

Liddell Power Station Battery Energy Storage System Soil and Water Management Sub Plan

Environmental Management Strategy

16-May-2024

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Table of Contents

Glossary and terms		i		
1.0	Introduction	1		
	1.1	Background	1	
	1.2	Site details	1	
	1.3	Project description	2	
	1.4	Construction activities	6	
	1.5	Relevant approvals and conditions	6	
		1.5.1	Project approvals	6
		1.5.2	Development consent conditions	6
	1.6	Scope, purpose and objectives	7	
	1.7	Related reports and plans	8	
2.0	Legislation and guidelines	8		
	2.1	Legislation	8	
		2.1.1	POEO Act	8
		2.1.2	Water Management Act 2000	8
		2.1.3	Water Management (General) Regulation 2018	8
	2.2	Standards and guidelines	9	
		2.2.1	NSW Aquifer Interference Policy	9
		2.2.2	Managing Urban Stormwater: Soils and Construction (Volume 1)	9
		2.2.3	Australian and New Zealand Guidelines for Fresh and Marine Water Quality	9
		2.2.4	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW	9
		2.2.5	NSW Water Quality and River Flow Objectives	9
		2.2.6	Guideline: Pollution Incident Response Management Plans	9
	2.3	Environmental impact assessment	9	
3.0	Roles and responsibilities	10		
4.0	Environmental setting and potential impacts	10		
	4.1	Soils	10	
		4.1.1	Land and soil capability	10
	4.2	Waterways and waterbodies	10	
		4.2.1	Lake Liddell	10
		4.2.2	Bayswater Creek	11
	4.3	Water allocations and uses	11	
	4.4	Flooding	11	
	4.5	Groundwater	11	
	4.6	Potential impacts	14	
5.0	Environmental management measures	14		
6.0	Compliance and reporting	18		
	6.1	Monitoring and reporting	18	
	6.2	Incidents and complaints	19	
	6.3	Document review and update	19	
Appendix A				
	Indicative Erosion and Sediment Control Plan	A		

Glossary and terms

Term	Description
AECOM	AECOM Australia Pty Ltd
AGLM	AGL Macquarie Pty Ltd
BAW	Bayswater Ancillary Works
BESS	Battery Energy Storage System
BESS Project (the)	Stage 2 of the Liddell Battery and Bayswater Ancillary Works Project consisting of the construction of a BESS with the storage capacity to facilitate a maximum discharge of up to 500 MW for a four-hour period, or up to 2 GWh
CCTV	Closed-circuit television
DPE	Department of Planning and Environment (now DPHI)
DPHI	Department of Planning, Housing and Infrastructure (formerly DPE)
EIS	Environmental Impact Statement
EMS	Environmental Management Strategy
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
GWh	Gigawatt hours
ha	hectares
HRSTS	Hunter River Salinity Trading Scheme
km	kilometre
kV	Kilovolt
LBBAWP	Liddell Battery and Bayswater Ancillary Works Project, consisting of a battery energy storage system at Liddell, decoupling works, and works associated with the ongoing operation of Bayswater
LSC	Land and Soil Capability
ML	megalitre
MW	Megawatt
NEM	National Energy Market
PIRMP	Pollution Incident Response Management Plan
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
RTS	Response to Submissions
SEARs	Secretary's Environmental Assessment Requirements
Site (the)	Location of the existing solar array area to be used for the BESS
SSD	State Significant Development
SWMP	Soil and Water Management Plan
TPZ	Tree Protection Zones
V	Volt

Term	Description
WAL	Water Access Licences
WOAOW	Bayswater Water and Other Associated Operational Works Project, which involves improvements to the management of ancillary processes at Bayswater power station and to facilitate an improved rehabilitation outcome for the ash disposal area. These works may occur at the same time as the LBBAWP.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by AGL Macquarie Pty Limited (AGLM) to prepare a Soil and Water Management Plan (SWMP) for a Battery Energy Storage System (BESS) to be constructed as part of the Liddell Battery and Bayswater Ancillary Works Project (LBBAWP), NSW.

The LBBAWP is a State Significant Development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011*¹, and is subject to Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

An Environmental Impact Statement (EIS) was prepared in March 2021 in accordance with the Secretary's Environmental Assessment Requirements (SEARs). Development consent (SSD-8889679) was issued by the Department of Planning and Environment (DPE) (now Department of Planning, Housing and Infrastructure (DPHI)) on 8 March 2022.

1.1 Background

AGLM is progressing with plans to facilitate the efficient, safe and reliable continuation of electricity-generating works from the Bayswater and Liddell sites. The LBBAWP will be carried out in the following stages:

- Stage 1 - Decoupling Works: Alternative network connection arrangements for the Liddell 33 Kilovolt (kV) switching station that provides electricity to the infrastructure required for the ongoing operation of Bayswater power station, to associated ancillary infrastructure and to potential third-party industrial energy users
- Stage 2 - BESS: Replacement of a portion of Liddell's dispatchable electricity supply is required for the National Energy Market (NEM), including the construction of a grid-connected utility-scale BESS with a capacity of up to 500 megawatts (MW) and 2 gigawatt hours (GWh)
- Stage 3 - Bayswater Ancillary Works (BAW): Works associated with Bayswater power station, which may include upgrades to ancillary infrastructure, such as pumps, pipelines, conveyor systems, roads and assets, to enable maintenance, repairs, replacement or expansion
- Consolidated consents: Surrender and consolidation of various existing development approvals required for the ongoing operation of AGLM assets.

This management plan has been developed for Stage 2 only (i.e. the BESS), which is hereinafter referred to as 'the BESS Project'.

1.2 Site details

The AGLM landholding is located approximately 15 kilometres (km) southeast of Muswellbrook, 25 km northwest of Singleton, and approximately 165 km west northwest of Sydney in NSW. The total area of the AGLM landholding is approximately 10,000 ha, including the Bayswater and Liddell power station operational areas, the Ravensworth rehabilitation area, Lake Liddell and surrounding buffer lands.

Surrounding the AGLM landholding is predominantly land uses heavily influenced by industrial activity. The local area is dominated by large-scale infrastructure associated with Bayswater and Liddell power stations and open-cut mining activities. Agricultural clearing for the purposes of grazing is also present within and surrounding the AGLM landholding.

Elevations within approximately 10 kilometres of the AGLM landholding range from around 100 to 500 metres above sea level.

The majority of the AGLM landholding has been previously disturbed during the construction and operation of Liddell and Bayswater power stations and historic agricultural activity. The BESS will be located within the location of the existing solar array area (the site), shown as 'Area 2' in Figure 1. This location was selected as it is in close proximity to Liddell Power Station and is on previously disturbed

¹ Now State Environmental Planning Policy (Planning Systems) 2021

operational lands no longer required for Liddell operations. Stockpiling for the BESS Project will occur within the former coal yards area, shown as 'Area 1' in Figure 1.

The solar array area consists of approximately 5 ha of solar thermal equipment. This consists predominantly of steel pipes used for heat absorption and water and steam transfer, mirror reflectors and steel mounting structures, as shown in Figure 2. The former coal yard covers an area of about 20 ha and consists of approximately 5 km of conveyor and associated stacker / reclaimer equipment.

1.3 Project description

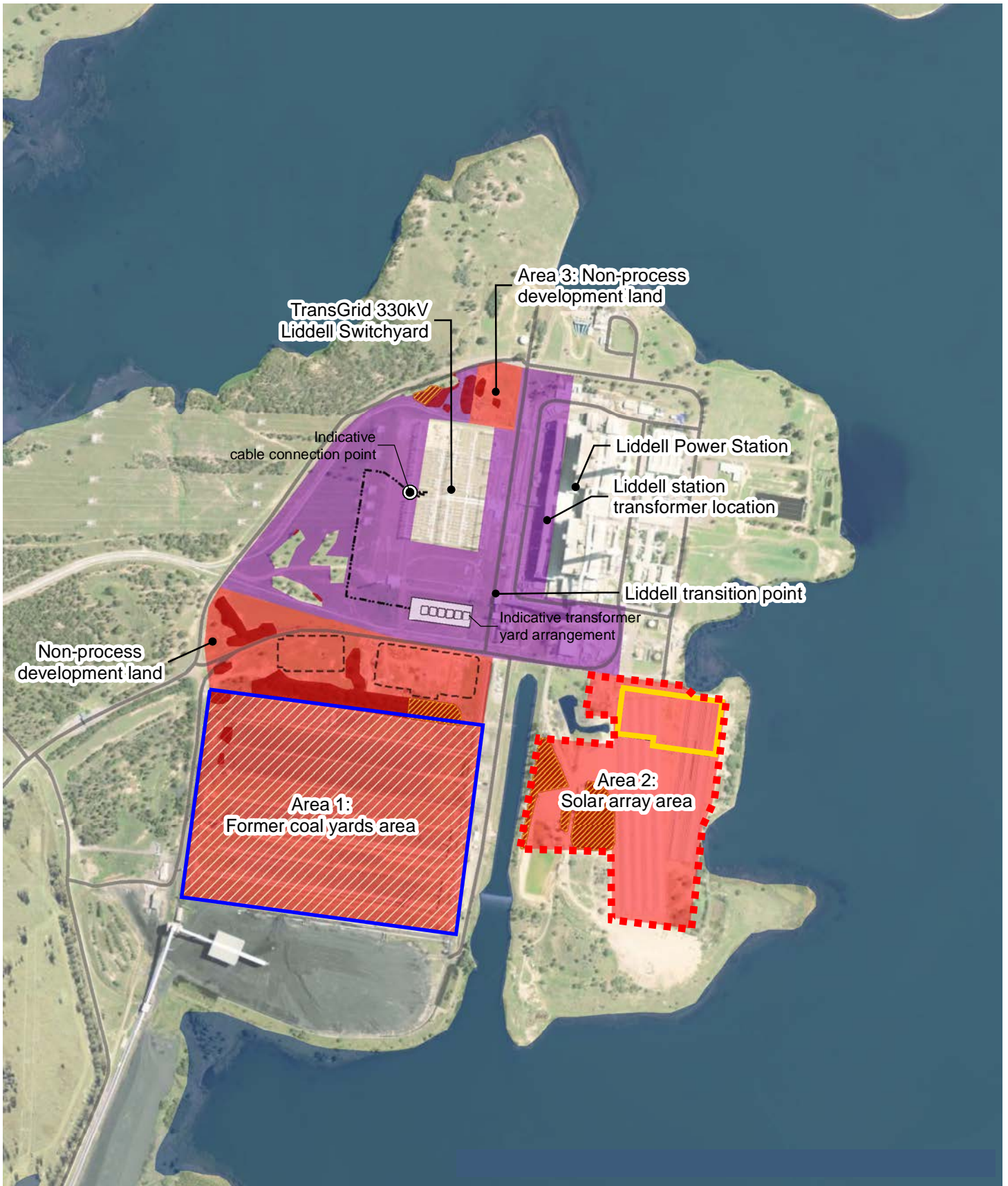
The BESS Project involves the construction, operation and decommissioning of a BESS with the storage capacity to facilitate a maximum discharge of up to 500 MW for up to a four-hour period or up to 2 GWh. The BESS will be located within 'Area 2', the existing solar array area and will be connected to the existing TransGrid 330kV substation via a new 330kV high-voltage power line (refer to Figure 1).

The BESS Project will involve the demolition of the existing solar array area for construction of the BESS and the former coal yard infrastructure for stockpiling purposes. Other redundant equipment may also require demolition and deconstruction to support construction of the BESS Project. The disturbance area for the BESS is expected to be around 20 hectares (ha). The BESS will be mounted on slab footings and will be containerised or otherwise enclosed in a formalised layout.

The approximate component requirements to achieve the maximum storage capacity for the BESS (based on indicative information provided by potential technology providers) are as follows:

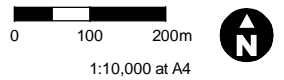
- Approximately 900 pre-assembled battery enclosures containing lithium-ion type batteries, internal cooling and fire suppression systems
- Approximately 148 medium voltage skid (inverter and transformers)
- Approximately 148 of 630 Volt (V) to 33 kV step-up transformers
- One control room, two electrical rooms, one social facility room and four storage rooms
- 33 kV reticulation system and collector switchrooms
- Overhead, underground, or a combination of both, subject to detailed design, 330 kV line to connect to TransGrid 330 kV substation
- Two 33 kV / 33kV / 330 kV three-winding transformers and 330 kV connection equipment
- Ancillary infrastructure, including water tanks for bushfire protection purposes, lightning protection, security fencing and closed-circuit television (CCTV).

An indicative layout of the BESS is shown in Figure 3.



Legend

- | | | |
|----------------------------------|---|--------------------------------|
| Project area assessed in the EIS | ● Indicative cable connection point (for discussion with TransGrid) | ▨ Species impact |
| ■ Battery energy storage system | --- Indicative 330kV cable route | ■ PCT impact - offset required |
| ■ Decoupling area | □ Transformer yard relocation | — Road |
| ■ Former coal yards area | ▭ Indicative battery block footprint | — Waterway |
| | ▨ Solar array area | ■ Waterbody |



Data sources
 Jacobs 2021
 AGL 2020
 ©Department of Finance,
 Service and Innovation Aug 2020



Imagery:
 © Department of Customer Service 2020
 GDA94 MGA56

Figure 1 Overview of Stage 1 and 2 of the LBBAWP (source: Jacobs 2021)

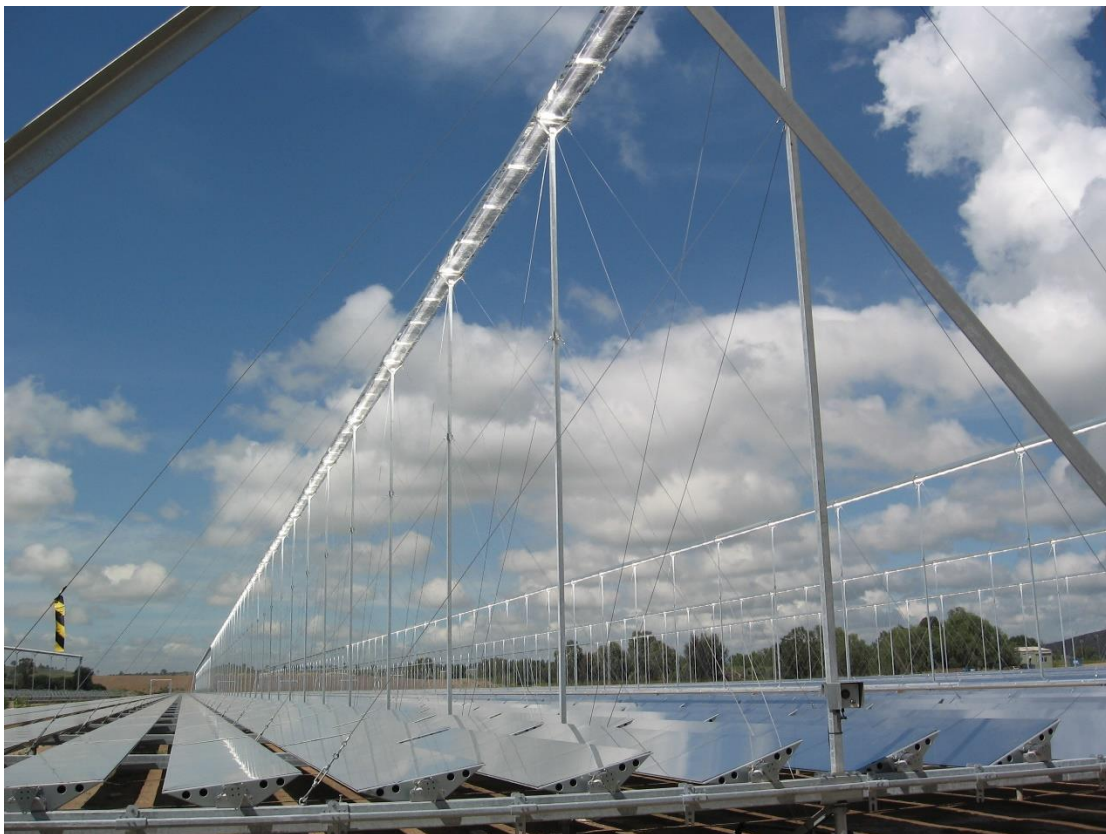
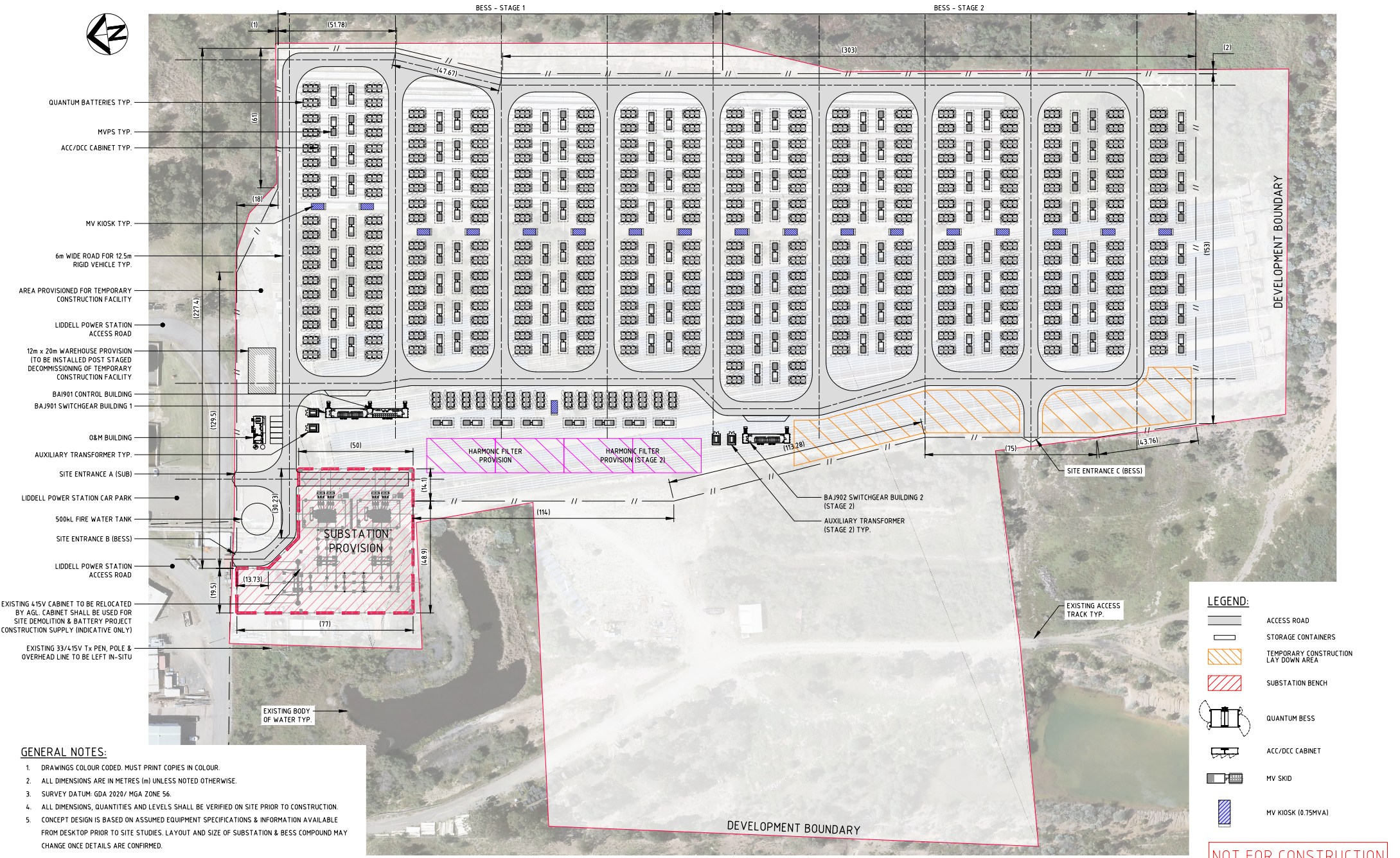


Figure 2 Existing solar array area



- QUANTUM BATTERIES TYP.
- MVPS TYP.
- ACC/DCC CABINET TYP.
- MV KIOSK TYP.
- 6m WIDE ROAD FOR 12.5m RIGID VEHICLE TYP.
- AREA PROVISIONED FOR TEMPORARY CONSTRUCTION FACILITY
- LIDDELL POWER STATION ACCESS ROAD
- 12m x 20m WAREHOUSE PROVISION (TO BE INSTALLED POST STAGED DECOMMISSIONING OF TEMPORARY CONSTRUCTION FACILITY)
- BAI901 CONTROL BUILDING
- BAI901 SWITCHGEAR BUILDING 1
- O&M BUILDING
- AUXILIARY TRANSFORMER TYP.
- SITE ENTRANCE A (SUB)
- LIDDELL POWER STATION CAR PARK
- 500ℓ FIRE WATER TANK
- SITE ENTRANCE B (BESS)
- LIDDELL POWER STATION ACCESS ROAD
- EXISTING 415V CABINET TO BE RELOCATED BY AGL. CABINET SHALL BE USED FOR SITE DEMOLITION & BATTERY PROJECT CONSTRUCTION SUPPLY (INDICATIVE ONLY)
- EXISTING 33/415V Tx PEN, POLE & OVERHEAD LINE TO BE LEFT IN-SITU

- GENERAL NOTES:**
1. DRAWINGS COLOUR CODED. MUST PRINT COPIES IN COLOUR.
 2. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE.
 3. SURVEY DATUM: GDA 2020/ MGA ZONE 56.
 4. ALL DIMENSIONS, QUANTITIES AND LEVELS SHALL BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.
 5. CONCEPT DESIGN IS BASED ON ASSUMED EQUIPMENT SPECIFICATIONS & INFORMATION AVAILABLE FROM DESKTOP PRIOR TO SITE STUDIES. LAYOUT AND SIZE OF SUBSTATION & BESS COMPOUND MAY CHANGE ONCE DETAILS ARE CONFIRMED.

- LEGEND:**
- ACCESS ROAD
 - STORAGE CONTAINERS
 - TEMPORARY CONSTRUCTION LAY DOWN AREA
 - SUBSTATION BENCH
 - QUANTUM BESS
 - ACC/DCC CABINET
 - MV SKID
 - MV KIOSK (0.75MVA)

NOT FOR CONSTRUCTION
17.02.2023 11:40 AM

ITEM	STAGE 1 (250MW/500MWh)	STAGE 2 (250MW/500MWh)	TOTAL (500MW/1000MWh)
AUX TRANSFORMER	2	2	4
MV KIOSK	8	8	16
MV SKID (INVERTER + TRANS.)	74	74	148
GRIDSOLY QUANTUM	444	444	888
ACC/DCC CABINET	148	148	296

SITE PLAN
SCALE 1:500

REV	DATE	REVISION DESCRIPTION	DES	RVD	APP	AUTH	CLIENT
0.2	17.02.2023	EQUIPMENT & LAYOUT REVISED	L.M.	K.M.	J.L.	A.M.	
0.1	10.02.2023	ISSUED FOR INFORMATION	L.M.	K.M.	J.L.	A.M.	



ENERVEN PROJECT No: 699

ENERVEN™

NAME	DATE
DESIGNED L. MUNIZ	10.02.2023
REVIEWED K. MACKAY	10.02.2023
APPROVED J. LOMBARD	10.02.2023
AUTHORISED A. MALCOLM	10.02.2023

LIDDELL BESS
CONCEPT SITE LAYOUT
SITE PLAN - SATELLITE OVERVIEW

SIZE	DRAWING NUMBER	REVISION
A1	699.EEI.GN.DWG.003	0.2

Figure 3 Preliminary site layout (indicative only)

1.4 Construction activities

Construction works associated with the BESS Project would be likely to involve:

- Installation and maintenance of environmental controls, including temporary and permanent water management infrastructure
- Establishment of access from the Liddell access road
- Demolition or deconstruction of existing infrastructure as required, including the existing solar array area and former coal yard infrastructure
- Establishment of a hardstand pad and construction laydown areas, including dedicated stockpiling areas
- Cut and fill to battery compound, transformer compounds, footings and construction laydown area
- Trenching of 33kV reticulation system
- Trenching and/or overhead line installation to TransGrid 330 kV substation
- Structural works to support enclosures, inverters, transformers, buildings and transformer compounds
- Delivery, installation and electrical fit-out
- Testing and commissioning activities
- Removal of construction equipment and reinstatement of construction areas.

1.5 Relevant approvals and conditions

1.5.1 Project approvals

Liddell power station was commissioned in 1971 and formed part of AGLM's integrated power generation complex. This complex also incorporates Bayswater power station (commissioned in 1985) and a range of supporting water management, coal supply, power supply and control system infrastructure.

Bayswater and Liddell power stations are regulated under several planning approvals. Most development at the site pre-dates current planning requirements enforced through the EP&A Act. However, alterations and additions after 1 September 1980 were subject to the provisions of the Act.

Development consent (SSD-8889679) was granted for the LBBAWP on 8 March 2022, which includes the voluntary surrender and consolidation of various existing development approvals into SSD-8889679.

In accordance with Section 55 of the *Protection of the Environment Operations Act 1997* (POEO Act), Liddell operated under Environment Protection Licence (EPL) 2122, which is still active for the site even though power generation operations have ceased for the power station. Bayswater is operated under EPL 779.

1.5.2 Development consent conditions

In accordance with SSD-8889679 development consent condition C1, an Environmental Management Strategy (EMS) has been prepared for the BESS Project to provide a strategic framework for the environmental management of the development. A range of subplans has been developed to support the EMS and address development consent condition C1(e)(i).

This SWMP has been developed to manage the potential environmental impacts to soil and/or water arising from the BESS Project. The relevant conditions are outlined below in Table 1.

Table 1 Development consent conditions – Soil and water management

Condition	Requirement	Reference
C1	<p>Prior to commencing construction, the Applicant must prepare an Environmental Management Strategy for the development to the satisfaction of the Secretary. This strategy must:</p> <p>(e) include:</p> <p>(i) the following subplans:</p> <ul style="list-style-type: none"> • soil, stormwater, water quality, flood and spoil management; • construction and decommissioning noise, including an out-of-hours works protocol; • air quality management; • contamination, including an unexpected finds protocol • waste management; and • traffic. 	This management plan
B24	The Applicant must ensure that it has sufficient water for all stages of the development and, if necessary, adjust the scale of the development to match its available water supply.	Section 4.3
B25	The Applicant must ensure that all surface discharges from the development comply with all relevant provisions of the POEO Act, including any discharge limits (both volume and quality) set for the development in any EPL.	Section 6.1
B26	<p>The Applicant must:</p> <p>(a) Ensure the development is designed, constructed and maintained to minimise impacts on surface water, flooding and groundwater at the site</p> <p>(b) 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</p> <p>(c) Ensure the battery energy storage system and ancillary infrastructure are designed, constructed and maintained to avoid causing any erosion on site</p> <p>(d) Ensure all works are undertaken in accordance with the <i>Guidelines for Controlled Activities on Waterfront Land</i> (NRAR, 2018), or its latest version unless DPE Water agrees otherwise.</p>	<p>Section 5.0</p> <p>Management Measures W2, W4 and W7</p>

1.6 Scope, purpose and objectives

This SWMP has been developed in accordance with SSD-8889679 development consent condition C1 and to address relevant requirements associated with:

- SSD-8889679 development consent conditions
- EIS management measures which were amended in the Response to Submissions (RTS) (Jacobs 2021)
- Bayswater Water and Other Associated Operational Works Project (WOAOW) management measures
- AGL plans and procedures.

The purpose of this SWMP is to:

- Summarise potential soil and water impacts of the BESS Project as assessed in the EIS (Jacobs 2021)
- Identify environmental management measures to be implemented to minimise soil and water impacts.

The objective of this SWMP is to mitigate and manage potential soil and water impacts as a result of the BESS Project and to maintain compliance with SDD-8889679.

All works undertaken by the Project Contractor must comply with the environmental management measures outlined in Section 5.0 of this plan.

1.7 Related reports and plans

There are environmental assessments, management plans and monitoring programs for existing and proposed operations within the AGLM landholdings. The following documents are considered related and may need to be read in conjunction with this SWMP:

- Water Management Plan (AGLM-HSE-PLN-009.02) (AGLM, 2022)
- Land Management Plan (AGLM-HSE-PLN-009.01) (AGLM, 2021)
- Pollution Incident Response Management Plan (PIRMP) (AGLM, 2022)
- Liddell Decoupling Works Soil and Water Management Plan (Jacobs, 2022).

2.0 Legislation and guidelines

2.1 Legislation

This SWMP has been prepared in accordance with the relevant legislation and regulatory requirements within the EMS. Key legislation relating to this SWMP:

- POEO Act (NSW)
- *Water Management Act 2000* (NSW)
- *Water Management (General) Regulation 2018* (NSW).

2.1.1 POEO Act

The aim of the POEO Act is to achieve the protection, restoration and enhancement of the quality of the NSW environment and reduce potential risks to human health and the environment. The POEO Act is the primary piece of legislation for the regulation of potential pollution impacts associated with scheduled operations or activities in NSW. Scheduled activities are those defined in Schedule 1 of the Act.

Liddell operated under EPL 2122, which specified the environmental performance requirements for operations, including emission limits of certain pollutants. EPL 2122 remains active for the site, however the BESS Project does not constitute a scheduled activity and is therefore not subject to the requirements of the EPL.

2.1.2 Water Management Act 2000

The *Water Management Act 2000* was introduced to provide a comprehensive singular piece of legislation to effectively manage and regulate access and use of the State's water resources.

2.1.3 Water Management (General) Regulation 2018

The *Water Management (General) Regulation 2018* provides further guidance on matters relevant to water management in NSW.

2.2 Standards and guidelines

The main standards and guidelines relevant to this SWMP include:

- *NSW Aquifer Interference Policy* (Department of Primary Industries, 2012)
- *Managing Urban Stormwater: Soils and Construction (Volume 1)* (Landcom, 2004)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian Government Institute, 2018)
- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* (Environment Protection Authority (EPA), 2007)
- *NSW Water Quality and River Flow Objectives* (Department of Environment, Climate Change and Water, 2006)
- *Guideline: Pollution Incident Response Management Plans* (EPA, 2022).

The *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* has been updated in 2022. Therefore, monitoring conditions within an EPL must be undertaken in accordance with the 2022 version of the *Approved Methods for Sampling and Analysis* (which replaces the 2004 version).

2.2.1 NSW Aquifer Interference Policy

The *NSW Aquifer Interference Policy* sets out the requirements for obtaining water licences for aquifer interference activities under NSW water legislation and establishes considerations in assessing and providing advice on whether more than minimal impacts might occur to a key water-dependent asset.

2.2.2 Managing Urban Stormwater: Soils and Construction (Volume 1)

The *Managing Urban Stormwater: Soils and Construction (Volume 1)* is a comprehensive guideline for use in construction to ensure all industries comply with appropriate stormwater management practices.

2.2.3 Australian and New Zealand Guidelines for Fresh and Marine Water Quality

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018) provide a framework for managing water quality in rivers, lakes, estuaries and marine waters in Australia and New Zealand.

2.2.4 Approved Methods for the Sampling and Analysis of Water Pollutants in NSW

The *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* provides guidance for the monitoring and analysis of water pollutants in NSW for comparison with limits or performance criteria listed in statutory instruments.

2.2.5 NSW Water Quality and River Flow Objectives

The *NSW Water Quality and River Flow Objectives* are an agreed set of environmental values and long-term goals for NSW surface water. These objectives include a range of water quality indicators for both fresh and estuarine surface waters relevant for the assessment of waterway conditions.

2.2.6 Guideline: Pollution Incident Response Management Plans

The *Guideline: Pollution Incident Response Management Plans* is a framework for EPL holders to ensure their site operations comply with the pollution incident response management plan obligations under the POEO Act.

The previous version of this guideline was from March 2012 and is the version to which AGLM prepared their existing PIRMPs.

2.3 Environmental impact assessment

The EIS prepared for the LBBAWP included an assessment of soil and water in accordance with the SEARs issued. The assessment involved a desktop review of available database searches and

previously prepared reports, including the Surface Water, Groundwater, and Flooding Technical Paper (Jacobs, 2020) prepared for the WOAOW project.

The assessment identified potential impacts associated with soil and water and recommended suitable mitigation and management measures which have been included in this SWMP in Section 5.0, where relevant to the BESS.

The EIS was placed on public exhibition for a period of 28 days, between 15 April 2021 to 12 May 2021. Following this, an RTS report (Jacobs 2021) was prepared to consider and respond to any submissions received during the exhibition period, which resulted in changes to some of the management measures from the EIS. Therefore, the management measures in the RTS report supersede those in the EIS, where changes have been made.

3.0 Roles and responsibilities

Section 4.3 of the EMS outlines key roles and responsibilities for both AGLM and the Project Contractor working on the BESS Project.

4.0 Environmental setting and potential impacts

4.1 Soils

The BESS Project is situated across Liddell soils (SHld). Soils in the vicinity of the BESS Project generally comprise silty clay loams, clay loams and silty loams underlain by silty clays, medium clays, and heavy clays.

Acid sulfate soils are generally limited to deeper marine sediments and low lying sections of coastal floodplains, rivers and creeks where surface elevations are less than approximately five metres above sea level. Mapping indicates most of the land near the BESS Project has a 'low probability of occurrence' for acid sulfate soils (with a 'very low' level of confidence). As the BESS Project is located at elevations above 90 metres above sea level, acid sulfate soils are not anticipated.

Soil salinity in the broad vicinity of the BESS Project ranges from 'non-saline' to 'highly saline'.

4.1.1 Land and soil capability

The land within the footprint of the BESS is mapped as 'Severe' limitations on the Land and Soil Capability Mapping for NSW (Department of Planning, Industry and Environment, 2021), which corresponds to a land and soil capability (LSC) class 5 (Moderate–low capability land). The land limitations need to be carefully managed to prevent long-term degradation.

4.2 Waterways and waterbodies

The LBBAWP is located in the central region of the Hunter River catchment area, which spans 22,000 square kilometres (km²). Within the AGLM landholdings exists the Bayswater Creek and Saltwater Creek sub-catchments.

There are a number of waterways and artificial waterbodies within the vicinity of the LBBAWP, as shown in Figure 4. Most of these waterways are highly disturbed and are not classified as sensitive receiving environments.

Surface water runoff from the BESS Project site would be received by Lake Liddell, which flows into Bayswater Creek, and then the Hunter River.

4.2.1 Lake Liddell

Lake Liddell is an artificial lake constructed to supply cooling water to Bayswater and Liddell power stations. The lake is located east of the BESS Project and collects runoff from the upper portion of the Bayswater Creek catchment, including flows from licenced discharges of Bayswater and Liddell power stations.

Flows from Lake Liddell are intermittently released to Bayswater Creek from a monitored, licenced discharge point at the main dam wall. The quality of water released into Bayswater Creek is subject to regulation by the Hunter River Salinity Trading Scheme (HRSTS) and water quality parameter limits implemented under EPL 779 (Bayswater power station's EPL).

4.2.2 Bayswater Creek

Bayswater Creek has been dammed to create Lake Liddell reservoir and heavily modified below the dam wall to accommodate discharges downstream into the Hunter River. The creek acts as a transfer channel between Lake Liddell and the Hunter River, with discharges to Hunter River regulated by the HRSTS.

4.3 Water allocations and uses

The major source of water for AGLM operations is water allocations from the Hunter River.

Bayswater and Liddell power stations share an integrated water supply and treatment system. This supply system is designed to pump up to 61,000 megalitres (ML) per year from the Hunter River at Jerry's Plains to meet the water requirements of Liddell (25,000 ML per year) (when it was operational) and Bayswater (36,000 ML per year).

The maximum allocated water volume is shown in Table 2, with allocations reset based on the calendar year. The actual annual usage of water on site from the Hunter River is variable and dependent on water availability from the Hunter River, water quality (on site and in the Hunter River), and dam levels within the AGLM landholdings.

With the closure of Liddell power station in April 2023, additional availability of water is now available for the BESS Project requirements.

Table 2 AGLM water allocations

Water allocation	Volume (ML)
Water utility	36,000
Supplementary	36,000
General security	2090
High Security	1740
Total	75,830

4.4 Flooding

The BESS Project is not located in a flood-prone area under the *Singleton Local Environment Plan 2013* or *Muswellbrook Local Environmental Plan 2009*. The BESS footprint would be located on land that is above the maximum water level of Lake Liddell, and away from drainage lines.

4.5 Groundwater

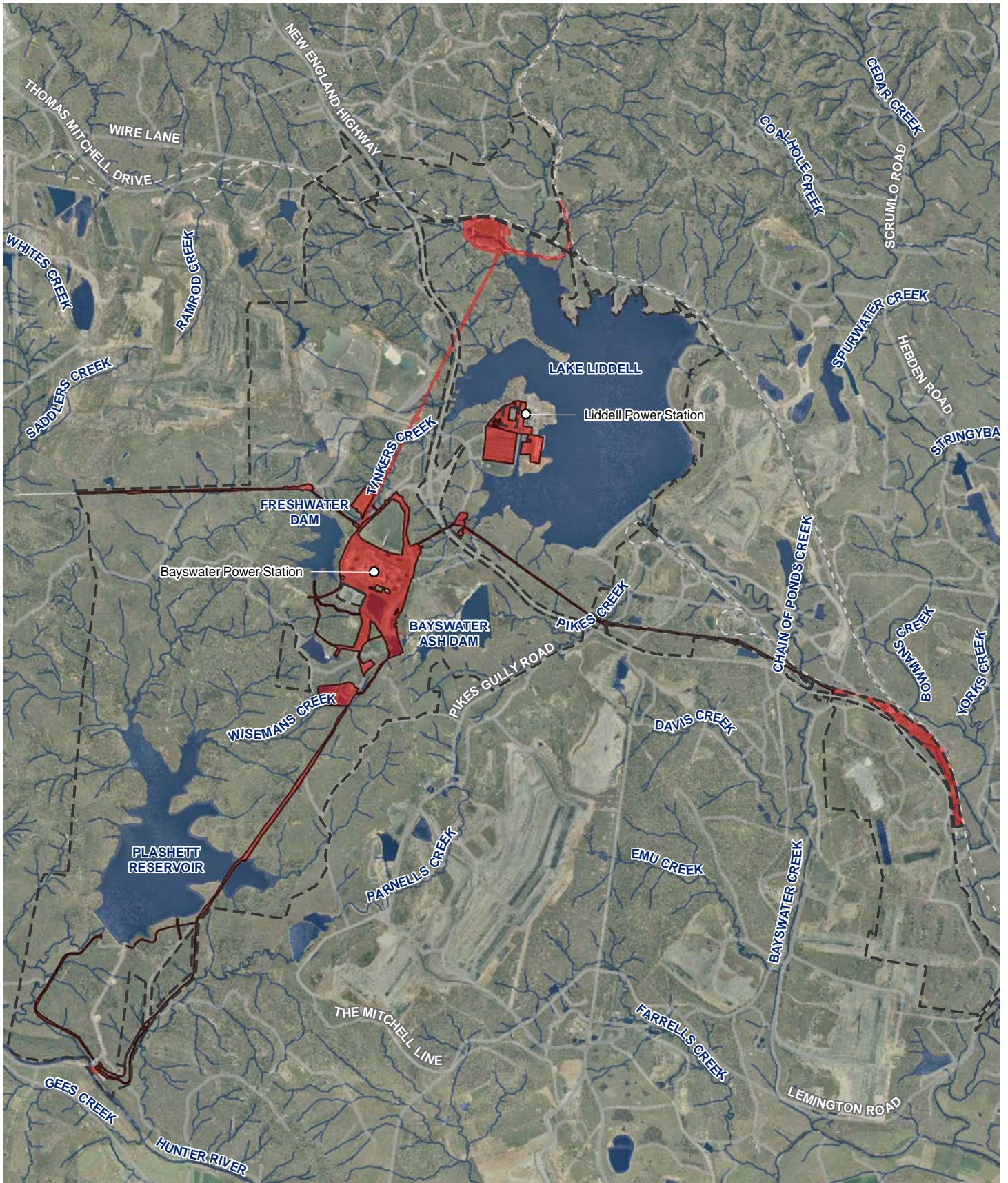
There are 35 registered groundwater bores within the surrounding land. The monitoring data from these bores found that standing water levels for the bores ranged from 3 to 43 metres below ground level.

The existing groundwater data for the AGLM landholdings indicate that average groundwater depths range from 0.4 metres below ground level to 11.5 metres below ground level. The relatively shallow groundwater depths are a result of the relevant bores being in relatively low-lying land.

Most of the construction activities would be limited to surface works and as such, there would be limited possibilities for direct interaction with groundwater. However, groundwater may be intercepted when constructing foundations or trenching works given the relatively shallow groundwater depths.

AGLM currently holds a number of water access licences (WAL) associated with Bayswater and Liddell. As no groundwater would be abstracted during the construction of the LBBAWP and harvesting of

surface water is covered by existing entitlements, a new WAL or modification to existing WAL/s would not be required.



Legend

- Project area
- Development site
- AGL owned land
- Railway
- Road
- Waterway
- Waterbody



Data sources

Jacobs 2020
 © Department Finance,
 Services and Innovation 2019
 AGL 2019

Imagery:
 © Department of Customer Service 2020

GDA94 MGA56



Figure 4 Waterways near the BESS project (source: Jacobs 2021)

4.6 Potential impacts

According to the impact assessment undertaken as part of the EIS for the construction phase of the LBBAWP, potential impacts to water and soils could occur through the following construction activities:

- Removal of vegetation and general earthworks, including stripping of topsoil and excavation, could result in the mobilisation of exposed soils, increased erosion and sedimentation
- Stockpiling of topsoil and vegetation could lead to the discharge of sediment-laden water
- Transportation of cut and/or fill materials and the movement of heavy vehicles across exposed earth could lead to increase in dust
- Potential for spills and leaks of chemicals, petroleum, oils and other toxicants from construction machinery, plant equipment, refuelling and vehicles travelling to and from Liddell power station could result in discharge to the environment
- Concrete works resulting in concrete dust, concrete slurries or washout water could enter downstream waterways, which can increase the alkalinity and pH of downstream waterways and harm aquatic life.

In addition, the assessment anticipated that there would be negligible impact on water and soils during the operation of the BESS Project.

5.0 Environmental management measures

The BESS Project will be designed, constructed and maintained to minimise impacts on soils, surface water, flooding and groundwater. Specific control requirements will be confirmed during the development of the detailed design and before construction commences.

The management measures provided in Table 3 and Table 4 will be implemented to minimise potential soil and water impacts from the BESS Project. Management measure W6 has been included for consistency with the EIS and RTS, however is not relevant to the BESS Project.

Table 3 Environmental management measures – soil and water (EIS / RTS / development consent)

Reference	Environmental management measures	Responsibility	Timing
W1	The specific requirements for water quality controls will be confirmed as the detailed design develops and prior to the commencement of construction of each Project component to ensure the objectives of the Project are achieved.	Project Contractor	Pre-construction
W2	The following measures will be undertaken to manage activities in proximity to waterways: <ul style="list-style-type: none"> • The design and implementation of works within waterfront land will be managed in accordance with <i>Guidelines for Controlled Activities on Waterfront Land</i> (NRAR, 2018) • Implementing practices to minimise disturbance of banks and undertake bank stabilisation • Appropriate drainage features will be incorporated into the design of the BESS Project components by a suitably qualified and experienced professional. All Project components will be designed and constructed in accordance with relevant guidelines. 	Project Contractor	Pre-construction Construction Decommissioning

Reference	Environmental management measures	Responsibility	Timing
W3	<p>Stockpiles will be managed to minimise the potential for mobilisation and transport of dust, sediment and leachate in runoff. This will include:</p> <ul style="list-style-type: none"> • Minimising the number of stockpiles, the area used for stockpiles, and the time that they are left exposed (i.e. covering stockpiles) • Locating stockpiles away from drainage lines, waterways and areas where they may be susceptible to wind erosion • Stabilising stockpiles, establishing appropriate sediment controls (i.e. sediment fences) and suppressing dust as required. 		
W4	<p>Erosion and sediment control measures will be implemented and maintained at all work sites in accordance with the principles and requirements in <i>Managing Urban Stormwater – Soils and Construction, Volume 1</i> (Landcom 2004), commonly referred to as the “Blue Book”. Additionally, any water collected from worksites will be treated and discharged (where able) to avoid any potential contamination or local stormwater impacts. Measures will be designed in accordance with the relevant guideline where appropriate.</p>	Project Contractor	Construction Decommissioning
W5	<p>Water use during construction will be minimised where possible, and measures to reduce water use will be applied.</p>	Project Contractor	Construction
W6	<p>The Bayswater site operational water quality monitoring program will be updated and implemented as required.</p>	AGLM	Pre-operation Operation
W7	<p>The BESS and ancillary facilities will be designed, constructed and maintained to minimise impacts on surface water, flooding, and groundwater and to avoid impacts on soil and erosion</p>	Project Contractor	Pre-construction Construction

Table 4 Environmental management measures – soil and water (other)

Reference	Environmental management measures	Responsibility	Timing
W8	<p>An Erosion and Sediment Control Plan (ESCP) will be prepared showing a drawing or map of the site layout, including:</p> <ul style="list-style-type: none"> • North point and plan scale • Approximate grades and directions of falls (Contours 0.5m for gradients <15%, 1m for gradients 15-30% and 2m slopes >30%) • Site boundaries, adjoining roads and sensitive surroundings • Construction access points • Site office, car park and location of stockpiles 	Project Contractor	Pre-construction

	<ul style="list-style-type: none"> • Proposed construction activities and limits of disturbance • Approximate location of trees and other vegetation designated “No Go Zones” • Existing and proposed drainage patterns and discharge points • Clean water diversion of upslope runoff around the disturbed areas • Location and details of proposed erosion and sediment control measures • Location of stockpile areas, including topsoil storage, protection and reuse methodology • Location of concrete washout areas • Commentary describing: <ul style="list-style-type: none"> - timing of works - nature and extent of earthworks (cut and fill) - site rehabilitation proposals, including schedules - frequency and nature of maintenance regimes. <p>An indicative ESCP is included in Appendix A. Note that this ESCP is indicative and subject to further design changes. The construction contractor will be required to prepare a detailed ESCP prior to the commencement of construction..</p>		
W9	Topsoil will be reused where reasonable and feasible and stockpiled separately	Project Contractor	Construction Decommissioning
W10	Site access points will be stabilised with track mat or similar if required	Project Contractor	Construction Decommissioning
W11	Geo-fabric or similar will be installed over any stormwater drains	Project Contractor	Construction Decommissioning
W12	No excavation with machinery, stockpiling, or equipment storage will occur within tree protection zones (TPZ)	Project Contractor	Construction Decommissioning
W13	Surface runoff will be diverted away from disturbed soil and stockpiles	Project Contractor	Construction Decommissioning
W14	<p>Work will not be carried out in periods of predicted high rainfall in order to manage offsite stormwater discharge. Predicted high rainfall scenarios may include the following:</p> <ul style="list-style-type: none"> • Heavy rainfall experienced during the work and is to be stopped • Where the site is waterlogged and likely to be damaged by vehicle and rig movement • Where consistent rainfall is experienced and likely to persist during the day. <p>The Environment Manager is to make the decision as to whether work needs to be stopped.</p>	Project Contractor	Construction Decommissioning
W15	Water carts will be maintained on site and used for dust suppression on internal roads and on other internal areas necessary,	Project Contractor	Construction Decommissioning

	particularly in dry weather. Any sediment/soil transferred offsite will be swept up at least daily or before rainfall		
W16	All chemicals and fuels will be stored in accordance with relevant Australian Standards and Data Safety Sheets. Stored chemicals will be recorded on a site register and clearly labelled	Project Contractor	Construction Decommissioning
W17	Plant and equipment washdown will be carried out within a designated washdown area. All concrete washout activity will occur at a designated concrete washout location that will securely capture and store concrete wastewater and solids in an impervious bunded area	Project Contractor	Construction Decommissioning
W18	Plant and equipment will be regularly checked for leaks. Oil/fuel leaks will be repaired immediately, or the item will be removed from site and replaced with a leak-free item	Project Contractor	Construction Decommissioning
W19	Refuelling, fuel decanting and vehicle maintenance is to be carried out away from waterways and drainage lines with spill kits close by.	Project Contractor	Construction Decommissioning
W20	Spill kits will be provided on site, and kept stocked for clean-up of accidental chemical/fuel spills and will be readily accessible	Project Contractor	Construction Decommissioning
W21	All pollution incidents, including spills, will be managed in accordance with the AGLM Pollution Incident Response Management Plan (PIRMP)	Project Contractor	Construction Decommissioning
W22	A Dewatering Management Plan will be prepared to address all aspects of dewatering, including groundwater and rainwater. All water discharged will meet the criteria specified in EPL 2122. Dewatering /aquifer interference permits will be obtained where the construction dewatering volume exceeds three megalitres	Project Contractor	Construction
W23	Any imported material will be certified for the intended use and will be free from contamination, including asbestos	Project Contractor	Construction Decommissioning
W24	Any spoil removed from site will be classified in accordance with NSW Environment Protection Authority Waste Classification Guidelines and disposed of at a suitably licensed waste facility. Spoil removed will be recorded in a Waste Disposal Register and include the disposal location	Project Contractor	Construction Decommissioning
W25	Ground disturbance will be minimised, and disturbed areas stabilised progressively	Project Contractor	Construction Decommissioning
W26	Potential or actual acid sulphate soils will be managed in accordance with the Acid Sulfate Soils Management Advisory Committee's Acid Sulfate Soils Assessment Guidelines	Project Contractor	Construction Decommissioning

	(ASSMAC 1998). Acid sulphate soils are not anticipated to be encountered.		
W27	If required, appropriate soil salinity mitigation measures will be adopted. This may include: <ul style="list-style-type: none"> • Treat existing salinity with gypsum • Establish salt-tolerant species in existing or potential salinity problem areas after construction • Stabilise existing areas of erosion • Minimise water use on site • Avoid rotation and vertical displacement of the original soil profile • Backfill excavations deeper than one metre in the same order, or treat or use this material as fill at depths more than one metre from the finished level. 	Project Contractor	Construction Decommissioning
W28	Controls will only be removed once surfaces have been stabilised, including trapped sediment in drainage lines being removed	Project Contractor	Construction Decommissioning

6.0 Compliance and reporting

6.1 Monitoring and reporting

A recommended monitoring and inspection plan for the construction and decommissioning of the BESS Project is provided in Table 5. There will be no operational monitoring associated with the BESS Project.

Table 5 Soil and water management monitoring plan

Type of monitoring	Frequency	Responsibility	Records
Erosion and sediment controls have been installed effectively prior to construction	Once	Project Contractor	Inspection checklist
General observations of erosion and sediment controls to ensure they remain installed effectively	Daily	Project Contractor	Daily pre-starts
Environmental site inspection: <ul style="list-style-type: none"> • Inspection of control measures – clean, adjust and replace as required • Inspection of disturbed areas and stockpiles – ensure dust and sediment control measures are active • Inspection of sealed roads – identify any sediment/soil which has been transferred offsite • Inspection of local water quality (i.e. turbidity, hydrocarbon spills/slicks) – identify any potential spills or deficient erosion and sediment controls. 	Weekly	Project Contractor	Inspection checklist
Adverse weather event inspection: <ul style="list-style-type: none"> • Inspection of control measures • Inspection of disturbed areas and stockpiles • Inspection of sealed roads • Inspection of local water quality. 	As required	Project Contractor	Inspection checklist

Type of monitoring	Frequency	Responsibility	Records
Rainfall and weather forecasts	Daily	Project Contractor	Daily pre-starts

The Project Contractor will establish and maintain a system of records that provides full documentation of all inspections.

Records are to include the following:

- Before and after photos of each site
- Document the date the control is installed and removed
- Document checks and any issues with each control.

6.2 Incidents and complaints

Incident management will be managed in accordance with the process outlined in Section 4.5 of the EMS.

Complaints and enquiries will be managed in accordance with the process outlined in Section 5.3 of the EMS.

6.3 Document review and update

It is a requirement of the EMS that all associated plans, studies and strategies are reviewed and updated within three months of the following events:

- The submission of an environmental incident report
- The submission of an audit report
- The approval of any modification to the conditions of the development consent
- A direction of the Secretary.

Appendix A

Indicative Erosion and Sediment Control Plan

Appendix A Concept Erosion and Sediment Control Plan

The objective of this Erosion and Sediment Control Plan (ESCP) is to ensure that appropriate procedures are in place to minimise soil erosion and potential discharge of sediment to downstream waters during construction. This ESCP has been prepared as a Concept ESCP for the Area 1 stockpile area and Area 2 Battery Energy Storage System (BESS) to provide a framework for the Construction Contractor's Detailed ESCP. This ESCP is subject to change as the design progresses and the contractor will be required to prepare a Construction Detailed ESCP. As the site will be changing during the construction phase the ESCP will need to be proactively managed by the contractor, incorporating suggested treatments on a case-by-case basis.

Managing Urban Stormwater: Soils and Construction (Volume 1) 'Blue Book' is to be referenced as this is a comprehensive guideline for use in construction to ensure all industries comply with appropriate stormwater management practices.

There are several waterways and artificial waterbodies within the vicinity of Areas 1 and 2, which will need to be protected from the disturbance from construction onsite even though these are highly disturbed environments and are not classified as sensitive receiving environments.

The demolition of the coal loader bays and the construction phase stockpiling of spoil in the project area has the potential to impact water and soils through the following construction activities:

- Demolition of decommissioned infrastructure
- Removal of vegetation and general earthworks, including stripping of topsoil and excavation, could result in the mobilisation of exposed soils some of which may be contaminated, increased erosion and sedimentation
- Stockpiling of topsoil and vegetation could lead to the discharge of sediment-laden water
- Transportation of cut and/or fill materials and the movement of heavy vehicles across exposed earth could lead to increase in dust
- Potential for spills and leaks of chemicals, petroleum, oils and other toxicants from construction machinery, plant equipment, refuelling and vehicles travelling to and from Liddell power station could result in discharge to the environment
- Concrete works resulting in concrete dust, concrete slurries or washout water could enter downstream waterways, which can increase the alkalinity and pH of downstream waterways and harm aquatic life.

This ESCP is indicative of the measures required for sediment control during the construction works. The construction contractor will be required to provide an ESCP for construction purposes.

All clean water external to the site should be diverted around the site. Any contaminated waste/soil, if found, need to be disposed of in accordance with the site's contamination and waste policies.

Area 1 encompasses the decommissioned coal loader infrastructure which is to be demolished, and part of the area used for stockpiling of soil from Area 2 BESS site. Approximately 6.8 hectares (three coal bays) will be used for stockpiling soil from Area 2. Based on the Blue Book spreadsheet for type D basins an estimated total basin volume of 1500m³ will be required to accommodate this area. The rest of the coal loader bay approx. 12.2 hectares requires an estimated total basin volume of 2800m³ type D basin.

Should the entire 8 hectares of the Area 2 BESS site be disturbed, it is anticipated that a total estimated basin volume of 1350m³ would be required, based on the Blue Book spreadsheet for type D basins. This could be split into two basins; one to service the BESS approximately 1000m³ and the other for the catchment to the west approximately 350m³, as shown on the ESCP.

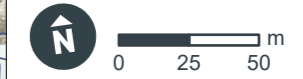
The exact size and location of the basins will need to be determined by the contractor in the Construction Detailed ESCP. Dirty water (runoff from disturbed ground) should be directed to the sedimentation basin as necessary via drainage channels (refer SD 5-6 and 5-6 'Blue Book').

Outlets from the sedimentation basin should be constructed to not cause any erosion issue downstream of the outlet.

A stabilised site access (refer SD 6-14 'Blue Book') is required and has been placed where the haul road enters and exits Area 2 the battery storage facility and enters and exits Area 1 the stockpile facility.

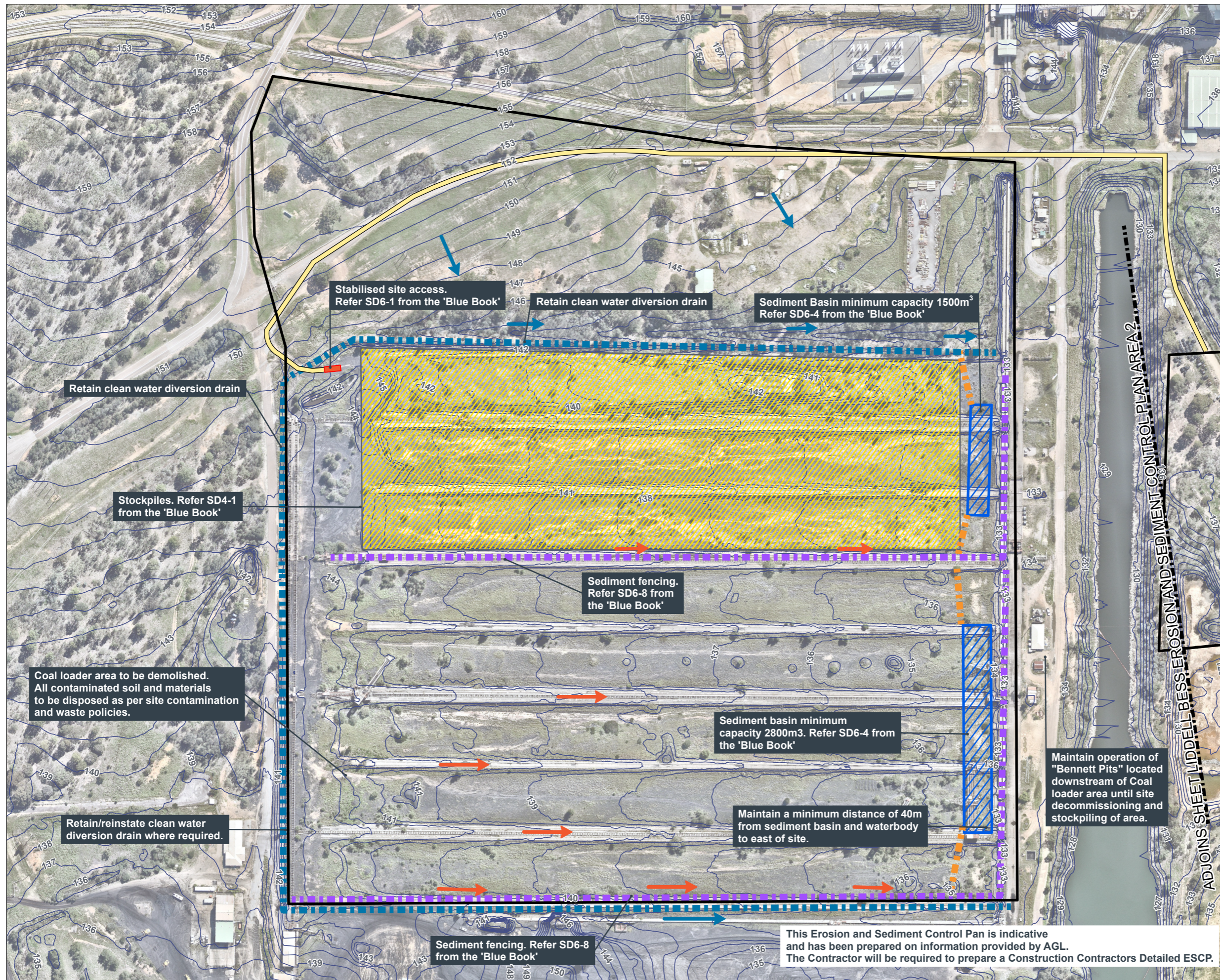
Sediment fencing (refer SD 6-8 'Blue Book') is to be installed along the contour with periodic small returns, creating several small sub catchments. Sub catchment areas should be sufficiently small to constrain maximum flows to 50 L/s in the design storm event should all water discharge at one point.

Temporary stockpiling of material for the works within Area 2 should be placed at least 5m away from existing vegetation, concentrated water flow, roads and other hazard areas. Stockpiles should be stabilised if they are in place for more than 10 days (Refer SD 4-1 'Blue Book').



Legend

- Development Boundary
- Stockpile
- Sediment Basin
- Stabilised Site Access
- 1m Contour
- Clean Water Diversion
- Sediment Fence
- Dirty Water Collection
- ▶ Clean Water
- ▶ Dirty Water
- Stockpile Haul Road
- Break Line



LIDDELL BESS EROSION AND SEDIMENT CONTROL PLAN

Area 1

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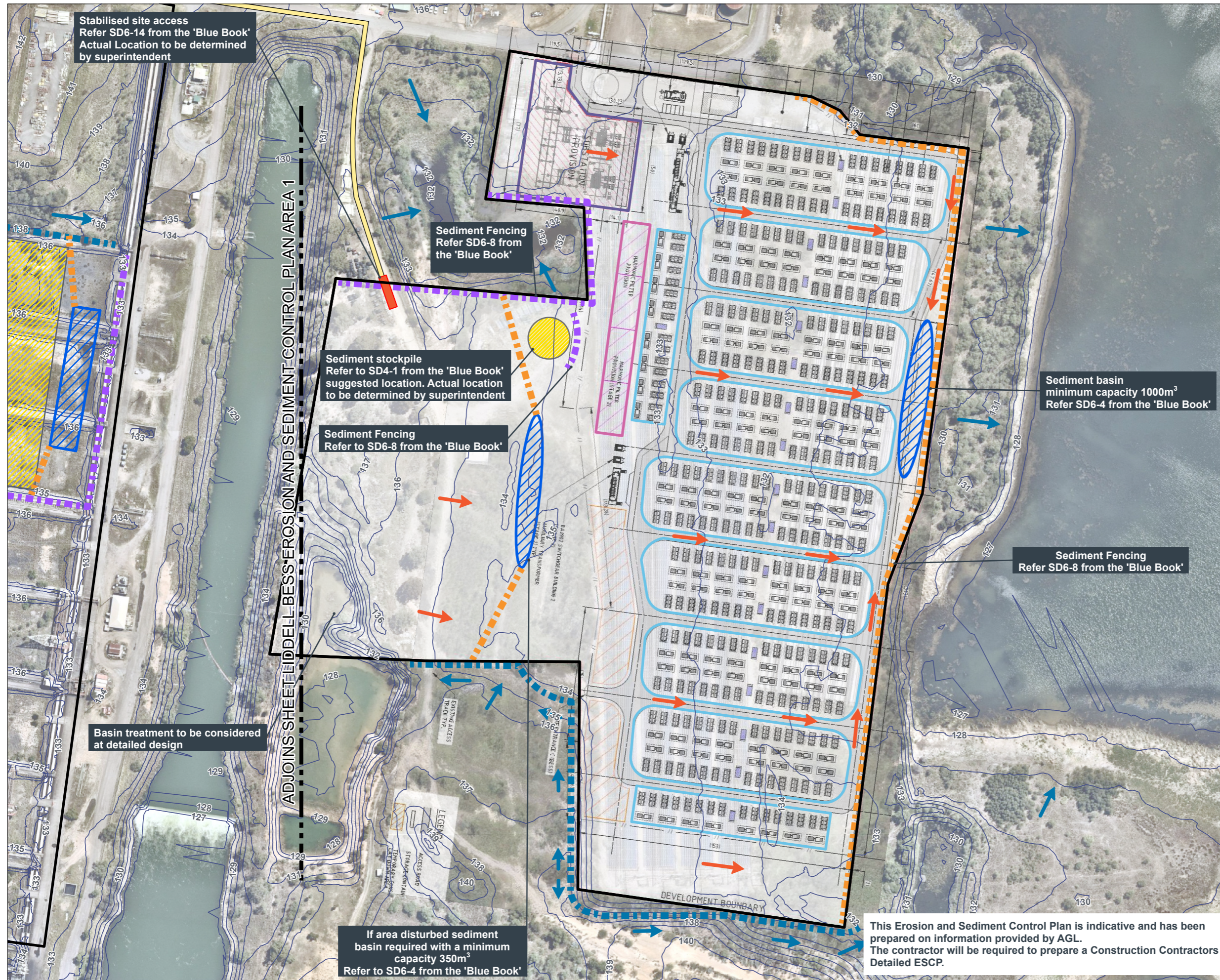
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Source: Imagery, Nearmap 2024;

This Erosion and Sediment Control Plan is indicative and has been prepared on information provided by AGL. The Contractor will be required to prepare a Construction Contractors Detailed ESCP.

Legend

- Development Boundary
- Stockpile
- Sediment Basin
- Battery Storage
- Stabilised Site Access
- Harmonic Filter Provision
- Substation Provision
- 1m Contour
- Clean Water Diversion
- Sediment Fence
- Dirty Water Collection
- ▶ Clean Water
- ▶ Dirty Water



LIDDELL BESS EROSION AND SEDIMENT CONTROL PLAN

Area 2

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