Clean TeQ Sunrise Project
Surface Water Management Plan
2020-CTEQ-0000-66AA-0018

28 October 2019

REVISION 1

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1. INTRODUCTION

The Clean TeQ Sunrise Project (the Project)[1] is a nickel cobalt scandium open cut mining project situated near the village of Fifield, approximately 350 kilometres (km) west-northwest of Sydney, in New South Wales (NSW) (Figure 1).

The Project includes the establishment and operation of the following (Figure 1):

- mine (including the acid leach processing facility);
- limestone quarry;
- rail siding;
- gas pipeline;
- borefields, surface water extraction infrastructure and water pipeline;
- accommodation camp; and
- associated transport activities and transport infrastructure (e.g. the Fifield Bypass, road and intersection upgrade).

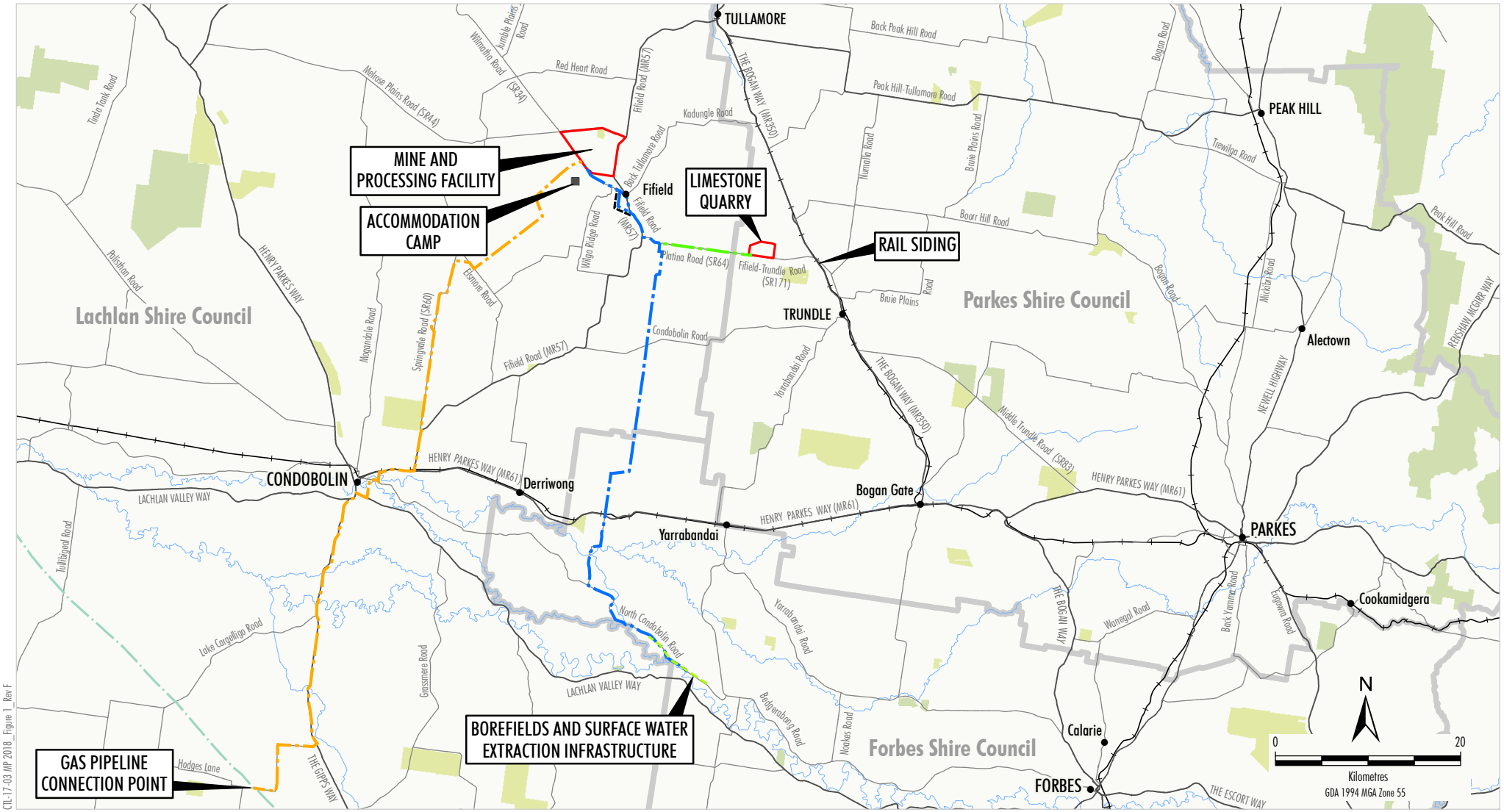
Clean TeQ Sunrise Pty Ltd owns the rights to develop the Project. Clean TeQ Sunrise Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ).

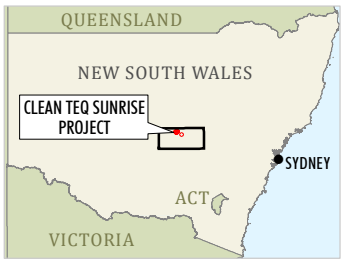
Development Consent DA 374-11-00 for the Project was issued under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) in 2001. Six modifications to Development Consent DA 374-11-00 have since been granted under the EP&A Act:

- 2005 – to allow for an increase of the autoclave feed rate, limestone quarry extraction rate and adjustments to ore processing operations;
- 2006 – to allow for the reconfiguration of the borefields;
- 2017 – to allow for the production of scandium oxide;
- 2017 – to amend hazard study requirements;
- 2018 – to relocate the accommodation camp; and
- 2018 – to implement opportunities to improve the overall efficiency of the Project.

The general arrangement for the mine layout during the initial Project construction activities and full development are shown on Figures 2 and 3.

[1] The Project was previously known as the Syerston Project.





LEGEND

- National Park/Conservation Area
- State Forest
- Local Government Boundary
- Railway
- Existing Gas Pipeline
- Mining Lease Boundary (ML)
- Fifield Bypass
- Gas Pipeline
- Water Pipeline
- Limestone Quarry Water Pipeline
- Borefield Infrastructure Corridor

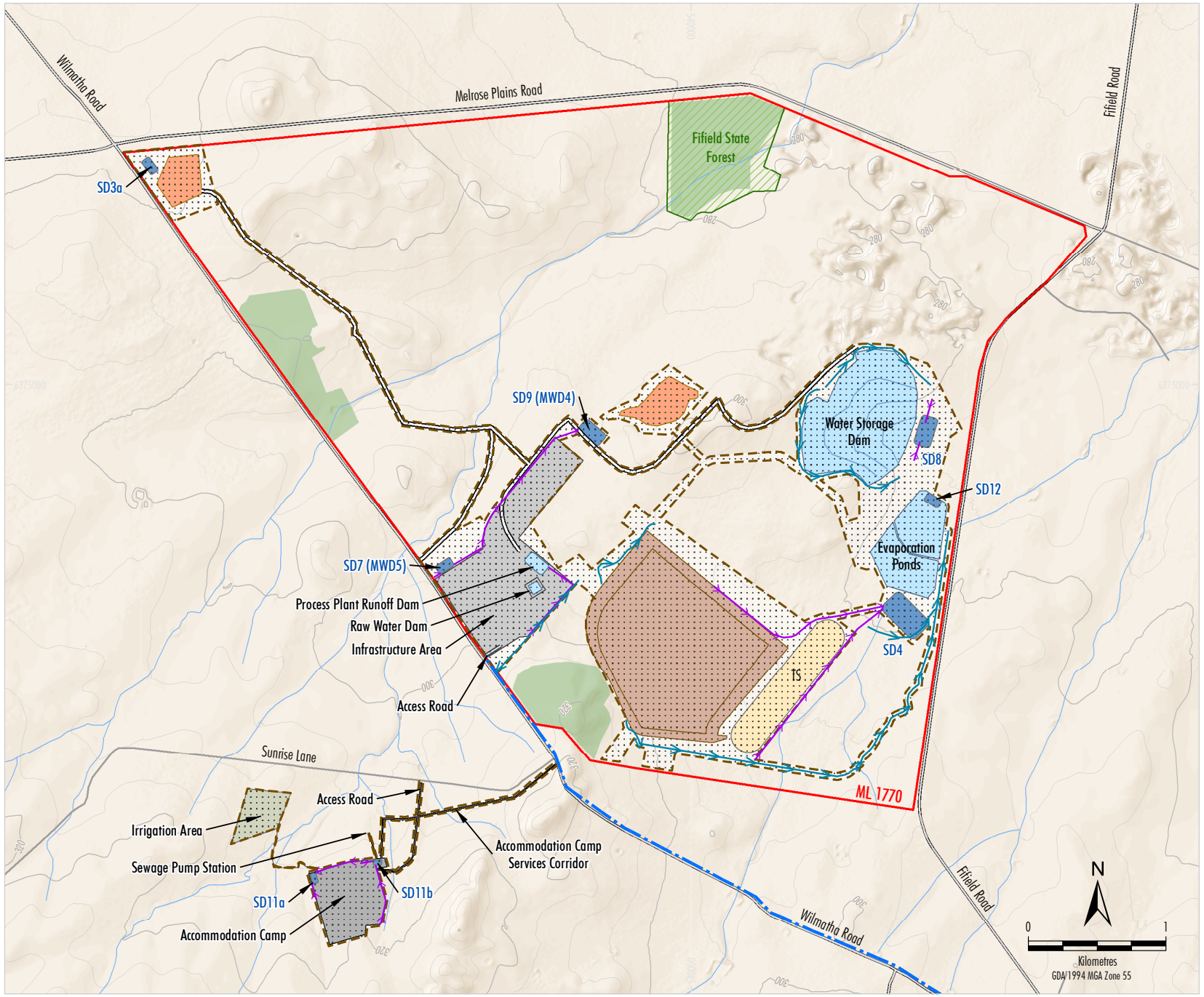
Source: Black Range Minerals (2000); Clean TeQ (2017, 2018); NSW Department of Industry (2018); NSW Land & Property Information (2017); Office of Environment and Heritage NSW (2017)

CLEAN TEQ SUNRISE PROJECT

Regional Location

Figure 1

CTL-17-03 MP 2018_Figure 1_Rev F



LEGEND

- State Forest
- Mining Lease Boundary (ML)
- Initial Construction Activities
- Surface Development Area
- Tailings Storage Facility
- Borrow Pit
- TS Topsoil Stockpile
- Infrastructure Area
- Water Storage (Mine Water)
- Sediment Dam (Mine Water)
- Existing Open Woodland to be Maintained
- Water Pipeline
- Collection Drain (Sediment Water) #
- Diversion Channel (Clean Water)

No 'mine water' would be generated during the initial construction activities and therefore no 'mine water' collection drains are shown.

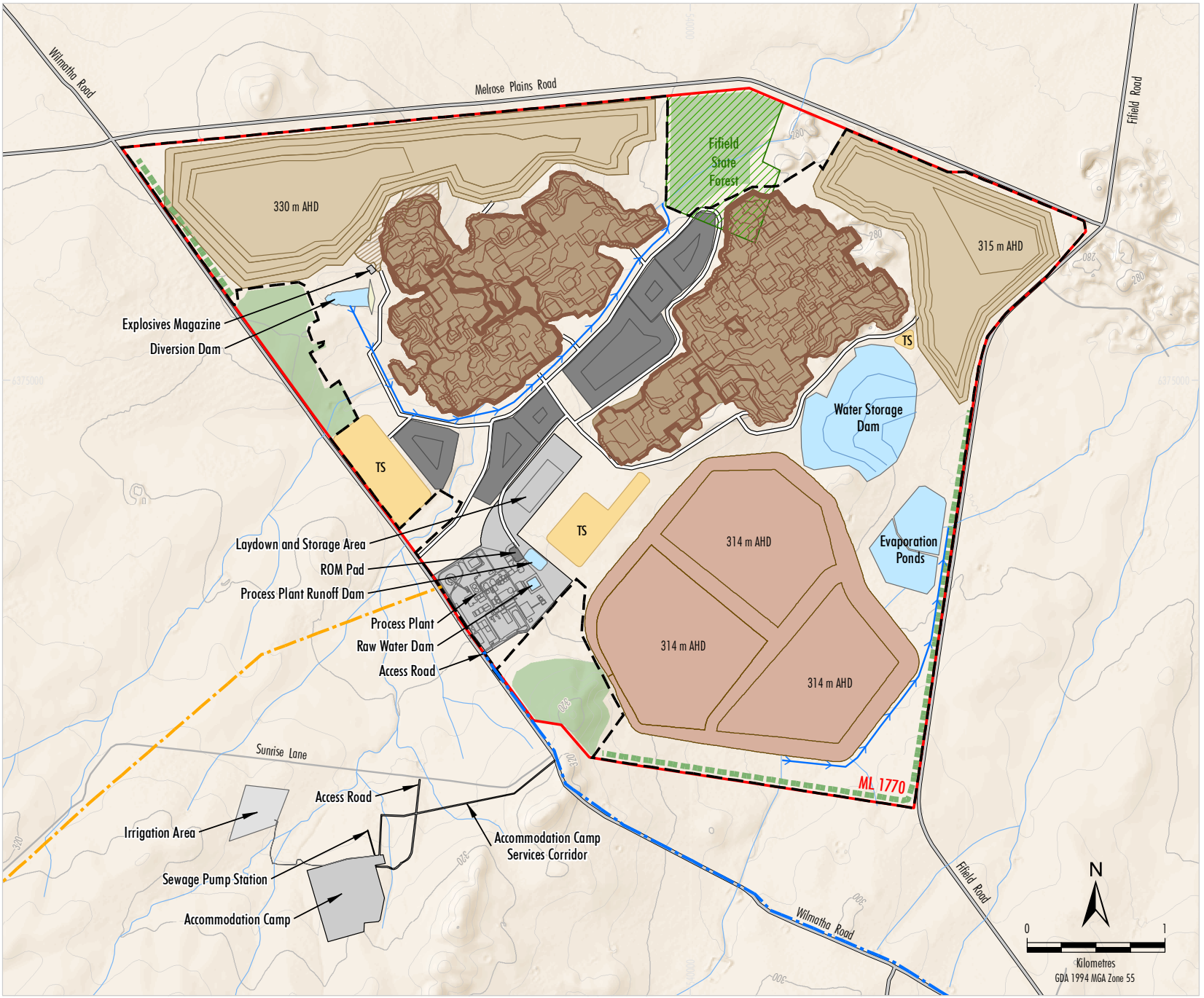
Source: Black Range Minerals (2000); Clean TeQ (2017, 2019); NSW Department of Industry (2018); NSW Land & Property Information (2017)

CLEAN TEQ SUNRISE PROJECT

Mine and Processing Facility General Arrangement (Initial Construction Activities)

Figure 2

CTL-17-03 MP 2018_WMP_202D



LEGEND

- State Forest
- Mining Lease Boundary (ML)
- Approved Surface Development Area
- Open Cut Pit (Scandium Oxide)
- Open Cut Pit
- Waste Rock Emplacement
- Tailings Storage Facility
- TS Topsoil Stockpile
- Ore Stockpile
- Mine Infrastructure Area
- Diversion Structure
- Vegetation Screening
- Existing Open Woodland to be Maintained
- Gas Pipeline
- Water Pipeline

Source: Black Range Minerals (2000); Clean TeQ (2017, 2019); NSW Department of Industry (2018); NSW Land & Property Information (2017)

CLEAN TEQ SUNRISE PROJECT

Mine and Processing Facility Conceptual General Arrangement

Figure 3

CTL-17-03 MP 2018_MOD4_Figure 3_Rev C

1.1 Purpose and Scope

This Surface Water Management Plan (SWMP) has been prepared by Clean TeQ in accordance with the requirements of Condition 30(b), Schedule 3 of Development Consent DA 374-11-00 (Table 1) and is a component of the Water Management Plan (WMP) (Appendix B of the WMP).

Table 1 – SWMP Requirements in Development Consent DA 374-11-00

Development Consent DA 374-11-00 Schedule 3	**Section where Addressed in this SWMP**
30. Prior to carrying out any development after 6 May 2017, the Applicant must prepare a Water Management Plan for the development in consultation with DoI Lands & Water and the EPA, and to the satisfaction of the Secretary. This plan must include:	The WMP
b) a Surface Water Management Plan, that includes:	This SWMP
• *baseline data on water flows and quality in the watercourses that could be affected by the development (if available);*	Section 4
• *a detailed description of the water management system on-site, including the:* – *clean water diversion systems;* – *erosion and sediment controls; and* – *water storages; and* – *irrigation area;*	Section 6 and the Site Water Balance (SWB)
• *objectives and performance criteria, including trigger levels for investigating any potential or actual adverse impacts associated with the development, including the:* – *surface water flows and quality;* – *downstream flooding;*	Section 5
• *a program to monitor and report on:* – *the effectiveness of the water management system and tailings storage facility; and* – *surface water flows and water quality;* – *the performance measures listed in Table 9;* – *impacts on water users;* – *downstream flooding;*	Sections 7 to 9
• *a plan to respond to any exceedances of the trigger levels and/or performance criteria, and minimise and/or offset any adverse surface water impacts of the development;*	Sections 7 to 9
31. The Applicant must implement the approved Water Management Plan for the development.	Section 3.1.1

On 5 July 2018, the Secretary of the Department of Planning, and Environment (now the Department Planning, Industry and Environment [DPIE]) (the Secretary) approved the progressive submission of environmental management plans for the Project in accordance with Condition 12, Schedule 2 of Development Consent DA 374-11-00. The scope of this SWMP is specifically related to the following initial Project construction activities:

- development of the mine, including:
  - site establishment and earthworks;
  - construction of site access roads and haul roads;
  - processing facility earthworks;
  - establishment of temporary facilities required for construction activities (e.g. offices, lay down areas, communications infrastructure);

  - construction of the mine infrastructure area including the offices, workshops, warehouse, laboratory and amenities buildings, fuel storage areas, potable water treatment plant and car parking facilities;
  - construction of the tailings storage facility and evaporation pond;
  - construction of water management infrastructure including the raw water dam, water storage dam and sediment dams;
  - construction and operation of the concrete batch plant;
  - development of gravel and clay borrow pits (including blasting and crushing);
  - installation of appropriate fencing and barriers for public safety and security for mining and construction; and
  - other associated minor infrastructure, plant, equipment and activities;
- development and operation of the accommodation camp;
- development and operation of the borefields, surface water extraction infrastructure and water pipeline[2]; and
- road upgrades.

The initial construction activities would not include any development of the limestone quarry, rail siding or gas pipeline.

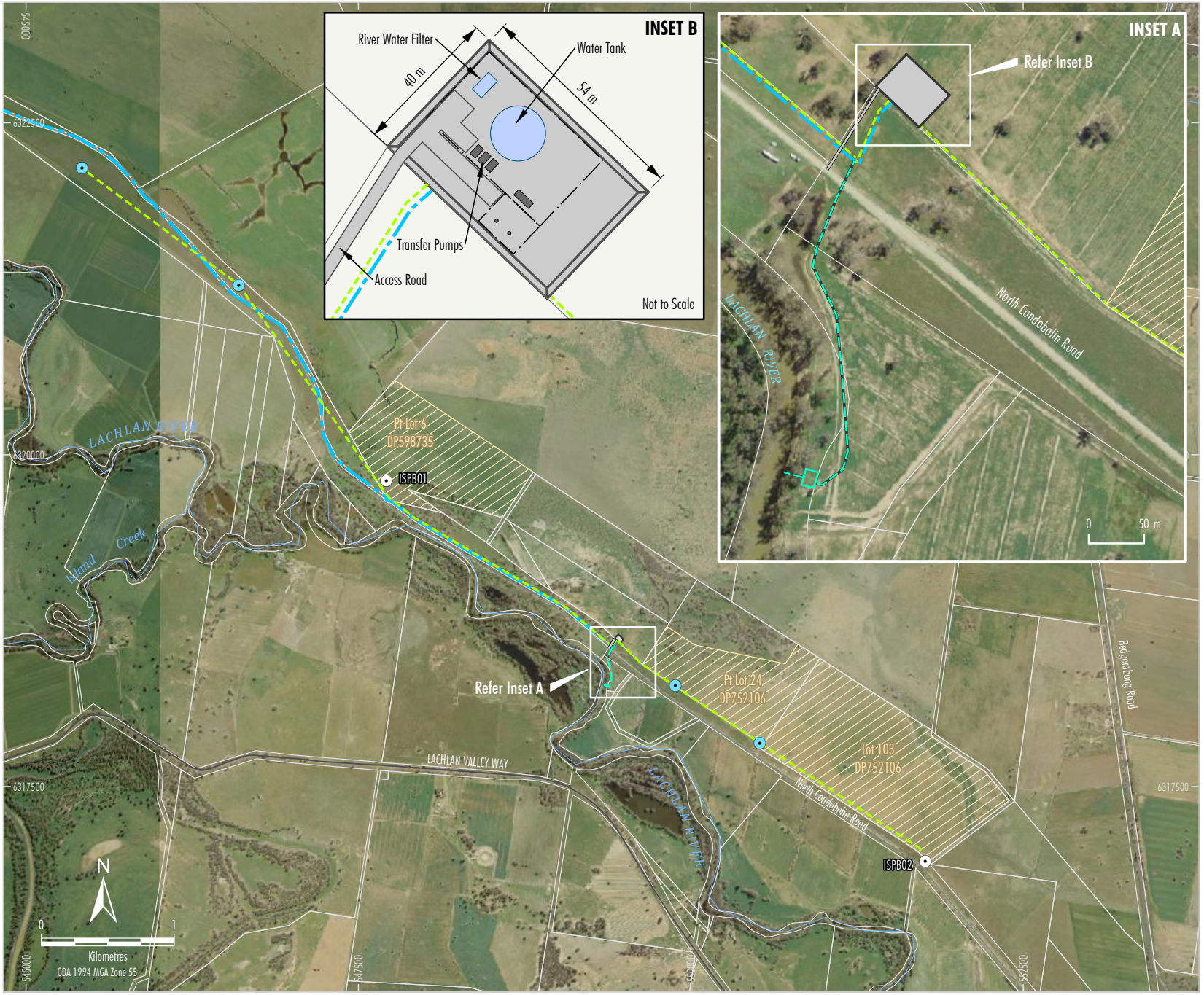
The approximate extent of the initial Project construction activities at the mine site and accommodation camp are shown on Figure 2. The approved water pipeline alignment, borefields and surface water extraction general arrangement is shown on Figures 1 and 4 respectively.

1.2 Structure of the Surface Water Management Plan

The remainder of this SWMP is structured as follows:

Section 2: Describes the review and update of the SWMP.
Section 3: Outlines the statutory requirements applicable to the SWMP.
Section 4: Provides an overview of the hydrological setting and baseline data.
Section 5: Details the performance measures and performance indicators that will be used to assess the Project, including trigger levels.
Section 6: Provides a description of the Project water management system and other surface water management measures.
Section 7: Details the surface water monitoring program.
Section 8: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

[2] The water pipeline includes the Fifield Bypass and Alternative Pipeline Route alignments.



LEGEND

- Property Boundary
- Borefield Location
- Water Pipeline
- Borefield Infrastructure Corridor *
- Surface Water Infrastructure Corridor *
- Pump Station
- Transfer Station
- Access Road
- Production Bore (constructed)
- Production Bore (not constructed)

* Infrastructure Corridor includes linking pipline, access road and electricity transmission line.

Source: Clean TeQ (2017, 2019); Ivanplats Syerston (2005); NSW Land & Property Information (2018)
NSW Imagery: © Department of Finance, Services & Innovation (2018)

CLEAN TEQ SUNRISE PROJECT

Borefields and Surface Water Extraction General Arrangement

Figure 4

Section 9: Describes the program to review and report on the effectiveness of management measures and improvement of environmental performance.

Section 10: Describes the protocol for management and reporting of incidents, complaints and non-compliances with statutory requirements.

Section 11: Lists the references cited in this SWMP.

2. SURFACE WATER MANAGEMENT PLAN REVIEW AND UPDATE

This SWMP has been provided to the NSW Environment Protection Authority (EPA) and the Department of Industry – Lands & Water (now the Natural Resources Access Regulator [NRAR]) for the purposes of consultation on 20 June 2018 and 25 June 2018, respectively, in accordance with Condition 30, Schedule 3 of Development Consent DA 374-11-00.

The NRAR provided comments on 26 September 2018 and 12 June 2019. These comments have been incorporated into this SWMP. The EPA indicated on 19 October 2018 that it had no comments on the SWMP.

Consistent with the Secretary's approval for the progressive submission of environmental management plans, the SWMP would be re-submitted and approved prior to the commencement of activities not included in the scope of this SWMP.

In accordance with Condition 6, Schedule 5 of Development Consent DA 374-11-00, this SWMP will be reviewed, and if necessary revised (to the satisfaction of the Secretary), within three months of the submission of:

- an Annual Review (Condition 5, Schedule 5);
- an incident report (Condition 8, Schedule 5);
- an independent environmental audit (Condition 10, Schedule 5); or
- any modification to the conditions of Development Consent DA 374-11-00 (unless the conditions require otherwise).

The reviews would be undertaken to ensure the SWMP is updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the Project.

Within 4 weeks of conducting a review of the SWMP, the Secretary will be advised of the outcomes of the review and any revised documents submitted to the Secretary for approval.

If agreed with the Secretary, a revision to the SWMP required under Development Consent DA 374-11-00 may be prepared without undertaking consultation with all parties nominated under the relevant condition of Development Consent DA 374-11-00.

The revision status of this SWMP is indicated on the title page of each copy.

The approved SWMP will be made publicly available on the Clean TeQ website, in accordance with Condition 12, Schedule 5 of Development Consent DA 374-11-00.

3. STATUTORY REQUIREMENTS

Clean TeQ's statutory obligations relevant to surface water management are contained in:

- the conditions of Development Consent DA 374-11-00;
- relevant licences and permits, including conditions attached to mining leases; and
- other relevant legislation.

Obligations relevant to this SWMP are described below.

3.1 Development Consent DA 374-11-00

3.1.1 SWMP Requirements

Condition 30(b), Schedule 3 of Development Consent DA 374-11-00 requires the preparation of a SWMP. Table 1 presents these requirements and indicates where they are addressed in this SWMP.

In accordance with the requirements of Condition 30, Schedule 3 of Development Consent DA 374-11-00 (Table 1), this SWMP is included as a component of the WMP (Appendix B of the WMP).

In accordance with Condition 31, Schedule 3 of Development Consent DA 374-11-00, Clean TeQ will implement the Water Management Plan (including the SWMP).

3.1.2 Management Plan (General) Requirements

In addition to the SWMP requirements prescribed in Condition 30(b), Schedule 3, Condition 4, Schedule 5 of Development Consent DA 374-11-00 outlines the management plan (general) requirements that are also applicable to the preparation of this SWMP.

Table 2 presents these requirements and indicates where each is addressed within this SWMP. As noted, the Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.

Table 2 – Management Plan (General) Requirements

Development Consent DA 374-11-00 Schedule 5	SWMP Section
Management Plan Requirements	
4. The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, are consistent with other plans prepared for other stakeholders, and include:	
a) detailed baseline data;	Section 4
b) a description of:	
• *the relevant statutory requirements (including any relevant approval, licence or lease conditions);*	Section 3
• *any relevant limits or performance measures/criteria;*	Section 5
• *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;*	Section 5
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 6
d) a program to monitor and report on the:	Sections 7 to 9
• *impacts and environmental performance of the development;*	
• *effectiveness of any management measures (see c above);*	
e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 8
f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 9
g) a protocol for managing and reporting any:	
• *incidents;*	Section 10.1
• *complaints;*	Section 10.2
• *non-compliances with statutory requirements; and*	Section 10.3
• *exceedances of the impact assessment criteria and/or performance criteria; and*	Sections 7 to 9
h) a protocol for periodic review of the plan.	Section 2
Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	

3.2 Licences, Permits and Leases

In addition to the requirements of Development Consent DA 374-11-00, all activities at or in association with the Project will be undertaken in accordance with the following licences, permits and leases which have been issued or are pending issue:

- Mining Lease 1770 sought and issued by the NSW Minister for Resources under the NSW *Mining Act, 1992*.
- Mining Operations Plan(s) submitted and approved by the NSW Division of Resources and Geoscience.
- Environment Protection Licence (EPL) 21146 issued by the EPA under the NSW *Protection of the Environment Operations Act 1997* (POEO Act).
- Water supply works, water use approvals and water access licences (WALs) issued by NRAR under the NSW *Water Management Act 2000* including:
  - Water Supply Works Approval 70CA614098 for the Project borefields.

  - WAL 32068 in the Upper Lachlan Alluvial Groundwater Source (Upper Lachlan Alluvial Zone 5 Management Zone) for 3,154 share components under the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*.
  - WAL 39837 in the Upper Lachlan Alluvial Groundwater Source (Upper Lachlan Alluvial Zone 5 Management Zone) for 766 share components under the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*.
  - WAL 28681 in the Lachlan Fold Belt Murray-Darling Basin (MDB) Groundwater Source (Lachlan Fold Belt MDB [Other] Management Zone), for 243 share components under the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources 2011*.
  - WAL 6679 in the Lachlan Regulated River Water Source, for 123 share components (General Security) under the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*.
  - WAL 1798 in the Lachlan Regulated River Water Source, for 300 share components (General Security) under the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*.
  - WAL 42370 in the Lachlan Regulated River Water Source, for zero share components (High Security) under the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*.
- Groundwater licences for monitoring bores under the *Water Management Act 2000*.
- Aboriginal Heritage Impact Permits (AHIPs) (AHIP #C0003049 and AHIP #C0003887) issued by the Office of Environment and Heritage (OEH) under the NSW *National Parks and Wildlife Act 1974*.
- Mining and workplace health and safety related approvals granted by the NSW Department of Industry and SafeWork NSW.
- Permits under the *Roads Act 1993*.
- Heavy Vehicle Authorisation Permit 119039 issued by the National Heavy Vehicle Regulator under the *Heavy Vehicle National Law NSW.*
- Crown Land Licences issued under the *Crown Land Management Act 2016*.

3.3 Other Legislation, Policies and Guidance

Clean TeQ will conduct the Project consistent with the requirements of Development Consent DA 374-11-00 and any other legislation that is applicable to an approved Part 4 Project under the EP&A Act.

In addition to the statutory obligations described in Sections 3.1 and 3.2, the following NSW Acts (and their Regulations) may be applicable to the conduct of the Project:

- *Aboriginal Land Rights Act 1983;*
- *Biodiversity Conservation Act 2016;*
- *Biosecurity Act 2015;*
- *Crown Land Management Act 2016;*
- *Contaminated Land Management Act 1997;*
- *Dams Safety Act 2015;*
- *Dangerous Goods (Road and Rail Transport) Act 2008;*
- *Energy and Utilities Administration Act 1987;*
- EP&A Act;
- *Fisheries Management Act 1994;*
- *Forestry Act 2012;*
- *Mining Act 1992;*
- *National Parks and Wildlife Act 1974;*
- *Pipelines Act 1967;*
- POEO Act;
- *Rail Safety (Adoption of National Law) Act 2012;*
- *Roads Act 1993;*
- *Soil Conservation Act 1938*;
- *Water Act 1912;*
- *Water Management Act 2000;*
- *Work Health and Safety Act 2011; and*
- *Work Health and Safety (Mines and Petroleum Sites) Act 2013.*

Commonwealth Acts which may also be applicable to the conduct of the Project include:

- *Environment Protection and Biodiversity Conservation Act 1999; and*
- *Native Title Act 1993.*

Relevant licences or approvals required under these Acts will be obtained as required.

Further details relating to the above NSW Acts regulated by NRAR and EPA, and other relevant water policy and guideline documentation relevant to this SWMP is provided in the following sub-sections.

3.3.1 Water Management Act 2000

As water sharing plans have commenced under the *Water Management Act 2000* for all surface water systems within which the Project lies, the *Water Management Act 2000* is relevant to surface water licensing considerations for the Project. The following water sharing plans have been commenced under the *Water Management Act, 2000* for all surface water systems within which the Project lies, including:

Mine

- *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012*.

Lachlan River Surface Water Extraction

- *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*.

The *Water Management Act 2000* incorporates the provisions of various prior Acts relating to the management of surface and groundwater in NSW and provides a single statute for regulation of water access, use and works (e.g. pumps or bores) that affect the licensing of surface water and alluvial and non-alluvial (i.e. fractured rock and porous rock) groundwater in the vicinity of the Project.

3.3.2 Water Act 1912

As water sharing plans have commenced under the *Water Management Act, 2000* for all surface water systems within which the Project lies (Section 3.3.1), the *Water Act 1912* is not relevant to licensing considerations for the Project.

3.3.3 Protection of the Environment Operations Act 1997

Clean TeQ holds EPL 21146 for the Project. A summary of the key surface water related conditions of EPL 21146 is provided in Section 5.

Unless EPL 21146 authorises otherwise, the Project will be carried out to comply with Section 120 of the POEO Act.

3.3.4 National Water Quality Management Strategy/ANZECC & ARMCANZ (2000)

The *National Water Quality Management Strategy* is a joint national approach to improving water quality in Australian and New Zealand waterways. The ANZECC water quality guidelines (ANZECC & ARMCANZ, 2000) have been considered where applicable in this SWMP (Sections 4 and 7).

3.3.5 NSW Water Quality and River Flow Objectives

The *NSW Water Quality and River Flow Objectives* have been developed to guide plans and actions to achieve healthy waterways in NSW, including the Macquarie-Bogan River catchment.

Each objective is based on providing the right water quality for the environment and the different beneficial uses of the water. They are based on measurable environmental values (EVs), which are those values or uses of water that the community believes are important for a healthy ecosystem for public benefit, welfare, safety or health. The target concentrations for each water quality objective (WQO) are based on ANZECC & ARMCANZ (2000). ANZECC & ARMCANZ (2000) has been considered where applicable in this SWMP (Sections 4 and 7).

3.3.6 NSW Central West Local Strategic Plan

Local Land Services Central West Local Strategic Plan 2016-2021 has been considered where applicable in the development of this SWMP. The Local Strategic Plan describes the climate and geography, communities, agriculture, biosecurity challenges and natural resources in the region.

3.3.7 Australian Standard 1940-2017

Australian Standard (AS) 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids* sets out requirements and recommendations for the safe storage and handling of flammable liquids of dangerous goods (Class 3) and also provides requirements and recommendations for the storage and handling of combustible liquids. It also provides minimum acceptable safety requirements for storage facilities, operating procedures, emergency planning and fire protection.

AS 1940-2017 have been considered where applicable in this SWMP.

4. HYDROLOGICAL SETTING AND BASELINE DATA

4.1 Mine Site

Regional Hydrology

The mine site and accommodation camp are located in the Macquarie-Bogan catchment which covers an area of approximately 74,800 square kilometres (km^2) within the Murray-Darling Basin. Regional north-west-flowing rivers (Bogan, Macquarie, Castlereagh, Namoi and Barwon) drain an extensive floodplain north of the site.

NRAR operates 91 river flow gauging stations within the Macquarie-Bogan catchment recording flows on a continuous basis, with 6 stations located along the Bogan River. Flows along the Bogan River generally increase with distance downstream as a result of regulated water supplies entering from Albert Priest Canal, Gunningbar Creek and Duck Creek.

Gauging stations along the Bogan River relevant to understanding the regional hydrology are presented in Table 3.

Table 3 – Bogan River Gauging Stations

Gauging Station	Catchment Area (km^2)	Mean Daily Flow (ML)	Distance from Bullock Creek Confluence (km)	Period of Record
Upstream of Bullock Creek Confluence				
Peak Hill	1,036	60	60	1967-2017
Downstream of Bullock Creek Confluence				
Dandaloo	5,440	174	20	1971-2017
Neurie Plain	14,760	221	100	1959-2017
Gongolgon	27,970	532	280	1945-2017

ML = megalitres.

Local Hydrology

The mine site and accommodation camp are located in the upper headwaters of Bullock Creek in proximity to the township of Tullamore to the north-east. The headwaters of the Lachlan River catchment are located to the south of the mine site and accommodation camp areas.

Surface water from the mine site and accommodation camp drains into Bullock Creek to the north-east, which flows in a north-easterly direction and discharges to the Bogan River.

Ephemeral Drainage Lines

A catchment area (approximately 2,700 hectares [ha]) to the south-west of the mine site contributes to three ephemeral drainage lines which enter Mining Lease 1770 (Figure 5). The accommodation camp is located in the catchment of one of these ephemeral drainage lines (Figure 5).

These drainage lines lose definition north-east of the site (Figure 5) due to a combination of flat terrain and interruption by remnant mining operations in the area.

Surface Water Quality

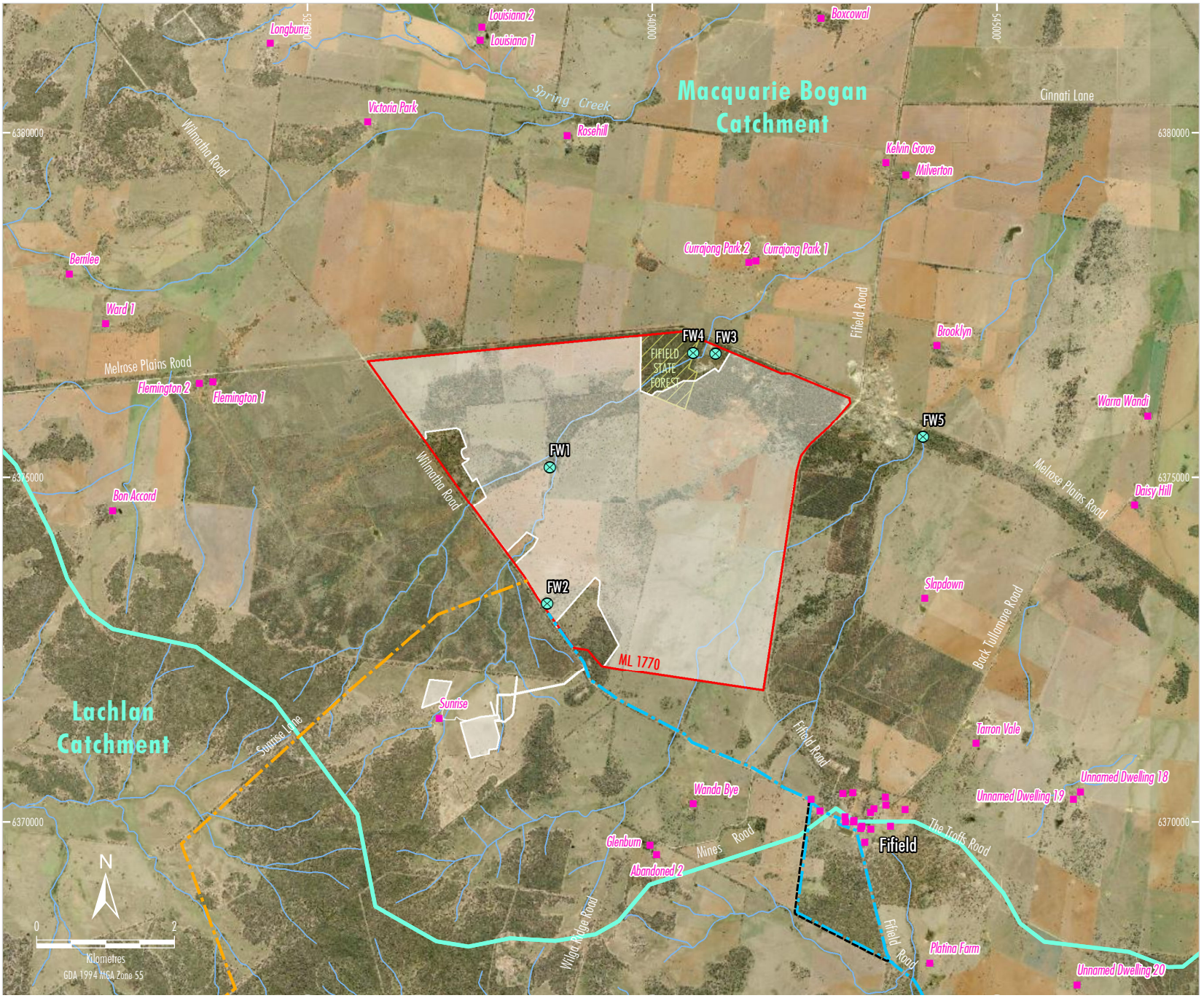
Water Quality Objectives (WQOs) have been developed for NSW rivers and estuaries which provide guideline levels to assist water quality planning and management (NSW Government, 2006). WQOs with accompanying trigger values apply to the following objectives: aquatic ecosystems, visual amenity, recreation, livestock and irrigation, drinking water, and aquatic foods.

A baseline surface water quality monitoring program was commenced in 1997 at monitoring sites FW1, FW2 and FW3 at the mine site and surrounds (Figure 5). Monitoring sites FW4 and FW5 were added to the monitoring program in May 2000. Table 4 presents a statistical summary of the recorded data.

Table 4 – Surface Water Quality Monitoring Results – Mine Site

Parameter	Units	Monitoring Results (FW1-FW5)
Electrical Conductivity (EC)	µS/cm	42 to 395
pH	pH units	7.01 to 8.95
Sodium (Na)	mg/L	3 to 48
Potassium (K)	mg/L	2 to 13
Calcium (Ca)	mg/L	<1 to 22
Magnesium (Mg)	mg/L	1 to 22
Iron (Fe)	mg/L	<0.1 to 3.7
Chloride (Cl)	mg/L	<1 to 32
Sulphate (SO_4)	mg/L	<1 to 6
Bicarbonate (HCO_3)	mg/L	22 to 184
Carbonate (CO_3)	mg/L	<1 to 48
Arsenic (As)	mg/L	<0.01
Cadmium (Cd)	mg/L	<0.001 to 0.017
Copper (Cu)	mg/L	<0.001 to 0.006
Nickel (Ni)	mg/L	<0.001 to 0.004
Lead (Pb)	mg/L	<0.001 to 0.002
Zinc (Zn)	mg/L	<0.001 to 0.031
Suspended Solids	mg/L	4 to 40

Source: Black Range Minerals (2000)
µS/cm = micro Siemens per centimetre; mg/L = milligrams per litre.



LEGEND

- State Forest
- Mining Lease Boundary (ML)
- Approved Surface Development Area
- Fifield Bypass
- Gas Pipeline
- Water Pipeline
- Dwelling
- Baseline Surface Water Quality Monitoring Location
- Surface Water Catchment Boundary

Source: Black Range Minerals (2005); Clean TeQ (2017, 2018); ENRS (2019); NSW Department of Industry (2017); NSW Land and Property Information (2017); Office of Environment and Heritage NSW (2017); NSW Department of Primary Industries - Water (2018) NSW Imagery: © Department of Finance, Services & Innovation (2018)

CLEAN TEQ SUNRISE PROJECT

Local Hydrology and Baseline Surface Water Quality Monitoring - Mine Site

Figure 5

CTL-17-03 MP 2018_SWMP_204B

Surface Water Users

Given the ephemeral nature of the drainage lines in the vicinity of the mine site, there are no known surface water users immediately upstream or downstream with a WAL.

As identified in Coffey (2016a), surface water users in the region are predominately associated with the regulated Lachlan and Macquarie Rivers and to a lesser extent, the unregulated Lachlan water sources.

Flooding

The local group of west and north-west flowing rivers (Bogan, Macquarie, Castlereagh, Namoi and Barwon Rivers) drain an extensive floodplain north of the mine site at low gradients (less than 1 in 5,000), historically producing large areas of inundation in wet years. The mine site is located some 30 metres (m) to 70 m above the estimated upper extent of this floodplain (Golder Associates Pty Ltd, 2000).

Flood events in the vicinity of the mine site and accommodation camp are relatively minor and short in duration as the mine site and accommodation camp are located in the headwaters of the catchment.

4.2 Borefields and Surface Water Extraction Infrastructure

Regional Hydrology

The borefields and surface water extraction infrastructure are located adjacent to the Lachlan River and alluvial plain, approximately 65 km south of the mine site, within the Lachlan River catchment.

Flow in the Lachlan River is regulated. The main regulating storage is Wyangala Dam, located at the junction of Abercrombie and Lachlan Rivers 48 km upstream of Cowra. The volume and temporal pattern of flow in the river has changed significantly since the construction of Wyangala Dam and the increasing extraction of water for irrigation and other purposes. Since regulation, no-flow periods in the upper parts of the catchment have largely disappeared, and short-duration flow events are more attenuated.

Flow in the Lachlan River reaches a maximum at Forbes but then begins decreasing due to losses to the alluvial expanses west of Forbes. This is caused by recharge of alluvial expanses in the more arid westerly regions, from streamflow generated in the topographically higher (eastern) part of the catchment where rainfall is higher and alluvial tracts are less significant.

Despite the Lachlan River being a tributary of the Murrumbidgee River, the losses make the Lachlan River a quasi-terminal system with little water flowing past the Great Cumbung Swamp at its end. Flow from the Lachlan River to the Murrumbidgee River only occurs during large flood events.

Local Hydrology

The topography of the borefields and surface water extraction infrastructure area along the Lachlan River and immediate surrounds is highly advantageous for gravity-driven irrigation. Besides the Lachlan River itself, surface drainage systems include ephemeral streams, irrigation channels (artificial, but ephemeral, watercourses), swamps and intermittent lakes.

The area to the south of the Lachlan River (to Lake Cowal) hosts the Jemalong Irrigation District covering 93,000 ha. Jemalong Irrigation Limited manages the licensed diversion of flows from the Lachlan River at Jemalong Gap.

Surface Water Quality

Water quality sampling in the Lachlan River in the vicinity of the surface water infrastructure was conducted in August 2017 (Coffey, 2017). Table 5 presents a summary of the surface water quality data.

Surface Water Users

The extraction of surface water from the Lachlan River in the vicinity of the surface water infrastructure is managed in accordance with the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*.

It was estimated at the time of commencement of the *Water Sharing Plan for the Lachlan Regulated River Source 2016*, the share components of regulated river (high security) access licences authorised to take water from the Lachlan Regulated River Water Source total 27,680 unit shares.

It was estimated at the time of commencement of the *Water Sharing Plan for the Lachlan Regulated River Source 2016*, the share components of regulated river (general security) access licences authorised to take water from the Lachlan Regulated River Water Source total 592,801 unit shares.

Table 5 – Surface Water Quality Monitoring Results – Surface Water Infrastructure (Lachlan River)

Parameter	Units	Monitoring Results (FW1-FW5)
Electrical Conductivity (EC)	µS/cm	484
pH	pH units	7.2
Sodium (Na)	mg/L	35
Potassium (K)	mg/L	2
Calcium (Ca)	mg/L	24
Magnesium (Mg)	mg/L	17
Iron (Fe)	mg/L	1.92
Chloride (Cl)	mg/L	61
Sulphate (SO_4)	mg/L	26
Bicarbonate (HCO_3)	mg/L	93
Carbonate (CO_3)	mg/L	<1
Arsenic (As)	mg/L	0.001
Cadmium (Cd)	mg/L	<0.0001
Copper (Cu)	mg/L	0.003
Nickel (Ni)	mg/L	0.002
Lead (Pb)	mg/L	0.001
Zinc (Zn)	mg/L	<0.005
Suspended Solids	mg/L	94

Source: Coffey (2017)
µS/cm = micro Siemens per centimetre; mg/L = milligrams per litre.

Flooding

The borefields and surface water extraction infrastructure are located in the Lachlan River floodplain.

The pump station at the Lachlan River and all associated infrastructure would be constructed to be at an elevation higher than the 1 in 25 year flood event (Golder Associates, 2017).

5. PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

Table 9 in Development Consent DA 374-11-00 prescribes the water management performance measures for the Project, as follows:

- **Water Management – General**
  - Maintain separation between clean and mine water management systems.
  - Minimise the use of clean water on-site.
- **Construction and Operation of Infrastructure**
  - Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction including Volume 1* (Landcom, 2004)*, Volume 2A – Installation of Services* (Department of Environment and Climate Change [DECC], 2008a) and *Volume 2C – Unsealed Roads* (DECC 2008b)*.*
  - Design, install and maintain infrastructure within 40 metres (m) of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (Department of Primary Industries [DPI], 2012), or its latest version.
  - Design, install and maintain any creek crossings generally in accordance with the Policy and *Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull, S. and Witheridge, G., 2003), or their latest versions.
- **Clean Water Diversion Infrastructure**
  - Maximise the diversion of clean water around disturbed areas on-site.
  - Design, construct and maintain the clean water diversions to capture and convey the 100 year, peak flow rainfall event.
- **Sediment Dams (Mine and Limestone Quarry)**
  - Design, install and/or maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom, 2004) and *Volume 2E Mines and Quarries* (DECC, 2008c).
- **Mine and Limestone Quarry Water Storages**
  - Design, install and/or maintain mine and limestone water storage infrastructure to ensure no discharge of mine or limestone quarry water off-site (except in accordance with an EPL).
  - On-site storages (including mine infrastructure dams, groundwater storage and treatment dams) are suitably designed, installed and/or maintained to minimise permeability.

- Ensure that the floor and side walls of the tailings storage facility, Evaporation Basin and Surge Dam are designed with a minimum of a 900 millimetres (mm) clay or modified soil liner with a permeability of no more than 1 x 10^{-9} metres per second (m/s), or a synthetic (plastic) liner of 1.5 mm minimum thickness with a permeability of no more than 1 x 10^{-14} m/s (or equivalent).
- Design, install and maintain a seepage interception system in the Tailings Storage Facility embankments in accordance with Dams Safety Committee (DSC) guidelines.
- Design, install and maintain the water storages to capture and convey the 100 year, 72-hour Average Recurrence Interval (ARI) rainfall event.
- Design, install and/or maintain the facilities to meet the requirements of the DSC.
- The design of the tailings storage facility should conform to:
  - DSC3A – Consequence Categories for Dams (DSC); and
  - DSC3F – Tailings Dams (DSC).

- **Chemical and Hydrocarbon Storage**
  - Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards.
- **Irrigation Area**
  - Manage the irrigation area in accordance with the EPA's *Environmental Guidelines: Use of Effluent by Irrigation* (Department of Environment and Conservation [DEC], 2004).

During construction activities, Clean TeQ will assess the Project against the specific water management performance indicators outlined in Table 6.

Table 6 – Water Management Performance Indicators – Construction

Performance Measure	Performance Indicators
Water Management - General	
• Maintain separation between clean and mine water management systems.	The water management system is constructed and maintained generally in accordance with the design described in the SWMP.
• Minimise the use of clean water on-site.	Water use is consistent with the water use priority described in the Water Balance and in accordance with relevant Water Management Act 2000 approvals.
Construction and Operation of Infrastructure	
• Design, install and maintain erosion and sediment controls generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1, Volume 2A – Installation of Services and Volume 2C – Unsealed Roads.*	Suitably qualified person documents that erosion and sediment controls have been designed and installed generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1*, *Volume 2A – Installation of Services* and *Volume 2C – Unsealed Roads.*
• Design, install and maintain infrastructure within 40 m of watercourses generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPI 2012), or its latest version.	Suitably qualified person documents that key infrastructure within 40 m of watercourses is designed and installed generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (DPI 2012), or its latest version.
• Design, install and maintain any creek crossings generally in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003), or their latest versions.	Suitably qualified person documents that creek crossings have been designed generally in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (NSW Fisheries 2003), or their latest versions.

Table 6 (Continued) – Water Management Performance Indicators – Construction

Performance Measure	Performance Indicators
Clean Water Diversion Infrastructure	
• Maximise the diversion of clean water around disturbed areas on-site.	Suitably qualified person documents that clean water diversions are designed to maximise the diversion of clean water around disturbance areas.
• Design, construct and maintain the clean water diversions to capture and convey the 100-year, peak flow rainfall event.	Suitably qualified person documents that clean water diversions are designed and constructed to capture and convey the 100-year, peak flow rainfall event.
Sediment Dams (Mine and Limestone Quarry)	
• Design, install and/or maintain the dams generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* and *Volume 2E Mines and Quarries*.	Suitably qualified person documents that sediment dams have been designed and installed generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1* and *Volume 2A – Installation of Services and 2E Mines and Quarries.*
Mine and Limestone Quarry Water Storages	
• Design, install and/or maintain mine and limestone water storage infrastructure to ensure no discharge of mine or limestone quarry water off-site (except in accordance with an EPL).	Suitably qualified person documents that the water management infrastructure is constructed and maintained generally in accordance with the design described in the Water Balance and SWMP.
• On-site storages (including mine infrastructure dams, groundwater storage and treatment dams) are suitably designed, installed and/or maintained to minimise permeability.	Mine water storages are constructed and maintained to minimise seepage.
• Ensure that the floor and side walls of the tailings storage facility, evaporation basin and surge dam are designed with a minimum of a 900 mm clay or modified soil liner with a permeability of no more than 1×10^{-9} m/s, or a synthetic (plastic) liner of 1.5 mm minimum thickness with a permeability of no more than 1×10^{-14} m/s (or equivalent).	Suitably qualified person documents that the tailings storage facility, evaporation basin and surge dam mine water storages are designed and constructed to capture and convey the 100 year, 72-hour ARI rainfall event.
• Design, install and maintain a seepage interception system in the Tailings Storage Facility embankments in accordance with the DSC guidelines.	The Dam Safety Committee approves the tailings storage facility design.
• Design, install and maintain the water storages to capture and convey the 100 year, 72-hour ARI rainfall event.	Suitably qualified person documents that the mine water storages are designed and constructed to capture and convey the 100 year, 72-hour ARI rainfall event.
• Design, install and/or maintain the facilities to meet the requirements of the DSC.	The Dam Safety Committee approves the design of relevant water storages (i.e. prescribed structures).
• The design of the tailings storage facility should conform to: – DSC3A – Consequence Categories for Dams (DSC); and – DSC3F – Tailings Dams (DSC).	The Dam Safety Committee approves the tailings storage facility design.
Chemical and Hydrocarbon Storage	
• Chemical and hydrocarbon products to be stored in bunded areas in accordance with the relevant Australian Standards.	Suitably qualified person documents that chemical and hydrocarbon storages are designed and constructed in accordance with the relevant Australian Standards.
Irrigation Area	
• Manage the irrigation area in accordance with the *EPA's Environmental Guidelines: Use of Effluent by Irrigation*.	The irrigation area is designed and maintained so as not to cause irrigation water runoff from the irrigation area.

In addition, EPL 21146 includes surface water quality limits for receiving waters at the mine site and surface water quality limits for waters discharged from the sediment dams (Table 7).

Table 7 – EPL 21146 Surface Water Quality Limits

Parameter	Units	Limit
Receiving Waters		
Electrical Conductivity (EC)	µS/cm	2,200
pH	pH units	6.5 – 8.5
Total Suspended Solids	mg/L	50
Iron (Fe)	mg/L	3.7
Nickel (Ni)	mg/L	0.008
Stormwater (Sediment Dam) Discharges[1]		
Electrical Conductivity (EC)	µS/cm	2,200
pH	pH units	6.5 – 8.5
Total Suspended Solids	mg/L	50[2]
Turbidity	Nephelometric Turbidity Units	50

µS/cm = micro Siemens per centimetre; mg/L = milligrams per litre.

1 Limits do not apply when the discharge occurs solely as a result of rainfall measured at the site which exceeds a total of 50.7 mm of rainfall over any consecutive 5 day period (Condition L2.5 of EPL 21146).

2 Limit is not deemed to be exceeded where the water sample complies with the turbidity limit at the time of discharge and the EPA is advised of any total suspended solid exceedances within 3 working days of the completion of the total suspended solids testing (Condition L2.6).

5.1 Trigger Levels for Investigation

Surface water impact trigger levels for surface water flows, quality and downstream flooding have been considered and where applicable developed using the available baseline data (Section 4).

5.1.1 Mine Site

Surface Water Flows

While monitoring of licensed discharge points is proposed as part of the surface water monitoring program (Section 7), given the ephemeral nature of drainage lines entering Mining Lease 1770, a surface water flow impact trigger level is not proposed for the mine site.

Surface Water Quality

The ANZECC & ARMCANZ (2000) guidelines recommend that wherever possible, site-specific data is used to define trigger values for physical and chemical factors which can adversely impact the environment. Trigger values are not regarded as assessment criteria; rather they are used as an indicator of potential impacts and to initiate investigations into the surface water quality as reported by the monitoring program.

In the event that suitable site-specific trigger values cannot be developed, the default (acceptable limit) values defined by ANZECC & ARMCANZ (2000) for upland rivers in slightly to moderately disturbed ecosystems in south-east Australia are provided in Table 8.

Table 8 – ANZECC & ARMCANZ (2000) Guideline (Acceptable Limits) Values for Key Water Quality Parameters

Water Quality Value	Acceptable Limit
pH Range	6.5 – 8.0
Electrical Conductivity (µS/cm)	30 – 350
Turbidity (mg/L)	2 – 25

The approach recommended by ANZECC & ARMCANZ (2000) for developing site-specific trigger values for slightly to moderately disturbed ecosystems is to formulate trigger values based on the 80th percentile of the site-specific monitoring data. The objective of this approach is to develop conservative, site-specific trigger values for use as a means to improve water quality in highly disturbed ecosystems.

However, comparison of the baseline monitoring results to the ANZECC & ARMCANZ (2000) guideline values in the ephemeral drainage lines surrounding the mine site (Table 4) show that there is potential to exceed the ANZECC & ARMCANZ (2000) default trigger values for pH, EC and turbidity.

The baseline monitoring results (Table 4) also indicate major ions and metals range from below detection to moderate to high concentrations. These results demonstrate the variability of water quality in such ephemeral conditions.

Therefore, surface water quality trigger levels for investigation will be based on the limits included in EPL 21146 (Table 7).

Downstream Flooding

As described in Section 4, the mine site is located some 30 m to 70 m above the estimated upper extent of the floodplain associated with the Bogan, Macquarie, Castlereagh, Namoi and Barwon Rivers. Flood events in the vicinity of the mine site and accommodation camp are relatively minor and short in duration as the mine site and accommodation camp are located in the headwaters of the catchment.

Three ephemeral drainage lines enter ML 1770 from the south-west (Figure 5). The two most northern drainage lines merge and then exit ML 1770 in the north and the southern drainage line exits ML 1770 in the east (Figure 5). These drainage lines lose definition north-east of ML 1770 (Figure 5) due to a combination of flat terrain and interruption by remnant mining operations in the area.

Two permanent clean water diversions (i.e. the southern and northern diversions) will be developed to collect and divert clean water in the three ephemeral drainage lines around disturbed areas at the mine site (Figure 3). As described in Section 6.1.3, these diversions will be designed, constructed and rehabilitated to be safe, stable and non-polluting. The design would consider long term stability and compatibility with existing hydrological features, landforms and vegetation. The NRAR's (2018) *Controlled Activities on Waterfront Land – Guidelines for Riparian Corridors on Waterfront Land* will also be considered during the design and construction of the permanent clean water diversions. In particular, the principles of natural stream design outlined in the NRAR's (2018) *Controlled Activities on Waterfront Land – Guidelines for Riparian Corridors on Waterfront Land* will be considered in the design and construction of the permanent clean water diversions.

In addition, although Clean TeQ will maximise the diversion of clean water around disturbed areas on-site (Section 5), the mine site is expected to reduce flows downstream of ML 1770 as runoff from disturbed areas will generally be collected and retained on-site in accordance with best practice management.

Given the above, no significant impacts on downstream flooding are predicted during the initial Project construction activities and therefore a downstream flooding impact trigger level is not proposed for the mine site.

5.1.2 Borefields and Surface Water Extraction Infrastructure

The surface water extraction infrastructure will be located on the Lachlan River. As described in Section 4.2, the Lachlan River is a regulated watercourse and therefore surface water flows are driven by releases from Wyangala Dam which is the main regulating storage on the Lachlan River.

The surface water extraction infrastructure will be designed, installed and maintained generally in accordance with the *Guidelines for Controlled Activities on Waterfront Land* (Natural Resources Access Regulator [NRAR], 2018) and surface water extraction will be undertaken in accordance with relevant approvals under the *Water Management Act 2000*.

Given the above, the surface water extraction infrastructure is not expected to have a significant impact on surface water flows, surface water quality or flooding in the Lachlan River and a surface water impact trigger level is not proposed for the surface water extraction infrastructure.

6. WATER MANAGEMENT SYSTEM

Consistent with the general water management and clean water diversion infrastructure performance measures for the Project (Section 5), the key objectives of the water management system are to control runoff from the development/construction areas and the operation areas, while diverting up-catchment water around these areas, and to minimise the use of clean water on-site.

The water management system will include both permanent features that will continue to operate post-closure (e.g. northern and southern diversion channels) and temporary structures during mining operations (e.g. sediment dams).

An internal drainage system will be constructed to collect and contain water generated within the development/construction areas and operation areas.

Sediment control structures such as sediment dams and sediment fences will be employed where necessary within and downstream of disturbance areas. Consistent with the relevant performance measure (Section 5) the erosion and sediment controls will be designed, installed and maintained generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1* (Landcom, 2004), *Volume 2A – Installation of Services* (DECC, 2008a) and *Volume 2C – Unsealed Roads* (DECC, 2008b).

The water management system will be progressively developed during the construction and operation phases as diversion and containment requirements change. The water management system layout for the initial construction activities is provided in Figure 2 and a summary of the water management system is provided in Section 6.1.

Erosion and sediment control plans are provided in Attachment 1.

6.1 Water Management and Related Infrastructure

6.1.1 Mine Water Storages

The following mine water storages will be constructed during the initial construction activities (Figure 2):

- tailings storage facility;
- evaporation pond;
- water storage dam;
- mine water dams and runoff dam; and
- raw water dam.

Tailings Storage Facility

Consistent with the relevant performance measures (Section 5):

- the tailings storage facility will be designed, installed and maintained to ensure no discharge of mine water off-site;
- the floor and side walls of the tailings storage facility will be designed with a minimum of a 900 mm clay or modified soil liner with a permeability of no more than 1 x 10^{-9} m/s, or a synthetic (plastic) liner of 1.5 mm minimum thickness with a permeability of no more than 1 x 10^{-14} m/s (or equivalent);
- a seepage interception system will be designed, installed and maintained in the tailings storage facility embankments in accordance with DSC guidelines;
- the tailings storage facility will be designed, installed and maintained to meet the requirements of the DSC; and
- the tailings storage facility design will conform with:
    - DSC3A – Consequence Categories for Dams (DSC, 2015); and
    - DSC3F – Tailings Dams (DSC, 2012).

All tailings generated in the process plant will be pumped to and stored in the tailings storage facility. The tailings slurry will be deposited through a series of spigots located at the perimeter of the cells and a decant pond will be maintained in the centre of each cell. Decant water will be piped to the water storage dam for reuse in the process plant.

The capacity of the tailings storage facility will progressively increase over the Project life as lifts are completed and the cells are developed.

The tailings storage facility will be a 'turkeys nest' dam and will not be used to harvest runoff as it will be used to contain tailings and mine water or effluent in accordance with best management practice.

Evaporation Pond

Consistent with the relevant performance measures (Section 5):

- the evaporation pond will be designed, installed and maintained to ensure no discharge of mine water off-site; and
- the floor and side walls of the evaporation pond will be designed with a minimum of a 900 mm clay or modified soil liner with a permeability of no more than 1 x 10^{-9} m/s, or a synthetic (plastic) liner of 1.5 mm minimum thickness with a permeability of no more than 1 x 10^{-14} m/s (or equivalent).

It is noted that return water would not be used from the chloride waste inflow contained separately in the evaporation pond.

The evaporation pond will have a capacity of approximately 281 million litres (ML) at full development.

The evaporation pond will be a 'turkeys nest' dam and will not be used to harvest runoff from land as it will be used to contain mine water or effluent in accordance with best management practice.

Water Storage Dam

Consistent with the relevant performance measures (Section 5):

- the water storage dam will be designed, installed and maintained to ensure no discharge of mine water off-site;
- the water storage dam will be suitably designed, installed and/or maintained to minimise seepage; and
- the water storage dam will be designed, installed and maintained to meet the requirements of the DSC (if required under the provisions of the *Dams Safety Act 1978*).

The water storage dam will have a capacity of approximately 1,230 ML.

The water storage dam will be a 'turkeys nest' dam and will not be used to harvest runoff from land as it will be used to contain mine water or effluent in accordance with best management practice.

Mine Water Dams and Runoff Dam

Consistent with the relevant performance measures (Section 5):

- the mine water dams and runoff dam will be suitably designed, installed and/or maintained to minimise seepage; and
- the runoff dam will be designed, installed and maintained to capture and convey the 100 year, 72-hour ARI rainfall event.

Water collected from the disturbance footprint of the ore stockpile areas will be temporarily contained in mine water dams. Water collected from the disturbance footprint of the processing facility area will be temporarily contained in the runoff dam. Water collected in the mine water dams and runoff dam will be reused in the mine site water system.

Based the requirement for the mine water dams to be designed, installed and maintained to capture and convey the 100 year, 72-hour ARI rainfall event, the preliminary design capacities for the mine water dams will range from approximately 19 ML to 116 ML. Based on the same design requirement, the preliminary design capacity for the runoff dam will be approximately 34 ML.

Raw Water Dam

Consistent with the relevant performance measures (Section 5):

- the raw water dam will be suitably designed, installed and/or maintained to minimise seepage; and
- the raw water dam will be designed, installed and maintained to capture and convey the 100 year, 72-hour ARI rainfall event.

The raw water dam will have a capacity of approximately 15 ML.

The raw water dam will be used as buffer storage for water supplied to the site from the external sources (e.g. borefields). The raw water dam will be a 'turkeys nest' dam and will not be used to harvest runoff from land.

6.1.2 Sediment Dams

Consistent with the relevant performance measures (Section 5) the sediment dams will be designed, installed and maintained generally in accordance with the series *Managing Urban Stormwater: Soils and Construction* including *Volume 1* (Landcom, 2004) and *Volume 2E Mines and Quarries* (DECC, 2008c).

Water collected from the disturbance footprint (e.g. internal haul roads and waste dumps) will be temporarily contained in the sediment dams to minimise potential water quality impacts. Where opportunities arise, water will be recycled for dust suppression or use in the process plant, or otherwise released in accordance with the requirements of EPL 21146.

A summary of the capacity of the sediment dams is provided in Table 9 based on preliminary designs. Although the sediment dam capacities may vary from those in Table 9 based on final design, they will however be sized in accordance with the design criteria outlined in Table 9. The as-constructed design details of the sediment dams and maintenance levels will be included in a subsequent revision of this SWMP.

Table 9 – Sediment Dam Design Criteria and Capacities

Sediment Dam	Design Criteria[1]	Approximate Capacity
SD3a	• Type F sediment basin. • 95th percentile 5 day duration rainfall event of 50.7 mm (Dubbo 5 day rainfall depth in Table 6.3a of Landcom, 2004). • A volumetric runoff coefficient of 0.74 assuming soil hydrologic Group D (Table F2 of Landcom [2004]). • Allowance for sediment storage zone capacity equal to 50% of calculated settling zone capacity.	1 ML
SD4		118 ML
SD7		32 ML[2]
SD8		23 ML
SD9		91 ML[2]
SD11a		7 ML
SD11b		5 ML
SD12		5 ML

Source: Hydro Engineering & Consulting (2019)

1 In accordance with *Managing Urban Stormwater: Soils and Construction including Volume 1* (Landcom, 2004) and *Volume 2E Mines and Quarries* (DECC, 2008c).

2 Sizing based on mine water dam design criteria (Section 6.1.1) as the sediment dam would eventually be used as a mine water dam.

6.1.3 Diversion Systems

The diversion system consists of clean water diversions and collection drains. The clean water diversions will collect and divert clean water around disturbed areas. The collection drains will collect and convey runoff from disturbed areas to mine water dams ("mine water") (Section 6.1.1) or sediment dams ("sediment water") (Section 6.1.2). Consistent with the relevant performance measures (Section 5), the diversion system will:

- maintain separation between clean and mine water management systems; and
- maximise the diversion of clean water around disturbed areas on site.

The diversion system layout for the initial construction activities is provided in Figure 2.

A summary of the diversion system design criteria is provided in Table 10.

Table 10 – Diversion System Design Criteria

Diversion System Component	Design Criteria
Clean Water Diversions	1 in 100 year, peak flow rainfall event[1]
Collection Drains	1 in 5 year, peak flow rainfall event (less than 1 year duration)[2]
	1 in 20 year, peak flow rainfall event (greater than 3 years duration)[2]

1 In accordance with Table 9 of Development Consent DA 374-11-00.

2 In accordance with *Volume 2E Mines and Quarries* (DECC, 2008c).

The diversion system (including inflow, channel and outflow) will be designed, constructed and maintained to capture and convey the design flows summarised in Table 10. The majority of the diversion system will be grass-lined with only minor sections requiring rip-rap protection (Hydro Engineering & Consulting, 2019). The inlet and outlets of the diversion system will be designed, constructed and maintained generally in accordance with the series *Managing Urban Stormwater: Soils and Construction – Volume 1* (Landcom, 2004) and *Volume 2E Mines and Quarries* (DECC, 2008c).

The permanent clean water diversions (i.e. the southern and northern diversions) will be designed, constructed and rehabilitated to be safe, stable and non-polluting. The design would consider long term stability and compatibility with existing hydrological features, landforms and vegetation. The NRAR's (2018) *Controlled Activities on Waterfront Land – Guidelines for Riparian Corridors on Waterfront Land* will also be considered during the design and construction of the permanent clean water diversions. In particular, the principles of natural stream design outlined in the NRAR's (2018) *Controlled Activities on Waterfront Land – Guidelines for Riparian Corridors on Waterfront Land* will be considered in the design and construction of the permanent clean water diversions.

6.1.4 Chemical and Hydrocarbon Storages

Consistent with the relevant performance measures (Section 5), chemical and hydrocarbon products will be stored in bunded areas in accordance with the relevant Australian Standards, including AS 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids*.

6.1.5 Other Infrastructure

Consistent with the relevant performance measures (Section 5):

- any infrastructure within 40 m of watercourses will be designed, installed and maintained generally in accordance with the *Guidelines for controlled activities on waterfront land – Riparian corridors* (NRAR, 2012), or its latest version; and
- any creek crossings will be designed, installed and maintained generally in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull, S. and Witheridge, G., 2003), or their latest versions.

6.1.6 Irrigation Area

Wastewater generated at the accommodation camp will be collected and treated at an on-site wastewater treatment plant. The wastewater treatment plant will consist of anaerobic and aerobic treatment and final disinfection of treated effluent. The wastewater treatment plant would be installed and operated in accordance with Lachlan Shire Council requirements.

The treated wastewater produced from the wastewater treatment plant will be pumped to the irrigation area via the irrigation water pipeline (Figure 2).

The irrigation application area will be approximately 3.5 ha and will be divided into irrigation zones. Up to 100,000 litres per day of treated wastewater will be pumped to the irrigation area. Sprinklers will be used to evenly distribute the treated wastewater at a maximum rate of approximately 3 millimetres per square metre per day. This application rate is conservative and will minimise risk of surface pooling and runoff (True Water Australia, 2018).

True Water Australia (2018) conducted a nutrient balance for the irrigation area and concluded that the irrigation area is of sufficient size for the expected nutrient load (i.e. nutrient loading will not be a limiting factor to irrigation).

Consistent with the relevant performance measure (Section 5), the accommodation camp irrigation area would be managed in accordance with the *Environmental Guidelines: Use of Effluent by Irrigation* (Department of Environment and Conservation, 2004) and the irrigation rate would be controlled so as not to:

- cause irrigation water runoff from the irrigation area; or
- exceed the capacity of the soil in the irrigation area to effectively absorb the applied nutrient, salt, organic material and hydraulic loads.

6.2 Other Surface Water Management Measures

The water management system at the mine site is designed to minimise any potential water quality impacts and is described in the Water Balance (Appendix A of the WMP). The overall objective of the surface water management system is to contain any potentially contaminated water generated within development/construction and operational areas while diverting all other water around these areas. In summary, this objective is achieved by:

- minimising disturbance areas;
- containment and recycling (including priority re-use of accumulated waters stored);
- collection of runoff from the stockpiles and emplacements to sediment dams designed and managed in accordance with relevant guidelines;
- progressive stabilisation and revegetation of disturbed areas; and
- installation of appropriate erosion and sediment controls.

The surface water monitoring program is described in Section 7.

6.4 Surface Water Licensing

Water Access Licences

The mine and accommodation camp are located within the mapped extent of the Upper Bogan River Water Source under the *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012*. Notwithstanding the above, small sections of Clean TeQ owned land are also located in the Gunningbland and Yarrabandai Water Source under the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*.

Clean TeQ would not require licensing for surface waters at the mine as (1) exemptions under the *Water Management (General) Regulation 2018* would apply; and (2) the runoff water captured by undisturbed areas between the clean water diversions and the ultimate extent of the Project disturbance boundary would be within the estimated harvestable right available to Clean TeQ (based on total contiguous landholdings) (refer below).

For the extraction from the Lachlan River, Clean TeQ currently holds WAL 6679 and WAL 1798 in the Lachlan Regulated River Water Source, for 123 and 300 share components (General Security) under the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016*, respectively. In addition, Clean TeQ currently holds WAL 42370 (zero High Security share components) in the Lachlan River Regulated River Source, for subsequent trading of water on the open market under the *Water Sharing Plan for the Lachlan Regulated River Water Source 2016.*

Harvestable Right

As described above, Clean TeQ owned land in the vicinity of the mine and accommodation camp are located within the Upper Bogan River Water Source under the *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012* and the Gunningbland and Yarrabandai Water Source under the *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*.

Clean TeQ's maximum harvestable right dam capacity (MHRDC) based on the ownership of contiguous Clean TeQ-owned lands in the vicinity of the mine site is presented in Table 11 for both of these Water Sharing Plans. A number of runoff-harvesting and in-stream dams exist on-site and in the nearby surrounding lands owned by Clean TeQ and these are also summarised in Table 11.

Table 11 – Maximum Harvestable Right Dam Capacity

Water Sharing Plan	Clean TeQ Owned Land Area (ha)	Maximum Harvestable Right Dam Capacity (ML)	Existing Clean TeQ Dams	
			Number	Volume (ML)
Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012	3,730	205	51	21
Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012	746	41	6	2

The mine water storages (Section 6.1.1) and sediment dams (Section 6.1.2) are not required to be considered under harvestable rights as they will be used to contain mine water or effluent in accordance with best management practice in accordance with the *Water Management (General) Regulation 2018*.

Based on Table 11, Clean TeQ's existing dam capacity is well within the MHRDC for both Water Sharing Plans. For the mine and accommodation camp (both located in the *Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012*), subtracting the capacity of dams (21 ML) from the harvestable right (205 ML) leaves an available harvestable rights volume of 184 ML.

Any runoff from disturbed mine areas that is captured on-site is not required to be considered under harvestable rights in accordance with the *Water Management (General) Regulation 2018*. Water that falls on undisturbed areas of the site and is not diverted around the site water management system but captured and used for operational purposes, cannot cumulatively exceed the available harvestable rights volume of 184 ML.

Where the opportunities arise, run-off harvested on-site will be used for the Project.

7. SURFACE WATER MONITORING PROGRAM

The surface water monitoring program for the Project is described in the following subsections.

As described in the Water Balance (Appendix A of the WMP), Clean TeQ will also monitor the following aspects of the water management system (upon completion of construction and commissioning of water management infrastructure):

- mine water storage and raw water dam levels and volumes (stored and freeboard), including development of storage curves;
- mine pit inflows/dewatering (where measurable from pumping records) to prepare a water balance of the mine pits;
- water received at the mine from the borefields and/or surface water extraction;
- potable water supply;
- dust suppression water demands; and
- processing water inputs and outputs including:
  - feed tonnage and moisture contents;
  - product tonnages and moisture contents;
  - high chloride stream to the evaporation ponds; and
  - tailings tonnages and solid:water ratios.

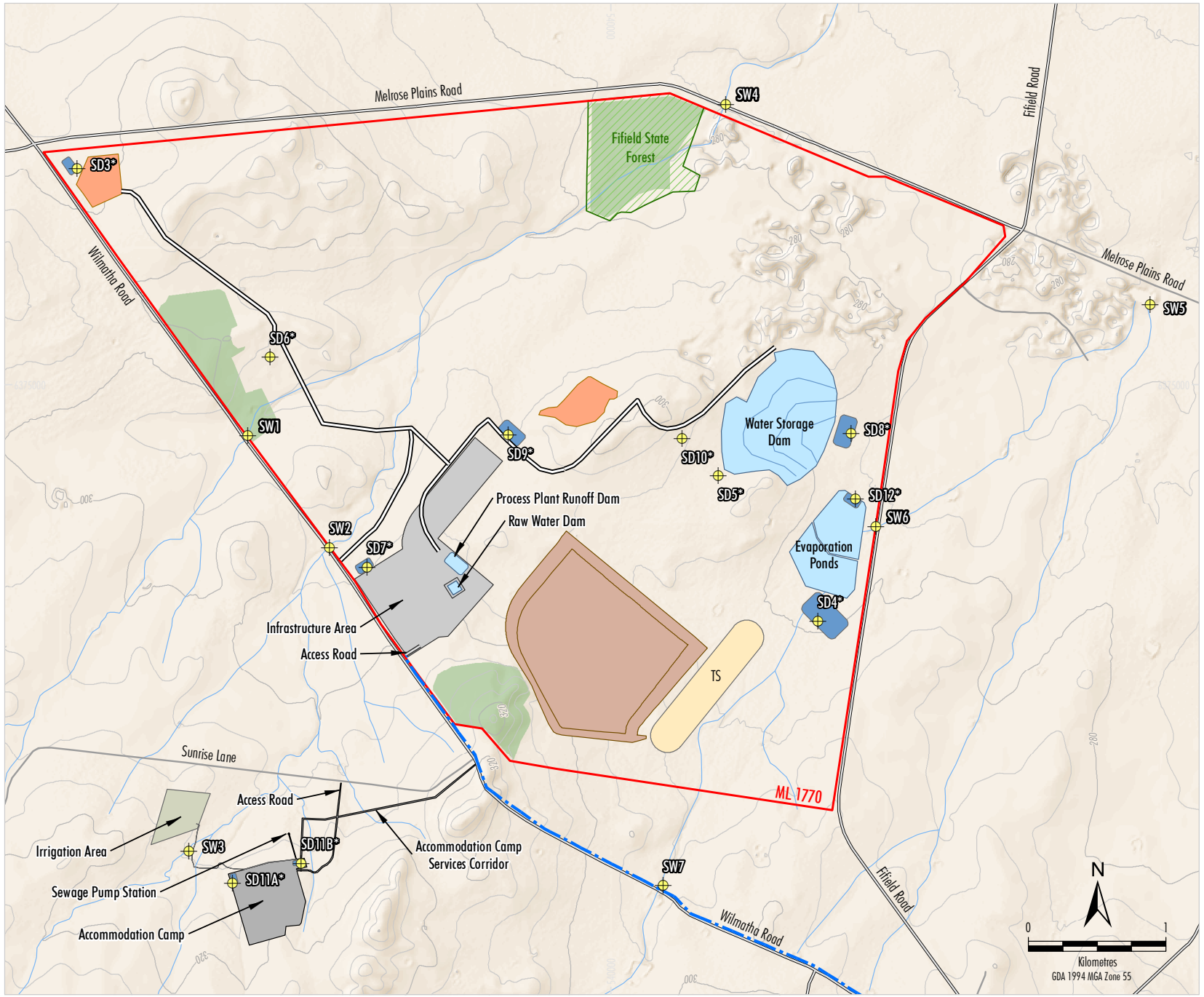
The appropriate monitoring frequencies and methods will be determined by Clean TeQ as required.

7.1 Baseline Monitoring

Baseline surface water monitoring at the mine site is described in Section 4.1. Surface water monitoring upslope and down-slope of the disturbance footprint during construction is proposed as described in Section 7.2.

7.2 Construction Monitoring

During construction, surface water quality monitoring would be conducted at sites along the ephemeral drainage lines (SW1 to SW7) (when flowing) for pH, electrical conductivity (EC), suspended solids, anions (SO_4, alkalinity), cations (Na, K, Ca, Mg) and selected metals (Al, As, Cd, Cu, Co, Cr, Fe, Mn, Ni, Pb, Zn) and nutrients. Sampling would be conducted within 24 hours of a rainfall event and weekly thereafter (where safe access is available). The proposed locations of the surface water quality monitoring sites (SW1 to SW7) are shown on Figure 6.



LEGEND

- State Forest
- Mining Lease Boundary (ML)
- Tailings Storage Facility
- Borrow Pit
- TS Topsoil Stockpile
- Infrastructure Area
- Water Storage
- Sediment Dam
- Existing Open Woodland to be Maintained
- Water Pipeline
- Proposed Surface Water Quality Monitoring Location

NOTE

* Monitoring to commence once Sediment Dam has been constructed.

Source: Black Range Minerals (2000); Clean TeQ (2017, 2019); NSW Department of Industry (2018); NSW Land & Property Information (2017)

CLEAN TEQ SUNRISE PROJECT

Surface Water Monitoring Locations - Mine Site

Figure 6

CTL-17-03 MP 2018_SWMP_201N

In addition, surface water quality monitoring would be conducted at all sediment dams (Figure 6) during discharge events for pH, EC, suspended solids, turbidity (Section 7.2.1).

Erosion and sediment control structures will be inspected on a regular basis and following rainfall events in order to assess the structural integrity and effectiveness of the control structures and any pumping requirements. Results of this monitoring would be used to evaluate necessary ameliorative measures.

7.2.1 Chemical and Hydrocarbon Storages

Chemical and hydrocarbon storages will be inspected on a regular basis in order to assess compliance with the relevant Australian Standards, including AS 1940-2017 *The Storage and Handling of Flammable and Combustible Liquids*. Results of this monitoring would be used to evaluate necessary ameliorative measures.

7.2.2 Licensed Discharge Points

EPL 21146 lists the sediment dams (Figure 6) as licensed discharged.

Surface water quality monitoring would be conducted at these licensed discharged points when discharging for pH, EC, suspended solids and turbidity in accordance with EPL 21146.

7.2.3 Irrigation Area

Monitoring of the accommodation camp irrigation area would include:

- irrigation water volume monitoring, including application rates, times, duration and areas;
- regular visual monitoring for signs of runoff, waterlogging and erosion;
- annual soil characteristics monitoring; and
- annual vegetation monitoring (e.g. review of pasture condition in terms of biomass, species composition and ground cover).

7.2.4 Downstream Flooding

As described in Section 5.1.1, no significant impacts on downstream flooding are predicted during the initial Project construction activities. Notwithstanding the above, the following downstream flooding monitoring is proposed:

- flow observations at SW4 and SW6 undertaken at the same time as surface water quality monitoring (Section 7.2); and
- annual channel stability monitoring at SW4 and SW6, including:
  - documenting locations and dimensions of significant erosive or depositional features so that any subsequent changes can be evaluated;
  - establishing photographic points at representative locations, so that photos can be taken of multiple inspections in a repeatable manner; and
  - written descriptions of the stream at each of the photographic points, focussing on evidence of erosion and exposed soils.

7.3 Operations Monitoring

The surface water monitoring program for operations will be developed in a subsequent revision of this SWMP.

Water quality samples from the tailings storage facility, evaporation pond, water storage dam and runoff would be collected and analysed for pH, EC, suspended solids, anions (SO_4, alkalinity), cations (Na, K, Ca, Mg) and selected metals (Al, As, Cd, Cu, Co, Cr, Fe, Mn, Ni, Pb, Zn).

8. CONTINGENCY PLAN

In the event a water management performance measure for the Project (detailed in Section 5) has not been met or a performance indicator is considered to have been exceeded, Clean TeQ will implement the following Contingency Plan:

- The Clean TeQ Environmental Superintendent will report the incident in accordance with Section 10.1.
- Clean TeQ will identify an appropriate course of action with respect to the identified potential impacts or environmental consequences (if any), in consultation with specialists and relevant government agencies, as necessary. For example, contingency measures, such as, but not limited to, those described in Section 8.2.
- Clean TeQ will submit the proposed course of action to the DPIE for approval.
- Clean TeQ will implement the approved course of action to the satisfaction of the DPIE.

8.1 Adaptive Management

In accordance with Condition 3, Schedule 5 of Development Consent DA 374-11-00, where any exceedance of the criteria and/or performance measures outlined in Schedule 3 of Development Consent DA 374-11-00 occurs, at the earliest opportunity Clean TeQ will:

- take all reasonable and feasible measures to ensure that the exceedance ceases and does not recur;
- consider all reasonable and feasible options for remediation and submit a report to the DPIE describing these options and preferred remediation measures; and
- implement remediation measures as directed by the Secretary of the DPIE.

8.2 Specific Contingency Measures

Specific contingency measures for an exceedance of the water management performance measures would include:

- The conduct of additional monitoring (e.g. increase in monitoring frequency or additional sampling), which would inform further specific contingency measures.
- Implementation of adaptive management strategies (e.g. on-site reconfiguration) to better maintain separation of clean and mine waters, diversion of clean waters, storage ‘as-built’ designs and avoid discharge of mine waters (except in accordance with an EPL).
- The provision of a suitable offset (e.g. improvement works) if there was an environmental consequence and/or adverse surface water impacts were to result.

Clean TeQ will also implement any preferred contingency measures identified to address an incident as directed by the Secretary (Section 10.1).

9. REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

9.1 Annual Review

In accordance with Condition 5, Schedule 5 of Development Consent DA 374-11-00, Clean TeQ will review the environmental performance of the Project by the end of March each year (for the previous calendar year) to the satisfaction of the Secretary.

In relation to water management, the Annual Review will (where relevant):

- describe the development that was carried out in the relevant calendar year, and the development that is proposed to be carried out during the following calendar year;
- include a comprehensive review of the monitoring results and complaints records of the development over the past year, which includes a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the Project Environmental Impact Statement (Black Range Minerals, 2000) and subsequent environmental assessments;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the development;
- identify any discrepancies between the predicted and actual impacts of the development, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the development.

The Annual Review will be made publicly available on the Clean TeQ website.

9.2 Independent Environmental Audit

In accordance with Condition 10, Schedule 5 of Development Consent DA 374-11-00, an independent environmental audit of the Project will be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary.

The independent environmental audit will assess the environmental performance of the Project and review the adequacy of this SWMP. If necessary, appropriate measures or actions to improve the environmental performance of the Project or this SWMP will be recommended.

An independent environmental audit will be conducted within one year of the commencement of the development under this consent, after 6 May 2017. The independent environmental audit, and Clean TeQ's response to the recommendations in the audit, will be made publicly available on the Clean TeQ website, in accordance with Condition 12, Schedule 5 of Development Consent DA 374-11-00.

10. REPORTING PROTOCOLS

In accordance with Condition 4(g), Schedule 5 of Development Consent DA 374-11-00, Clean TeQ has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in Clean TeQ's Environmental Management Strategy.

In accordance with Condition 9, Schedule 5 of Development Consent DA 374-11-00, Clean TeQ will provide regular reporting on the environmental performance of the Project on the Clean TeQ website. The Annual Review will be made publicly available on the Clean TeQ website to address this requirement.

10.1 Incident Reporting

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment and/or breaches or exceeds the limits or performance measures/criteria in Development Consent DA 374-11-00.

In the event that review of surface water monitoring data indicates an incident has occurred, the incident will be reported in accordance with Condition 8, Schedule 5 of Development Consent DA 374-11-00. Clean TeQ will notify the Secretary and any other relevant agencies including the relevant Council immediately after it becomes aware of the incident. Clean TeQ will also notify any affected landholders of any incident that has caused, or threatens to cause, material harm to the environment.

Within seven days of the date of the incident, Clean TeQ will provide the Secretary and any other relevant agencies with a detailed report on the incident and such further reports as may be requested. The report will:

- describe the date, time and nature of the exceedance/incident;
- identify the cause (or likely cause) of the exceedance/incident;
- describe what action has been taken to date; and
- describe reasonable and feasible options to address the incident and identify the preferred option to address the incident (Section 8.1).

10.2 Complaints

Clean TeQ will maintain a Community Complaints Line (tel: 1800 952 277) and email address (community@cleanteq.com) for the sole purpose of receiving community contacts and complaints. The Community Complaints Line number will be available on the website and included in Clean TeQ's advertising and community communication tools. The Community Complaints line will be staffed 24 hours a day, seven days a week during construction and operations. Clean TeQ will respond to callers on the next business day. If the issue is urgent a member of the leadership team will be contacted immediately.

Clean TeQ has developed a procedure that outlines its commitment to receiving, resolving and recording complaints received from the community. Detailed records of each complaint resolution are kept in Clean TeQ's record management systems.

Complaints will be investigated within 24 hours of receipt. The cause of the complaint will be analysed and actions to resolve the complaint taken as soon as possible. In complex cases where resolution will take more than 48 hours, Clean TeQ will commit to update the community member regularly until the complaint is resolved.

In accordance with Condition 12(a), Schedule 5 of Development Consent DA 374-11-00, a complaints register will be made available on the Clean TeQ website and updated monthly.

10.3 Non-Compliances with Statutory Requirements

A protocol for managing and reporting non-compliances with statutory requirements has been developed as a component of Clean TeQ's Environmental Management Strategy and is described below.

Compliance with all approvals plans and procedures is the responsibility of all personnel (staff and contractors) employed on or in association with Clean TeQ and the Project.

The Clean TeQ Environmental Superintendent will undertake regular inspections, internal audits and initiate directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance.

As described in Section 10.1, Clean TeQ will report incidents in accordance with Condition 8, Schedule 5 of Development Consent DA 374-11-00 and in accordance with the protocol for industry notification of pollution incidents under Part 5.7 of the POEO Act.

Clean TeQ will notify the Secretary and any other relevant agencies including the relevant Council immediately after the authorised person becomes aware of the incident which causes or threatens to cause material harm to the environment. Within seven days of the date of the incident, Clean TeQ will provide the Secretary and any other relevant agencies with a detailed report on the incident and such further reports as may be requested.

A review of compliance with all conditions in Development Consent DA 374-11-00, Mining Lease 1770 and all other approvals and licences will be undertaken prior to (and included within) each Annual Review (Section 9.1).

Additionally, in accordance with Condition 10, Schedule 5 of Development Consent DA 374-11-00, an independent environmental audit (Section 9.2) would be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary to assess whether Clean TeQ is complying with the requirements in Development Consent DA 374-11-00, and any other relevant approvals, EPLs, and/or mining leases.

10.4 Exceedances of Impact Assessment Criteria and/or Performance

A protocol for managing and reporting exceedances of impact assessment criteria and/or performance criteria is provided is Section 8.

11. REFERENCES

Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality – The Guidelines*. National Water Quality Management Strategy. October 2000.

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ATTACHMENT 1

Erosion and Sediment Control Plans

537,000mE

538,000mE

6,377,200mN

6,377,100mN

SD11a

SD11b

SD11a-2

SD11b-2

SD11a-1

SD11b-1

Clean TeQ Sunrise Project

Water Management Plan - Accommodation Camp

Date February 2019

File HECData\Aerials_and_CAD_Files\2018\J1807 Sunrise\BasePlan_1807-01_Rev 5

Legend

- Approved Surface Development Area
- Accommodation Camp Infrastructure Area
- Initial Construction Activities Surface Development Area
- Sediment Dam (SDx)*
- Collection Drain (SDx-x)*
- Catchment Boundaries

*Layout is indicative only and subject to detailed design

536,000mE
537,000mE
538,000mE
539,000mE
540,000mE
541,000mE
542,000mE
543,000mE
6,377,000mN
6,376,000mN
6,375,000mN
6,374,000mN
6,373,000mN
6,372,000mN
SW4
SW6
SD3a
SD9 (MWD4)
SD9-1
R1b
R1a
SD7 (MWD5)
SD7-1
SD7-2
DD7
Runoff Dam
RD-1
Raw Water Dam
DD8
DD6
R1a
R1b
R2
R1b
DD5
R1a
Water Storage Dam
SD8-2
SD8
SD8-1
R2
R1a
R1b
DD4
SW6
R1
DD3
SD4
R1
R1
R2
SD4-1
DD3b
R2
SD4-2
R3

Clean TeQ Sunrise Project

Water Management Plan - Construction Year 1 (Year -1)

Date February 2019

File HECData\Aerials_and_CAD_Files\2018\J1807 Sunrise\BasePlan_1807-01_Rev 8

Legend

- Future Water Storage
- Future Tailings Storage Facility
- Topsoil Stockpile
- Sediment Dam (SDx)*
- Gabbro Borrow Pit
- Approved Surface Development Area
- Haul Road
- Initial Construction Activities Surface Development Area
- Mine Infrastructure Area
- Diversion Channel (DDx)*
- Collection Drain (SDx-x)*
- Reach Segment (Rxx)
- Water Storage
- Catchment Boundaries
- Receiving Waters Monitoring Point

*Layout is indicative only and subject to detailed design

536,000mE
537,000mE
538,000mE
539,000mE
540,000mE
541,000mE
542,000mE
543,000mE
6,377,000mN
6,376,000mN
6,375,000mN
6,374,000mN
6,373,000mN
6,372,000mN
SD3a
SD9 (MWD4)
SD7 (MWD5)
Runoff Dam
Raw Water Dam
Water Storage Dam
SD8
SD12
Evaporation Pond
SD4

Clean TeQ Sunrise Project

Water Management Plan - Construction Year 2 (Year 0)

Date February 2019

File HECData\Aerials_and_CAD_Files\2018\J1807 Sunrise\BasePlan_1807-01_Rev 5

Legend

- Future Water Storage
- Future Tailings Storage Facility
- Topsoil Stockpile
- Sediment Dam (SDx)*
- Gabbro Borrow Pit
- Approved Surface Development Area
- Initial Construction Activities Surface Development Area
- Mine Infrastructure Area
- Diversion Channel*
- Collection Drain*
- Water Storage
- Catchment Boundaries
- Haul Road

*Layout is indicative only and subject to detailed design