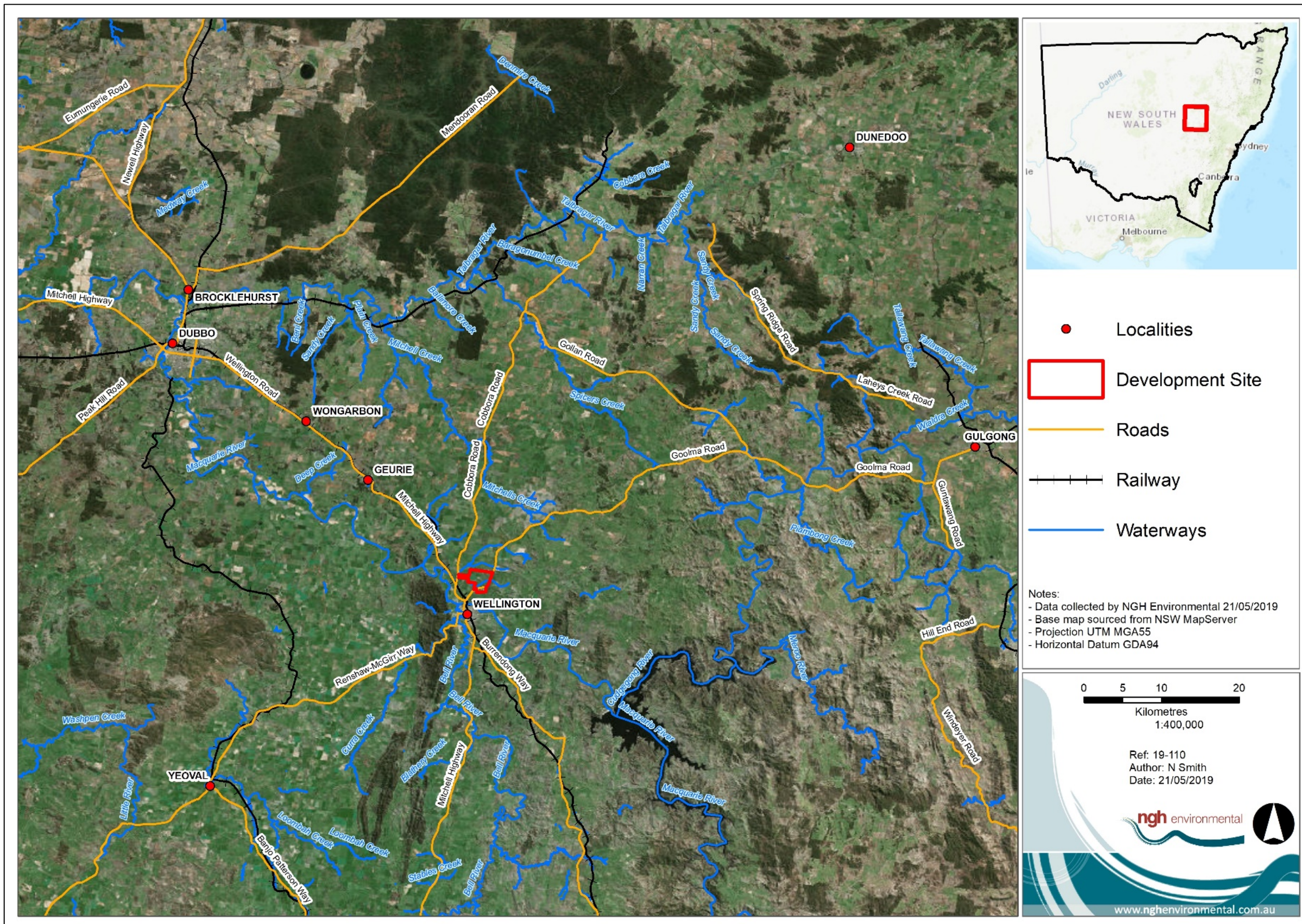
A.1 APPROVED GENERAL LAYOUT



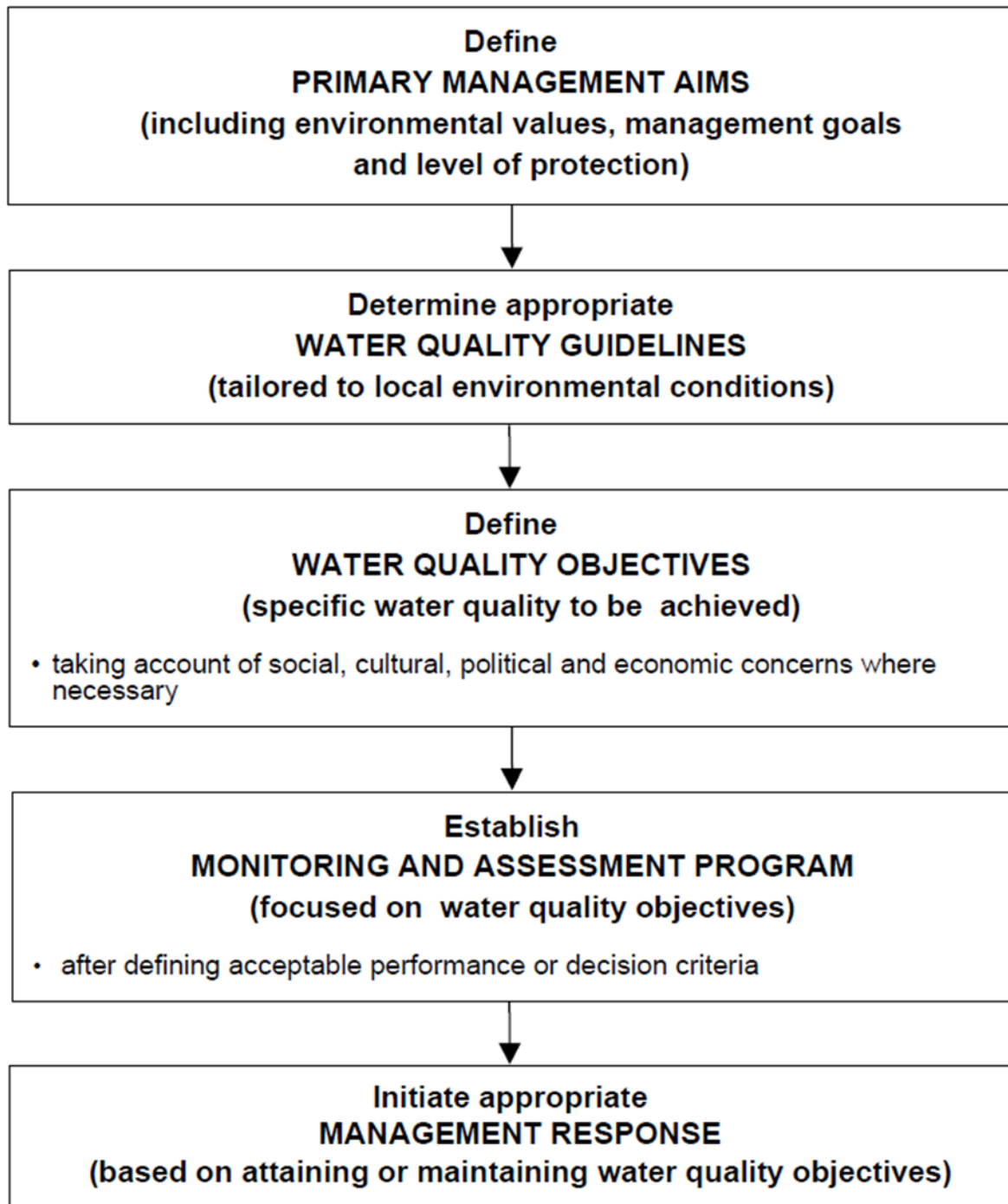
A.2 AEP 1% FLOOD LEVEL LAYOUT



A.3 REGIONAL CONTEXT



APPENDIX B ANZECC MANAGEMENT FRAMEWORK



APPENDIX C ANZECC SEDIMENT QUALITY GUIDELINES

Table C-0-1 Recommended sediment quality guidelines^a

Contaminant	ISQG-Low (Trigger value)	ISQG-High
METALS (mg/kg dry wt.)		
Antimony	2	25
Cadmium	1.5	10
Chromium	80	370
Copper	65	270
Lead	50	220
Mercury	0.15	1
Nickel	21	52
Silver	1	3.7
Zinc	200	410
METALLOIDS (mg/kg dry wt.)		
Arsenic	20	70
ORGANOMETALLICS		
Tributyltin ($\mu\text{g Sn/kg dry wt.}$)	5	70
ORGANICS ($\mu\text{g/kg dry wt.}$) ^b		
Acenaphthene	16	500
Acenaphthalene	44	640
Anthracene	85	1100
Fluorene	19	540
Naphthalene	160	2100
Phenanthrene	240	1500
Low Molecular Weight PAHs ^c	552	3160
Benzo(a)anthracene	261	1600
Benzo(a)pyrene	430	1600
Dibenzo(a,h)anthracene	63	260
Chrysene	384	2800
Fluoranthene	600	5100
Pyrene	665	2600
High Molecular Weight PAHs ^c	1700	9600
Total PAHs	4000	45000
Total DDT	1.6	46
p,p'-DDE	2.2	27
o,p'- + p,p'-DDD	2	20
Chlordane	0.5	6
Dieldrin	0.02	8
Endrin	0.02	8
Lindane	0.32	1
Total PCBs	23	—

a Primarily adapted from Long et al. (1995);

b Normalised to 1% organic carbon;

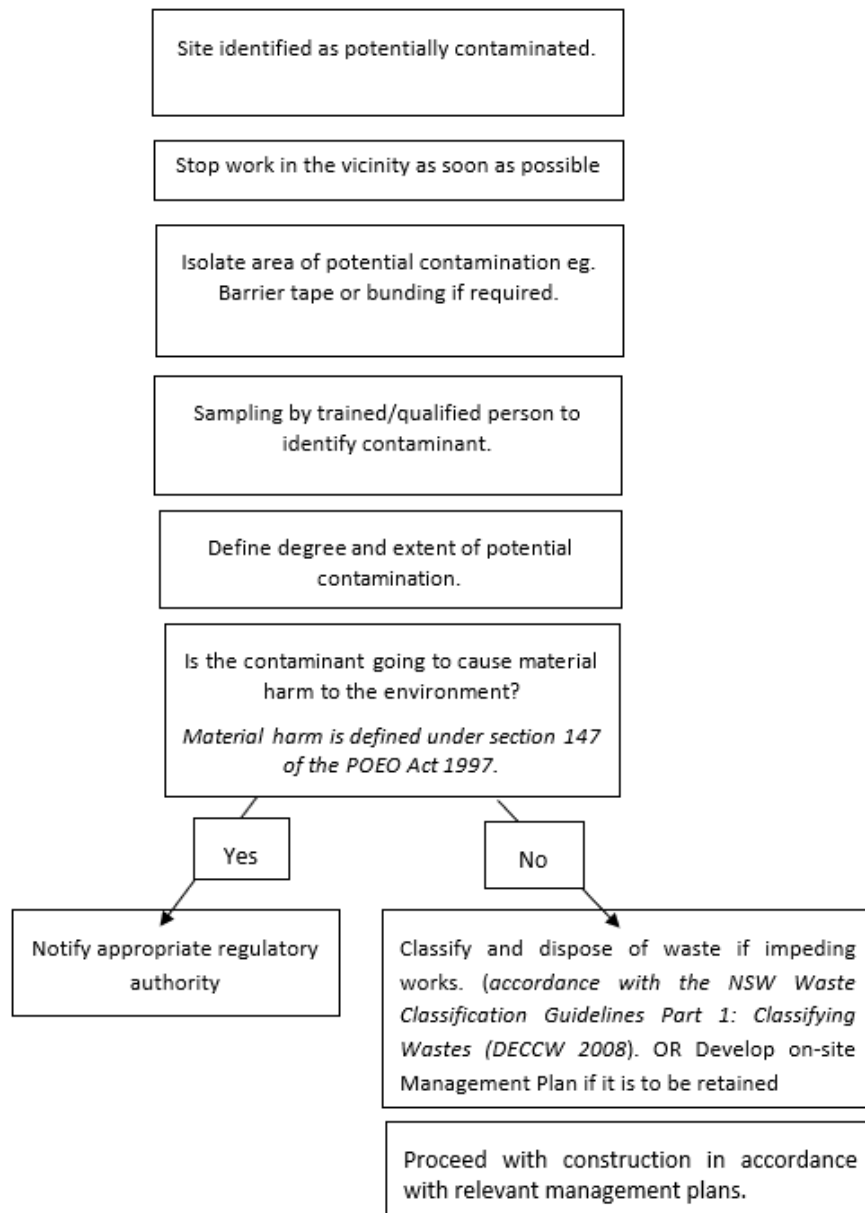
c Low molecular weight PAHs are the sum of concentrations of acenaphthene, acenaphthalene, anthracene, fluorene, 2-methylnaphthalene, naphthalene and phenanthrene; high molecular weight PAHs are the sum of concentrations of benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene and pyrene.

APPENDIX D DISCOVERY OF BURIED CONTAMINANTS PROTOCOL

Evidence that may indicate soil contaminants are present include:

- Strong odours from the soil
- Presence of material not consistent with local soil types (e.g. building debris, packaging)
- Suspected bonded and non-bonded asbestos containing materials (ACM)
- Discolouration of soils
- Chemical containers
- Oily sheen or staining in run off on or around the site

Where potential contamination is identified the following protocol will be followed:



APPENDIX E AGENCY APPROVAL OF SWMP

Mrs Diana Mitchell
Principal Environmental Planner
Lightsource Development Services Australia Pty Ltd
Level 10, 420 George Street
Sydney NSW 2000

07/05/2020

Dear Diana

**Wellington Solar Farm (SSD 8573)
Stormwater Management Plan**

I refer to the revised Stormwater Management Plan submitted to the Department under condition 21 of Schedule 3 of the Wellington Solar Farm Development Consent (SSD 8573).

The Department has carefully reviewed the document and is satisfied that it addresses the conditions of consent.

The Department notes that the Stormwater Management Plan has been updated since the previous version (version 2.2, dated 19 December 2019) approved on 20 December 2019, to incorporate changes resulting from modification 2.

Accordingly, the Secretary has approved the revised Wellington Solar Farm Stormwater Management Plan (version 2.4, dated 9 April 2020). Please ensure that the approved plan is placed on the project website at the earliest convenience.

If you wish to discuss the matter further, please contact Javier Canon on 02 9373 2821 or at Javier.Canon@planning.nsw.gov.au

Yours sincerely



Nicole Brewer
Director
Energy Assessments

As nominee of the Secretary