REX MINERALS LTD

Hillside Copper Mine

Proposed Program for Environment Protection and Rehabilitation (PEPR)

September 2019

Volumes 1 MAIN REPORT

For tenement holdings ML6438, EML6439 and MPL146

The PEPR comprises two volumes:

- **Main Report (Sections 1 to 7)**
- **Appendices (Sections 1 to 7)**

Document Status

Mine Owner	Rex Minerals (SA) Pty Ltd
Mine Operator	Rex Minerals (SA) Pty Ltd
Contact Person	Mr Richard Laufmann Chief Executive Officer
Contact Details	Rex Minerals Ltd PO Box 3435 Rundle Mall SA 5000
Tenements	Mineral Lease (ML) 6438 Extractive Minerals Lease (EML) 6439 Miscellaneous Purposes Licence (MPL) 146
Name of Mining Operation	Hillside Copper Mine
Commodity to be Mined	Copper and Gold

Revision History

Version	Details	Approved	Date
0.1	First Draft	Company Secretary	07/12/2017
0.2	Final Draft	Management	25/01/2018
1	PEPR Submission	Chief Executive Officer	02/02/2018
2	Revised PEPR Submission	Chief Executive Officer	24/06/2019
3	Final Proposed PEPR Submission	Chief Executive Officer	12/09/2019

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Declaration of Accuracy

I, Richard Laufmann, the tenement holder/authorised agent, have taken reasonable steps to review the information in this Program for Environment Protection and Rehabilitation (PEPR) to ensure its accuracy.

As such, the following steps have been undertaken.

- An internal audit process against the ministerial determination to ensure the minimum requirements have been addressed has been completed.
- An internal review has been undertaken and endorsed by Rex senior management.
- An internal peer review has been undertaken by suitably qualified and experienced company employees.
- An external peer review has been undertaken by a suitably qualified and experienced approvals professional.

Name: **Richard Laufmann**

Position: **Chief Executive Officer**

Signature:

Date: **12 September 2019**

LATHWIDA
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20 June 2019

Rex Minerals Ltd
c/o Kim Ferguson
Via email: kferguson@rexminerals.com.au

RE: INDEPENDENT PEER REVIEW OF REX MINERALS HILLSIDE PROGRAM FOR ENVIRONMENTAL PROTECTION AND REHABILITATION

Lathwida Pty Ltd (Lathwida) was commissioned by Rex Minerals Ltd (Rex Minerals) to complete an independent peer review of the draft Hillside Copper Project (the Project) Program for Environment Protection and Rehabilitation (PEPR). The scope of this review, as defined by Rex Minerals, was to confirm whether, in the opinion of Lathwida:

- the committed design/engineering and management controls, if implemented as described, are appropriate in the context of the agreed Environmental Outcomes for the Project; and
- the nominated monitoring program as described in the PEPR will be sufficient to demonstrate the performance of the Project in achieving the Environmental Outcomes

The method used to complete the peer review of the PEPR was as follows:

- Review of the Draft PEPR (version dated 3 June 2019), supporting appendices and background information
- Fatal flaws-style assessment of the proposed controls and monitoring program in the context of the agreed Environmental Outcomes, Outcome Measurement Criteria, Leading Indicators and/or Tenement Conditions
- Providing feedback to Rex Minerals highlighting any gaps or aspects requiring further clarification
- Reviewing the response(s) from Rex Minerals in the context of the scope of the peer review

The scope of this review was undertaken with consideration to the following:

- Impact identification and assessment, based on associated technical studies, were completed as a component of the MLP and subsequent Delta Impact Assessment and were not reviewed. The identified potential impact events were carried from the MLP into the PEPR and form the basis for the identification of the design/engineering and management controls proposed in the PEPR.
- Tenement Conditions, Environmental Outcomes, Outcome Measurement Criteria and Leading Indicators presented in the PEPR have been developed by Rex Minerals in consultation with the Department for Energy and Mining (SA). The focus of this peer review has been the proposed design/engineering and management controls and the monitoring program supporting these agreed aspects of the PEPR.

This review was completed by David Winterburn (Director). He has 20 years of experience in developing and reviewing primary approvals documentation, including the development of the BHP Olympic Dam Expansion Environmental Impact Statement, the development of the OZ Minerals Carrapateena Mining Lease Proposal and supporting Miscellaneous Purposes Licence Management Plans and the development of the OZ Minerals Carrapateena and Prominent Hill PEPRs. David has also provided expert advice to the SA Government regarding environmental assessment and mining regulation.

In the context of the scope of this review, it is Lathwida's view that the design/engineering and management controls committed to by Rex Minerals in the PEPR are appropriate in the context of the identified potential impact events and the agreed Environmental Outcomes, and that the monitoring program described in the PEPR will be sufficient to demonstrate the performance of the Project in achieving the Environmental Outcomes during the construction, operation, closure and post-closure phases.

Regards,

David Winterburn
Director
Lathwida Pty Ltd

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Glossary of Terms

Glossary of Terms

Units and Symbols

Abbreviation	Description
$ or A$	Australian dollar currency (unless otherwise denoted)
US$	United States of America dollar currency
%	Percentage
/	Per
º	Degree (angle)
ºC	Degree Celsius
2D	Two dimensional
3D	Three dimensional
As	Arsenic
Au	Gold
B	Boron
Ba	Barium
Be	Beryllium
Ca	Calcium
Cd	Cadmium
C.mol/kg	Chemistry unit for molar concentration – moles per litre per kilogram
cm	Centimetre
Cl	Chlorine
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CO^3	Carbonate
Cu	Copper
dB	Decibel, unit used to express sound intensity
dB(A)	A-weighted noise levels are expressed in units of dB(A)
dB(Lin) or dBL	Flat or linear frequency response i.e., unweighted decibel level

Abbreviation	Description
dS/m	Decisiemens/meter
EC1.5	Electrical conductivity of a soil or water sample, influenced by concentration and composition of dissolved salts, i.e., high EC value indicates high salinity level
Fe	Iron
g/t	Grams per tonne
GL	Gigalitre
g/m^2/month	Grams per square metre per month
GW	Gigawatt
GWh/a	Gigawatt hours per annum
H_2SO_4	Sulfuric acid
ha	Hectares
HCO_3	Bicarbonate
H:V	Horizontal:Vertical
K	Potassium
kg	Kilogram
kg/t	Kilograms per tonnes
kL	Kilolitre
km	kilometre
kph	Kilometres per hour
koz	Kilo ounce
kt	Kilo tonnes
kV	Kilovault
kW	Kilowatt
KWh	Kilowatt hours
kWh/a	Kilowatt hours per annum
L	Litres
LA_{10}	The A-weighted noise level exceeded 10% of the measurement period
LA_{90}	The A-weighted noise level exceeded 90% of the measurement period

Abbreviation	Description
LA_{eq}	The equivalent (continuous) noise level is defined as the equivalent steady noise level which, in a given period of time, would contain the same noise energy as the time-varying noise during the same time period
$LA_{eq,15min}$	The equivalent (continuous) noise level over a 15-minute period. The $Leq,_{15min}$ noise level is used to assess compliance with environmental noise legislation in South Australia
LA_{max}	The maximum A-weighted noise level in a measurement period
LA_{min}	The minimum A-weighted noise level recorded during a measurement period
L/s	Litres per second
L/s/m	Litres per second per metre width
L_wdB(A)	Sound power levels measured in watts
m	Metres
m^3	Cubic metres
m^3/h	Cubic metres per hour
m^3/s	Cubic metres per second
M	Million
mAHD	Elevation in metres with respect to the Australian Height Datum
Mg	Magnesium
mg	milligrams
mg/L	Milligrams per litre
mg/m^3	Milligrams per cubic metre
ML	Million litres
ML/a	Megalitres (million litres) per annum
ML/d	Megalitres (million litres) per day
mN	Metres North
mRL	Metres reduced level (elevation measure)
m/s	Metres per second
mm	Millimetres
mm/s	Millimetres per second, unit of vibration velocity
Mm^3	Million metres cubed
Mn	Manganese

Abbreviation	Description
Moz	Million ounces
Mt	Million tonnes
Mtpa	Million tonnes per annum
MW	Megawatt
Na	Sodium
Ni	Nickel
NO	Nitrate
oz	Ounces
P_{80} or P80	80% of material passing a certain size fraction
Pb	Lead
pH	A measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acid, 7 is neutral and 14 is most basic (alkaline)
PM	Particulate matter
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter equal to or less than 2.5µm
PM_{10}	Particulate matter 10 concentrations refer to fine suspended particulates less than 10 microns in diameter (see particulate matter)
ppm	Parts per million
ppt	Parts per thousand
PPV	Peak particle velocity is the maximum vector sum of the three velocity components in vibrations, i.e., longitudinal, transverse and vertical (measured in mm/s)
PQ	Diamond drill core size 122mm diameter
RL	Reduced level (measure of elevation). At the Hillside Project RL is equivalent to mAHD
s	Second
SO_4	Sulphate
t	Tonnes
t/a	Tonnes per annum
t/ha	Tonnes per hectare
tCO_2^e	Tonnes of CO_2 equivalent
t/d	Tonnes per day

Abbreviation	Description
t_{H2O} /t	Tonnes of water per tonne of concentrate
TJ	Terajoule
t/m^3	Tonnes per cubic metres
t/m^2h	Tonnes per square metre, per hour
tph	Tonnes per hour
tpa	Tonnes per annum
U	Uranium
Zn	Zinc
$\mu g/m^3$	Micrograms per cubic meter of air
μm	Micro metre or micron – one millionth of a metre
μS/cm	Microsiemens per centimetre

Terms and Descriptions

Abbreviation	Description
AC	Aircore
Acid	Substance with a pH less than 7.0; the lower the pH the higher the corrosive ability of the substance
Acid forming	The process whereby acid is formed by the oxidation of minerals (particularly sulphides) exposed to air and water
Acid rock drainage (ARD)	Runoff of acidic water, typically from mined materials, following acid formation within the material
Acidic	Having a pH less than 7.0
ACM	Acid consuming material
ACR	Annual Compliance Report
AEP	Annual exceedance probability
Air overpressure	The pressure caused by a blast-generated shock wave over and above normal atmospheric pressure. It is measured in decibels using the linear weighting scale dB(Lin) and is often below the range of human hearing
Alkaline	Having a pH greater than 7.0
AMD	Acid mine drainage, referred to throughout this PEPR as acid rock drainage (ARD)

Abbreviation	Description
Amenity	The desirability of an area
AN	Ammonium nitrate
ANC	Acid neutralising capacity
ANCOLD	Australian National Committee on Large Dams
ANFO	Ammonium nitrate/fuel oil
ANZECC	Australian and New Zealand Environment and Conservation Council
AQMP	Air Quality Management Plan
Aquatic	Living in or on water, or concerning water
Aquifer	A water-bearing layer of sediment or rock
ARD	Acid rock drainage
ARDMP	ARD Management Plan
ARI	Average recurrence interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
ASX	Australian Stock Exchange
APAL	APAL Australian Precision Agricultural Laboratory
Background	The conditions (e.g., noise levels, bird populations) already present in an area before the commencement of a specific activity (e.g., a mining operation)
BAM or EBAM	Beta attenuation monitoring
Baseline	A specific value or values that can serve as a comparison or control
Best practice	A process, technique, or use of technology, equipment or resource that has a proven record of success
BFS	Bankable Feasibility Study
Biodiversity	The diversity of different species of plants, animals and microorganisms, including the genes they contain, in the ecosystem of which they are part
Blasting	Detonation of explosive charge in a mine to assist in the removal of hard rock
BMP	Blast Management Plan
BOM	Australian Government – Bureau of Meteorology
Bore	A well, usually of less than 20cm diameter, sunk into the ground and from which water is pumped

Abbreviation	Description
C	Construction
Calcareous	Containing or characteristic of calcium carbonate
Cambrian	Relating to the earliest part of the Palaeozoic era, in which invertebrate animal life, including trilobites, appeared, and marine algae developed
CAP	Conservation Action Planning group (Southern YP)
Catchment	The entire land area from which water (e.g., rainfall) drains to a specific water course or water body
CCG	Community Consultative Group
CEC	Cation exchange capacity
CEO	Chief Executive Officer
CEP	Community Engagement Plan
CFS	Country Fire Service
Characteristic	Associated with a noise source, means a tonal, impulsive, low frequency or modulating characteristic of the noise that is determined in accordance with the Guidelines for the use of the Noise EPP to be fundamental to the nature and impact of the noise
Channel	River or irrigation channel, includes bed and bank
Cl	Closure
Clay	A discrete mineral species, belonging to the layered silicate group of less than 2 microns in diameter
CMMP	Coastal and Marine Management Plan
Compaction	The process of close packing of individual grains in a soil or sediment as a response to pressure
Concentration	The amount of a substance per unit of mass or volume of the medium in which it occurs
Conservative	A prediction, assumption, or measurement that errs on the side of safety
Contractor	Specialist brought in to perform a specific task, such as the construction of mine infrastructure or the excavation (mining) of an open pit
Cross-section	A two-dimensional diagram of an object presented as if the object has been cut along its length
Crusher	That part of an ore-processing plant where the ore is mechanically crushed into smaller pieces
CS_2	Carbon disulphide
CT	Certificate of Title
Cth	Commonwealth

Abbreviation	Description
Cyclone	A device that generates a vortex to clear particulate matter from air or water
Day	Between 7:00am and 10:00pm as defined in the Noise EPP
DCYP (now YPC)	District Council of Yorke Peninsula
DEE	Department of the Environment and Energy (Australian Government)
DEWNR	Former Department of Environment, Water and Natural Resources (SA)
Density	1. The mass of a substance (e.g., sediment) divided by its volume; water has a density of exactly 1kg per litre; gold has a density of 19.3kg per cubic litre 2. The coverage of vegetation (e.g., trees) per unit of distance (along a linear transect) or unit of area (in an area transect)
Deposition	Laying down of particulate material (e.g., sediment in a lake or tailings solids in a tailings storage)
Dewater	To remove water from (e.g., a mine pit or an aquifer)
DEM	Department for Energy and Mining, South Australia
DEW	Department for Environment and Water, South Australia
DPC	Department of the Premier and Cabinet, South Australia
DPTI	Department of Planning, Transport and Infrastructure, South Australia
Drawdown	A reduction in water level and/or pressure level in an aquifer as a result of groundwater extractions
Drilling	The action of boring holes (usually less than 30cm in diameter and up to several hundred metres deep) into the ground, typically to establish a water bore or to collect samples to investigate the below surface geology
DSCP	Dewatering and seepage collection pond
DSD	Department of State Development, South Australia (Department no longer exists)
EC	Electrical conductivity
EC PRO	Environment Community Procedures
Ecology	The science dealing with the relationships between organisms and their environments
Ecosystem	An interacting system of animals, plants, other organisms and non-living parts of the environment
EFS	Extended Feasibility Study announced by Rex in May 2015 – the EFS represents the Hillside Project as presented in this PEPR and is also referred to as Stage 1
EL	Exploration Licence
EM	Electromagnetic
EML	Extractive Minerals Lease 6439

Abbreviation	Description
Emission	A discharge of a substance (e.g., dust) into the environment
EMP	Environmental Management Plan
Environment	A general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists
EOM	End of mine
EPA	Environmental Protection Authority, South Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPP	Environment Protection Policy
Ephemeral	Not permanent, e.g., a stream that flows only seasonally or after rainfall or a lake that periodically dries out, or a plant that is present seasonally
Erosion	The wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice
ESP	Exchangeable sodium percentage
Evaporation	The loss of water as vapour from the surface of a liquid that has a temperature lower than its boiling point
Excavators	Vehicles used to excavate holes and move soil, earth, or rocks
Exotic	Introduced to a particular environment
Fault	Fracture of Earth's crust caused by the relative movement of the rock masses
Fauna	A general term for animals (birds, reptiles, marsupials, fish, etc.), particularly in a defined area or over a defined time period
Feasibility study	A preliminary technical and economic study to assess the viability of a project
Feed	Material being fed into a process
Flocculant	Chemical substance added to a flotation process to aid flocculation
Flood plain	A low-lying plain adjacent to a river subject to occasional or frequent flooding and formed by sediment deposition during flooding episodes
Flora	A general term for plants, particularly those found in a defined area or characteristic of a defined time period
Flowsheet	1. Diagram representing the sequence of events and decision-making logic of a particular process 2. The series of steps within the processing plant by which metals are recovered from ore
Fly rock	Rock that is ejected from the blast site in a controlled explosion in the open pit
Fly rock zone	The area around the open pit in which fly rock may land in as a result of the blast

Abbreviation	Description
Formation	A large stratigraphic sequence of rock beds (sandstone, shale, limestone, etc.) generally deposited over a distinct geological period (e.g., during a glacial period)
FoS	Factor of safety
Fugitive	Noise, dust, or light that has escaped into the environment (e.g., from a mine site)
Gangue	A mineral without economic value that is part of an ore deposit
GARD	Global acid rock drainage
GCE	Ground Control Engineering (a geotechnical engineering consultancy)
Geochemistry	The study of the chemical composition of the earth or of the chemical interaction of elements, molecules, or particles derived from the earth
Geosyncline	Subsiding elongate or basin-like trough that allows an accumulation of sedimentary and volcanic rocks
Geotechnical	A term currently employed to cover the fields of soil mechanics, rock mechanics, and engineering geology
GHG	Greenhouse gas emissions
GPS	Global positioning system
Grade	The concentration of metal, e.g., Cu, either in an individual rock sample or averaged over a specified volume of rock; Cu grade is usually given in percentage terms
Grader	Vehicle used to smooth a soil or rock surface
Gradient	Rate of change of a given variable (such as temperature or elevation)
Gravel	Sedimentary particles or rock fragments generally between 2mm and 10mm in size
Greenhouse gases	Carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride
Grinding	A process used to reduce the particulate size of a mine rock or soil, typically occurs after crushing
Ground vibration	Vibration transmitted through the ground following blasting
Groundwater	All waters occurring below the land surface; the upper surface of the soils saturated by groundwater in any particular area is called the water table
GWMP	Groundwater Management Plan
Habitat	The particular local environment occupied by an organism
Haematite	Common dark red or grey rock from which iron is obtained; oldest known iron oxide mineral and is widespread in rocks and soils
Haul trucks	Heavy vehicles used for the transportation of ore or waste rock
HANFO	Heavy ANFO

Abbreviation	Description
HDPE	High-density polyethylene
HMCV	Hillside Mine Community Voice
HMP	Heritage Management Plan
HSE	Health, Safety and Environment
HSE MS	Health, Safety and Environment Management System
HVAS	High volume air sampler
Hydrogeology	The study of groundwater, including its occurrence, recharge and discharge processes and the properties of aquifers
Hydrology	The study of water, particularly its movement in streams, rivers, or underground
ICMM	International Council on Mining and Metals
ICP	Inductively coupled plasma
ILG	Industry Leaders Group
In situ	In its natural or original place
INAP	International Network for Acid Prevention
Indicator	Any physical, chemical, or biological characteristic of the environment used to assess (i.e., indicate) environmental condition
indigenous	Belonging to, or found naturally in, a particular environment (see also exotic)
Indigenous	A cultural group (and their descendants) who have a historical association with a given region, or parts of a region, and who formerly or currently inhabit the region
Inflow	Flow directed into a particular feature, such as a lake or a mine pit
Infrastructure	The supporting installations and services that supply the needs of a project
Introduced	See exotic
Invertebrates	Commonly, animals without a backbone (jellyfish, worms, molluscs, etc.)
IP	Induced polarisation
IWMS	Integrated waste management system
JORC	Joint Ore Reserves Committee
K value	Measure of hydraulic conductivity, symbolically represented as K
Landform	A specific feature of a landscape (such as a hill) or the general shape of the land
Leach	Dissolution and removal of a soluble substance from a soil or a rock, e.g., the leaching of salt (by water) from a soil

Abbreviation	Description
Leachate	The fluid in which a leached substance is dissolved or transported
LG	Low grade
LIC	Leading indicator criteria
Lift	Each separate layer placed in the construction of an embankment or waste rock emplacement
Lithology	The description of rocks on the basis of colour, mineralogical composition, and grain size
Load	The amount of a substance discharged into a body of water (e.g., salt or sediment); usually expressed as mass over a specified time (e.g., tonnes per year)
Loam	Type of soil intermediate in texture between clay and sand, consisting of a mixture of clay, sand, gravel, silt, and organic matter
LoM	Life of mine
Magnetite	A common black magnetic mineral consisting of iron oxide; an important ore of iron
MAR	Managed aquifer recharge/reinjection
MCA	Minerals Council of Australia
MDE	Maximum design earthquake
Mean	Average; the sum of the data divided by the number of data points
Median	The middle value of a set of numbers arranged in order of magnitude
MEND	Mine environment neutral drainage
Metallurgical	Pertaining to metals, particularly their extraction from ore
MIBC	Methyl isobutyl carbinol
Mill	Ore processing plant
Mine Closure	Means when the last tonne of ore is processed through the plant. This will occur approximately 14 years after the commencement of mine construction
Mine Completion	Means the Land has been rehabilitated to an extent that the Minister could approve an application for surrender of the Mining Tenement on the basis that the Tenement Holder has complied with sub-regulation 59(1) of the Regulations and there is no obstacle under sub-regulation 59(3) of the Regulations
Mine materials	Material removed during excavation of the mine pit (e.g., topsoil, waste rock, or ore)
Mine waste	By-products of mining operations with no economic value
Mine water	All water used in mining and processing (including for dust suppression and in leach tanks)
Mineralisation	The occurrence of metals or minerals within a rock sequence that may potentially constitute ore

Abbreviation	Description
Mining Act	*South Australian Mining Act 1971*
MD	Managing Director
ML	Mineral Lease 6438
MLP	Mining Lease Proposal
Model	A mathematical simulation of a natural system (such as the variation model of particulate levels within a lake) used to predict how the system will change with time, particularly where external changes have been imposed upon it (such as from mining operations)
MOL	Maximum operating level
Monitoring	Systematic sampling and, if appropriate, sample analysis to record changes over time caused by impacts such as mining
MPA	Maximum potential acidity
MPL	Miscellaneous Purposes Licence 146 (infrastructure corridor)
mRL	Relative level to mean sea level expressed in metres (i.e., metres reduced level)
MSDS	Material safety data sheet
NAF	Non-acid forming
NAG	Net acid generation
NAPP	Net acid production potential
NATA	National Association of Testing Authorities
Native	See indigenous/Indigenous
Natural	Existing in, or formed by, nature (generally excludes anything obviously modified by human beings)
NCAPM	Non-controlled action particular manner
NEPM	National Environmental Protection Measure
Neutral	Neither acidic nor basic (e.g., a pH equal to 7.0)
NGER	Nation Greenhouse and Energy Reporting
Night	Between 10:00pm on one day and 7:00am on the following day as defined in the Noise EPP
Nitrate	Nitrogen compound commonly found in water bodies and used by plants and algae as a nutrient
NMD	pH neutral metalliferous drainage (NMD) generally caused by the oxidation of sulphide minerals
NMP	Noise Management Plan

Abbreviation	Description
Noise affected premises	Residential premises that are in separate occupation, or not on the same land, as the noise source. The noise source must be audible at the premises to be considered
Noise source	Premises or a place, at which an activity is undertaken, or a machine or device is operated, resulting in the emission of noise
NOL	Normal operating level
NRM	Natural Resources Management
NRM Act	*Natural Resources Management Act 2004* (SA)
Nutrients	Generally refers to nitrogen and phosphorus, which are essential for biological growth
NV	Native vegetation
NVC	Native Vegetation Council
NVMP	Native Vegetation Management Plan
NYNRM	Northern Yorke Natural Resources Management Board
O	Operations
OBE	Operating basis earthquake
OEM	Original equipment manufacturers
Open pit	Large hole excavated in an open-cut mining operation to remove the ore
Operations	Mining and ore processing activities
Operations phase	That period of the mining project, after construction and before decommissioning, when pit excavation and metal extraction takes place
Ore	A mineral or mixture of minerals containing a metal in sufficient amounts for its extraction to be profitable
Ore processing	The mechanical and chemical process by which a metal is extracted from an ore
Orebody	A solid mass of ore (both high and low grade) that is geologically distinct from the rock that surrounds it and that is commercially extractable
Overburden	Material that overlies a deposit of ore which must be removed for the ore to be mined
Oxidation	The process by which an element or compound undergoes a chemical reaction involving the removal of electrons; often involves reaction with oxygen to form an oxide (e.g., the rusting of iron)
PAF	Potentially acid forming
Particle size distribution	The relative proportions of particles (e.g., in a sediment) that fall within specific size categories
Particulate matter	Refers to a category of airborne particles that range from 0.1 micrometres (µm) to 50µm in aerodynamic diameter

Abbreviation	Description
Passive	Performing a function without electrical or mechanical action or movement (e.g., a jar-and-funnel rain gauge)
Pathogen	Bacterium, virus, or other microorganism that can cause disease
PAX	Potassium amyl xanthate
PC	Post-closure
PEPR	Program for Environment Protection and Rehabilitation
Perennial	1. A plant living for at least several years, and usually flowering each year 2. Waters or streams lasting throughout the year
Perimeter	Outer boundary
Permeability	The ability of a rock or soil to allow fluid to pass through it
Phytotoxic	Toxic effect by a compound on plant growth
Piezometer	A small-diameter cased bore used to measure groundwater levels
PIRSA	Department of Primary Industries and Regions of South Australia
Pit	See open pit
Pit water	Water inflow into the pit from incident rainfall, surface inflow or groundwater seepage from pit walls
PM	Particulate matter
PM10 or PM_{10}	A category of airborne particles with <10 micrometres (μm) aerodynamic diameter
PM2.5 or $PM_{2.5}$	A category of airborne particles with <2.5 micrometres (μm) aerodynamic diameter
PMP	Probable maximum precipitation
Pollution	The alteration of air, soil, or water as a result of human activities such that it is less suitable for any purpose for which it could be used in its natural state
Potable water	Water of quality suitable for human consumption
PPAMP	Pest Plant and Animal Management Plan
PPE	Personal protective equipment
PPV	Peak particle velocity
Precipitation	1. The process of changing from a dissolved compound into a solid, insoluble compound 2. Rain, hail and snow
PRO	Procedure
Process method	Method used to extract metals from the ore

Abbreviation	Description
Process plant	Where the extraction of metals from the mined ore occurs
Process water	Water used during the processing of ore
Progressive rehabilitation	Rehabilitation of mined or disturbed areas as soon as practicable after they are released during the life of the mine
Project area	The project area is the fenced operational area of the Hillside Project, also referred to as the operational footprint
Pyrite	A cubic iron sulphide mineral with a brassy metallic lustre that is used as an iron ore
Quality control	Procedures built into a sampling and analytical program to maintain the quality of the results obtained
Quantify	To determine the quantity or amount of a component in a substance
Quarry	An open pit from which construction materials are excavated
RAB	Rotary air blast
Radius	Distance from the centre of a circle to its perimeter
Rainfall events	Periods of rainfall
RC	Reverse circulation
Reagents	Chemicals used as part of an industrial process
Receptor	A designated place at which an impact may occur (e.g., a dwelling)
Recharge	The addition of water to an aquifer, directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems
Regolith	A layer of loose, heterogeneous material covering solid rock
Regrowth	Natural regeneration of vegetation following clearing, fire, etc.
Rehabilitation	The restoration of a landscape and especially the vegetation following its disturbance
Reptiles	Cold-blooded vertebrates, including lizards, snakes, turtles, and crocodiles
Reserve	Commercially extractable minerals
Residue	See tailings
Resource	Minerals in the ground, but not necessarily commercially extractable
Revegetated	An area that has been planted with trees, bushes and grasses after being disturbed
Rex	Rex Minerals Ltd
RL	Relative to mean sea level. At Hillside, this is equivalent to Australian Height Datum (AHD)
ROM or ROM Pad	Run-of-mine; see ROM ore stockpile

Abbreviation	Description
ROM ore stockpile	The stockpile of freshly mine ore used to feed the mill and process plant
RSF	Rock storage facility
Runoff	That portion of precipitation (rain, hail and snow) that flows from a specific area as water
RWP	Return water pond
SA	South Australia
SACOME	South Australian Chamber of Mines and Energy
SAG	Semi-autogenous grinding
SAG mill	Semi-autogenous grinding mill
Saline	Containing or impregnated with salt
Sand	Siliceous group of particles within the size range 63 microns to 2mm
SAPOL	South Australia Police
SARIG	South Australian Resources Information Gateway
SARDI	South Australian Research and Development Institute
SD Committee	Sustainable Development Committee
SEB	Significant environmental benefit
Sediment load	See load
Sediment transport	The movement of sediment particles by the action of water, wind or gravity
Seepage	1. Subsurface movement of water 2. Emergence of subsurface flow at the ground surface
Sequence (geological)	Layers of (predominantly) sedimentary rocks sourced from a common geological environment or period
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
Sheet flow	Runoff that is of substantial lateral extent and relatively uniform depth (rather than concentrated in channels)
Silt	Sediment with particles finer than sand and coarser than clay, i.e., 2 to 63 microns
Siltstone	Silt that has consolidated into rock
Site-specific	An observation that is particular to one site
SLMP	Soil and Land Disturbance Management Plan
Slurry	Mixture of fluid and solid (e.g., tailings water and solids)

Abbreviation	Description
SMBS	Sodium metabisulphite
SMP	Social Management Plan
SMS	Short message service
Sodic	High soil concentration of sodium, usually containing an exchangeable sodium percentage of >15%
Sound Level Analyser	An instrument that measures sound pressure levels with advanced analysis capabilities, such as spectral analysis which splits the sound into frequency components. Sound level analysers general have greater measurement accuracy than noise loggers
Sound power/Sound power level	Sound power (watt/W) is the total sound energy emitted by a noise source, per unit time. Sound power level is the logarithmic ratio of sound power to the threshold of hearing expressed in decibels
SP	Sampling point
Species	A taxonomic grouping of organisms which are able to interbreed with one another but not with members of other species
Species diversity	A measure of the number of different species in a given area
Spigot	A tap for controlling the flow of liquid from a pipe
Standing water	Water that is pooled and still
Station	A specific location established for repeated sampling, gauging, weather measurements, etc.
Stockpile	A pile used to store material (such as low-grade ore) for future use
Storage capacity	The maximum volume of liquid able to be retained in a structure or container (e.g., a reservoir or lake)
Stratigraphic	The origin, composition, and development of rock strata
Stripping	Removal of vegetation and topsoil
Substrate	An underlying layer (e.g., of sediment under water)
Sumps	Pits sunk to collect water
Supernatant	The layer of water above settled solids
Surface water	All water flowing over, or contained on, a landscape (e.g., runoff, streams, lakes, etc.)
Suspended (solids)	Solids held in suspension by the turbulent flow of a fluid
SWMP	Surface Water Management Plan
Tailings	By-product of the metal extraction process consisting of crushed rock from which the metal has been extracted (the solid fraction or portion) and a liquid fraction or portion composed of water and residual chemicals used in the extraction process
TCs	Thiocarbamates

Abbreviation	Description
TCDP	Throoka Creek Diversion Pond
TDD	Total dust deposition or average dust deposition
TDS	Total dissolved solids
Temperature inversion	An atmospheric phenomenon in which air temperature increases with height over a particular interval
Tenure (of land)	Terms of holding or authority of ownership
Terrestrial	Pertaining to land
Throughput	Quantity of material (ore, chemicals, etc.) moving through a system (e.g., an ore-processing plant)
Topography	Physical relief and contour of a region
TMP	Traffic Management Plan
Topsoil	Upper layer of soil, usually containing more organic material and nutrients than the subsoil beneath it
Toxic	Poisonous to a specific organism, sometimes resulting in death
Transect	A line across a study area along which observations are made and changes can be observed (e.g., changes in vegetation)
Transport	Movement (e.g., of sediment) via a medium such as river water
TRH	Total recoverable hydrocarbons
TSF	Tailings storage facility
TSP	Total suspended particulates. Mass of all suspended particulates
Turbidity	The optical property of water that prevents light from being transmitted; turbidity or muddiness is caused by the presence of very fine suspended matter such as clay or organic matter
Upper limits	The higher values within a defined range
UPS	Uninterrupted power supply
US	United States of America
USACE	US Army Corps of Engineers
Variable	1. Not constant, subject to change (e.g., temperature, rainfall or population) 2. Water quality indicator (e.g., pH, metal concentration)
Vegetated	Covered with plants
Velocity	Speed in a given direction
Vibration	Oscillating movement

Abbreviation	Description
VLG	Very low grade
VLGO	Very low grade ore
VSD	Variable speed drive
Waste oils	Used oils and lubricants retrieved from machinery
Waste rock	Uneconomic rock extracted from the ground during a mining operation to gain access to the ore
Waste rock storage	Structure to hold waste rock, formed by the placement of waste rock in stacked layers, engineered in such a way as to maximise stability and minimise erosion
Water balance	The sum of the inputs and outputs and changes in storage levels of water in a given locality
Water chemistry	The interaction of the chemical constituents (dissolved metals, suspended particles, etc.) of water
Water quality	Degree of the lack of contamination of water
Water table	The surface of the groundwater, below which soil and rock are saturated
Watercourse	Stream or river, running water
Weathering	The in situ physical disintegration and chemical decomposition of rock materials at or near Earth's surface
Weed	Any plant (in particular a herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use
Well	An opening in the ground that gives access to underground water
Wind erosion	Wearing away of exposed soil, earth, or rock surfaces by the abrasive action of wind-blown particles (e.g., grains of sand)
Worst-case scenario	A sequence of events likely to result in the worst-case effects on the environment
WRD	Waste rock dump – note this terminology is used in the lease conditions. Rex refers to the waste rock landforms as rock storage facilities (RSF), hence RSF is used throughout the PEPR when not citing lease conditions
YP	Yorke Peninsula
YPC	Yorke Peninsula Council (same as DCYP)
YPLOG	Yorke Peninsula Landowners Group

Section 1

Introduction

1. Introduction

1.1 Project Background

Rex Minerals Ltd (Rex or the Company) is a publicly listed minerals exploration and development company.

Rex's flagship asset is the Hillside copper mine (the Hillside Project or the Project), located 12km south of Ardrossan on the Yorke Peninsula in South Australia. Rex holds an approved Mining Lease Proposal for the Project and owns 100% of the Hillside Project as well as the land on which the deposit is located.

Copper-gold mineralisation was first discovered at the Hillside Project by Rex in 2008. Targeting of the Project was based on the presence of a small historical copper mine, a broad magnetic feature and subtle gravity anomalies in the area. The Project was the first test of a larger theory that iron-oxide-copper-gold style mineralisation could exist underneath the thin cover rocks on the Yorke Peninsula.

Following discovery, the Company has drilled over 239,000 metres of drill holes and invested over $160 million to bring the project to this stage. The Hillside Project is a substantial deposit and ranks as one of the most significant recent discoveries in Australia.

Published in May 2015, the Hillside Ore Reserve stands at more than 500,000 tonnes of contained copper and 430,000 ounces of gold, supported by a Mineral Resource of almost 2.0 million tonnes of contained copper and 1.4 million ounces of gold.

The Hillside Mineral Lease (ML6438), Miscellaneous Purposes Licence (MPL146) and Extractive Minerals Lease (EML6439) were granted on 16 of September 2014 following the submission of a Mining Lease Proposal (MLP) document in 2013. The MLP covered a larger project, referred to as the Stage 2 Project or Bankable Feasibility Study (BFS), with a larger disturbance footprint, a longer mine life and included iron ore production. Following completion of an Extended Feasibility Study (EFS) in May 2015 Rex announced a scaled approach to implementation of the Project which has significantly improved the Project's competitive fundamentals and materially reduced the initial capital investment. The smaller EFS Project, also referred to as Stage 1, is presented in this PEPR.

The key principles of the Stage 1 EFS Project, compared to the larger Stage 2 Project, are:

- a stand-alone copper-gold project removing iron ore production from the process flowsheet for Stage 1 of the Project's implementation;
- a smaller start-up footprint;
- significant reduction in operating fleet;
- simpler process flowsheet and material handling; and
- lower ramp-up rate plus a more manageable production rate that reduces economic risk.

At the point where the Stage 2 Project could be economic, additional approvals would be required and the Company would develop and submit an amendment PEPR.

Details on the differences between the MLP Stage 2 Project and the PEPR Stage 1 Project are presented in Section 3.1.

The Hillside Project also sits within two Rex exploration licences: EL5055 and EL5683.

Subject to the approval of this PEPR and subsequent financing, the Company plans to develop and operate the mine via conventional open cut mining methods, using trucks and excavators to deliver ore to a processing plant that will produce a copper concentrate.

The Hillside Project can be summarised with the following key characteristics:

- production of a copper-gold concentrate containing an average of approximately 35,000 tonnes (t) of copper and 24,000 ounces (oz) of gold per annum over an initial mine life of approximately 14 years;
- exportation of the copper-gold concentrate through the Port of Adelaide;
- the Company intends to draw its labour force from the surrounding country towns; and
- the Project will connect to South Australia's main power grid and water network.

1.2 The Importance of this Project

1.2.1 Local Benefits

The Hillside Project is expected to deliver significant social and economic benefits locally, regionally and more broadly to the State of South Australia.

Some of these benefits can be summarised to include:

- a workforce of approximately 500 direct employees and contractors, employed locally;
- a further additional expected employment multiplier of approximately 2.7;
- direct wages to employees and contractors to total over $500 million over the 13 years;
- direct contribution to gross state product (GSP) of over $2 billion. This includes investment in improvements to local infrastructure including water, power and roads; and
- payment of South Australian royalties of approximately $160 million.

1.2.2 Global Context – Why the World Needs Copper

Copper and its many alloys are characterised by their 100% recyclability, their superior technical properties such as high electrical and thermal conductivity, their ability to be easily processed, and their durability. These benefits reinforce the industry outlook that copper stands at the centre of many of the technologies that will drive global development.

Copper's role in climate change mitigation is fundamental by improving energy efficiency, lowering energy demand and enabling renewable technologies. Any vision of a lower carbon transportation system, whether it is hybrid and electric vehicles, connection to smart grids, or high-speed rail networks, requires copper.

Low carbon electricity sources, such as renewables, and the distributed electricity systems required to incorporate and manage them, require four to ten times the copper content of electricity produced via centralised, fossil fuel generation.

1.2.3 Australian Context

In 2017, copper was Australia's seventh largest minerals and energy export by value, with a value of approximately $4.8 billion in that year (DFAT 2018). A copper production profile linked with the South Australian Copper strategy could increase copper export value by 70%.

In 2016, Australia made a commitment to the Paris Agreement. This will require an increase in renewable energies and associated copper production to support it. Progress here is well advanced in South Australia.

1.2.4 South Australian Road Map

The South Australian Government recognised the unique geological endowment of the state and with a view on the future deficit in copper supply faced by an energy hungry world, in 2016 outlined its Copper Strategy. The strategy outlines the potential for South Australia to triple its copper production from approximately 300,000 to 1 million tonnes per year by 2030, and make Australia the world's third-largest copper producer. The Hillside Project fits perfectly into the objectives of this strategy, which will require significant future exploration and development of this scale to fulfil its objective.

The Hillside Project is a large, long-life mine with exciting exploration upside. Approval of this PEPR will be a major milestone in the implementation of the South Australian Government's Copper Strategy.

1.3 Purpose of the Program for Environment Protection and Rehabilitation

This Hillside Copper Mine Program for Environment Protection and Rehabilitation (PEPR) has been prepared to comply with the *Mining Act 1971* (SA) and Regulations, and the guidelines set out in the Department for Energy and Mining (DEM) (DEM 2018).

The PEPR incorporates control strategies in the form of engineering design and management controls to enable the commencement of mining operations at the Hillside Project and outlines how Rex will achieve the construction, operational and mine completion (on closure and post-closure) environmental outcomes derived from the assessment of the mining lease conditions as specified in the schedules of the lease/licence. Rex has demonstrated in the PEPR that they are able, and will continue to be able, to achieve those environmental outcomes throughout the whole-of-mine life.

The PEPR preparation process was managed by Rex with input from industry leading expert consultants. On its completion and progressively through the development of this documentation, suitably qualified and experienced Company employees peer-reviewed each section to ensure the accuracy of all information provided.

1.4 Stakeholder Consultation

A key requirement and expectation is that the PEPR will be informed through consultation with stakeholders. The Company's management team has been, and is continuing to be, actively engaged with our stakeholders, including local community, policy makers and the regulator, to ensure a comprehensive consultation.

To put this in perspective, in the development of approvals documentation, including this PEPR, Rex has documented over 590 separate stakeholder engagements. In reviewing the management plans (the key information from which is now presented in Section 5 of this PEPR) and seeking community input on minimising the social and environmental impact of the project, Rex met with local Yorke Peninsula community individuals and groups over 325 times to date. On many occasions, the regulators and various government departments took part in these community consultations.

In addition, the Company met with the regulators on a regular and often weekly basis. In these meetings, the purpose, structure and content of this PEPR process was vetted and their input contributed to greatly improve and align the PEPR quality with the State's requirements.

During consultation, Rex received and documented over 650 questions and suggestions related to the Hillside Project. This included over 400 government and 200 community questions and suggestions, all of which have been responded to, and where appropriate, incorporated into the PEPR.

1.5 Independent Audits

In line with the lease conditions, nine independent experts were engaged to review the effectiveness of the proposed strategies to achieve the environmental outcomes identified in this PEPR. They have independently confirmed that the Company's management strategies would be effective and achievable in complying with the Lease conditions.

1.6 Conclusion

This PEPR and its attention to detail reflects the level of Rex's commitment to work with all stakeholders to develop a first-class project and minimise its environmental and social impacts while maximising long term, sustainable benefits.

1.7 References

Department for Energy and Mining (DEM), 2018. Preparation of a Program for Environment Protection and Rehabilitation (PEPR) for Metallic and Industrial Minerals (Excluding Coal and Uranium) in South Australia, Minerals Regulatory Guidelines MG2b, Mineral Resources Division, August 2018. Department for Energy and Mining, South Australia, Adelaide.

Department of Foreign Affairs and Trade (DFAT), 2018. Composition of Trade Australia 2017, Australian Government, Australia.

Section 2

Description of the Environment

2. Description of the Environment

This chapter identifies and summarises updates to the information about the environment of the Project area since previously described in Chapter 5 of the 2013 Mining Lease Proposal (MLP). Further detail on the existing environment is presented in Chapter 5 of the MLP.

The location of the Hillside Mineral Lease (ML6438), Miscellaneous Purposes Licence (MPL146) and Extractive Minerals Lease (EML6439) and surrounding Exploration Licences (EL) in a regional context in shown in Figure 2-1.

The monitoring locations and new baseline environmental data relevant to the control strategies or criteria have been set out in Section 5 of this PEPR.

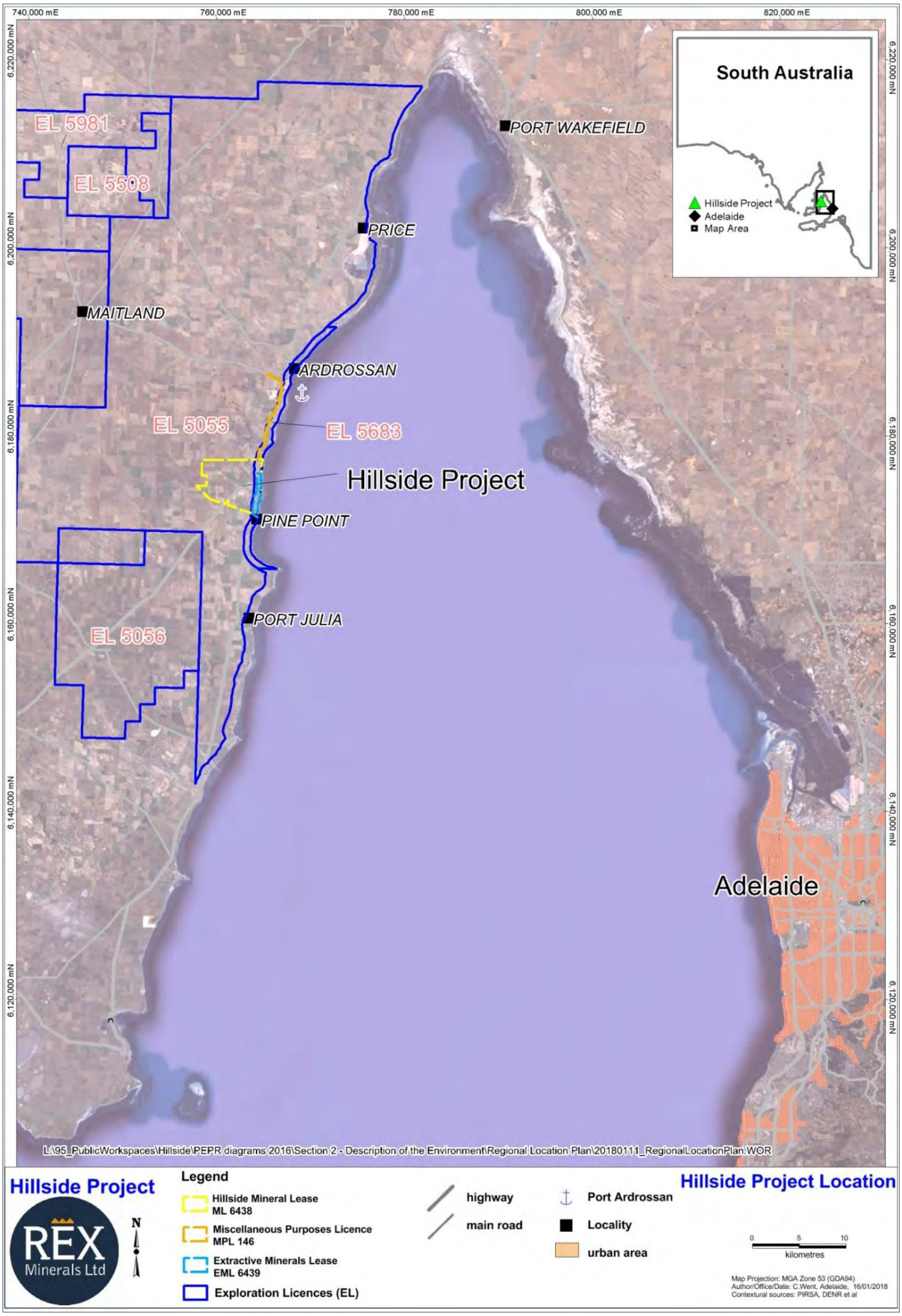


Figure 2-1: Hillside Project location

2.1 Climate

The ML area and surrounds have a typical Mediterranean climate, characterised by low rainfall in the immediate area of Pine Point and Ardrossan (annual average of around 345mm), and moderate to high daytime temperatures. Evaporation exceeds rainfall for five months of the year, with an annual evaporation rate of approximately 1,350mm. The prevailing winds in the summer months are generally from the south, while winds in the winter months are largely from the west and sometimes north-west.

Rex continues to operate the weather station to provide continuous data at site existing weather station (see Figure 2-2). Evaluation of the larger 2014 meteorological data set shows improvements in resolution compared to the 2010 data set, reported in the MLP. Most significantly, the larger wind data set shows a 45 degree rotation in the lighter wind speed and higher frequency wind directions (previously a north-south orientation, now a northeast-southwest orientation).

Stability class and mixing height data showed very similar patterns between the 2010 data, reported in the MLP, and 2014 data used in computer modelling for the mining operations described in this PEPR. This provides confidence in the meteorological modelling since the CALMET (Computer Aided Learning in Meteorology) input data was produced with different models.

An annual wind rose and seasonal wind roses are presented below in Figure 2-3 and Figure 2-4.

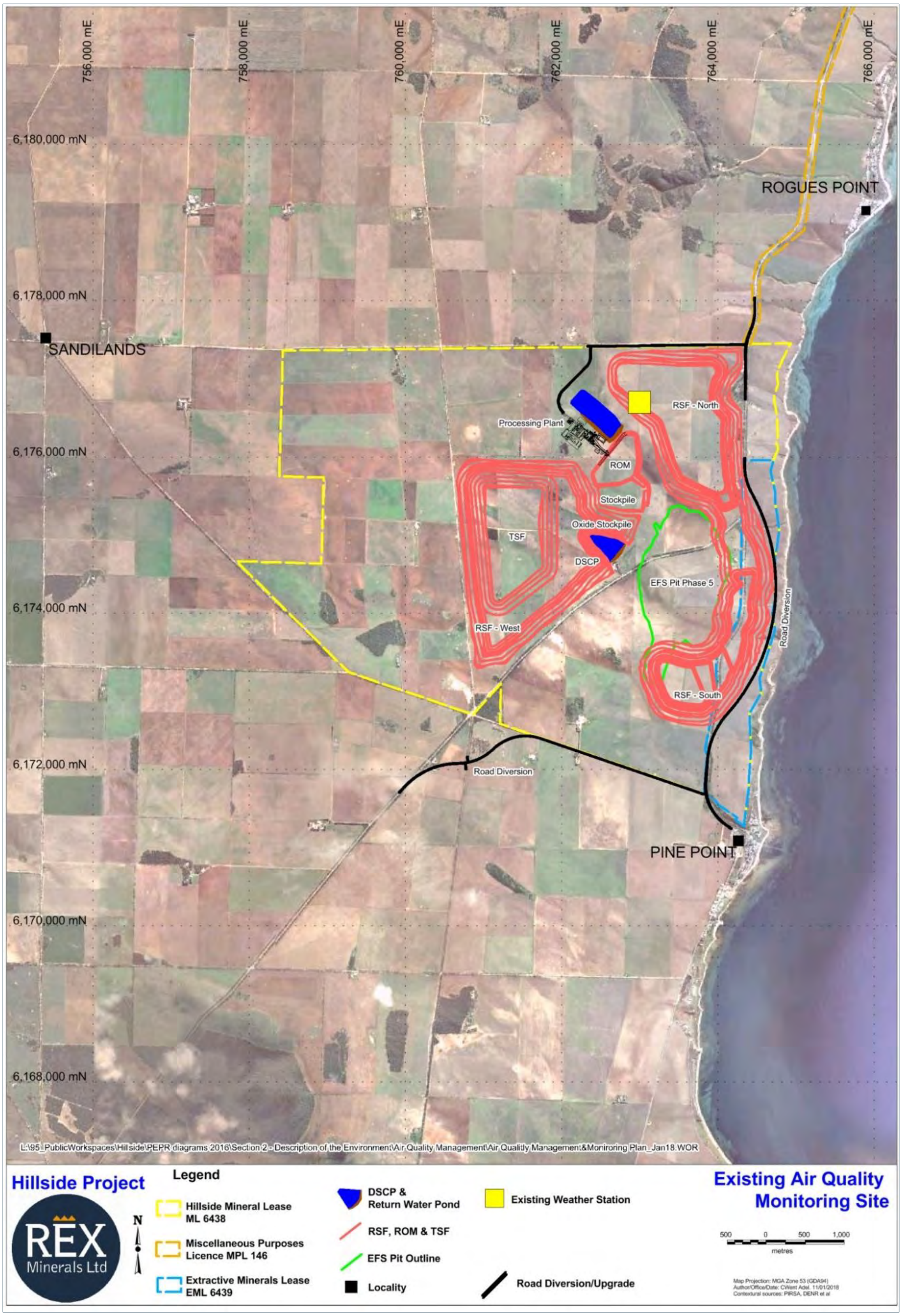
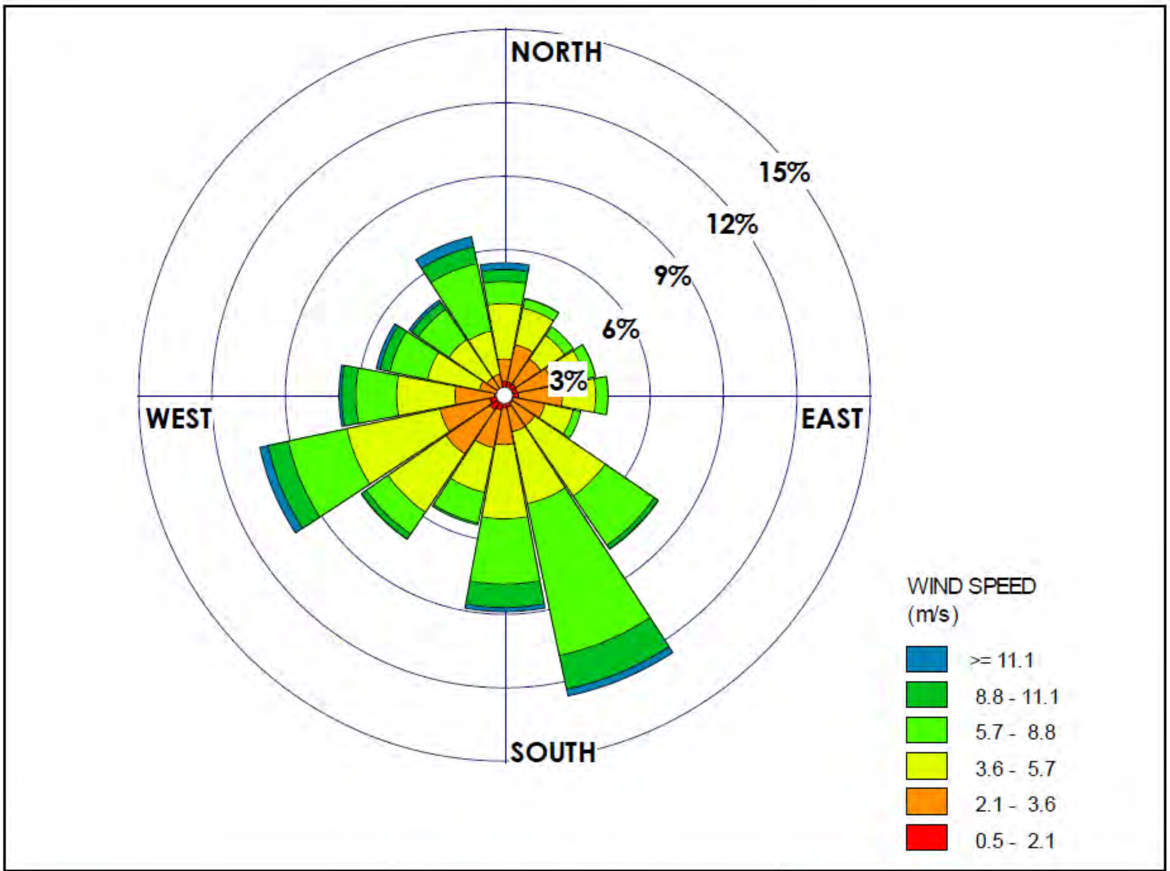


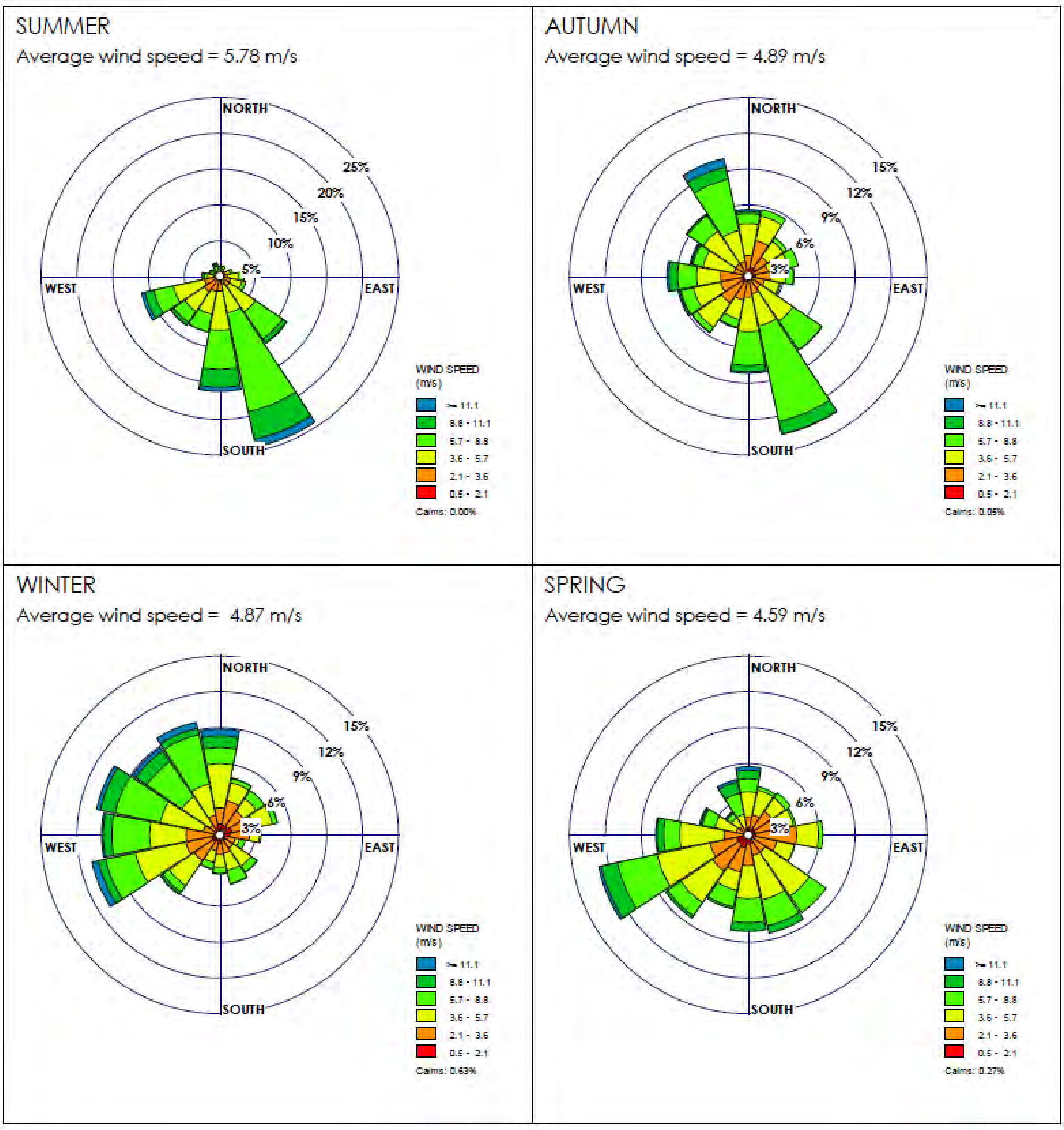
Figure 2-2: Existing weather station location



Location: Rex Minerals mine site	**Data Period:** 2014 (100% data availability)	**Data Type:** CALMET extract (From obs data)
Calm winds: 0.24%	**Average wind speed:** 5.03 m/s	**Plot:** J Meline

Source – Figure 4.1 of Appendix 2.1-A EFS Dust Impact Assessment September 2015

Figure 2-3: 2014 annual wind rose (based on Hillside Project meteorological data for 2014)



Source Figure 4.2 of Appendix 2.1-A EFS Dust Impact Assessment September 2015

Figure 2-4: 2014 seasonal wind roses (based on Hillside Project meteorological data for 2014)

The seasonal prevailing wind directions as presented in Figure 2-4 show winds with almost exclusive southerly components for the summer months and northerly to west south-westerly winds in the winter months.

Full details on the meteorological modelling methodology and evaluation are provided as part of the dust impact assessment in Appendix 2.1-A.

2.2 Topography

Pre-mining natural surface is shown below in Figure 2-5.

2.3 Interpreted Geology

Representative plans and sections of the interpreted geology are presented in Figure 2-6 to Figure 2-12.

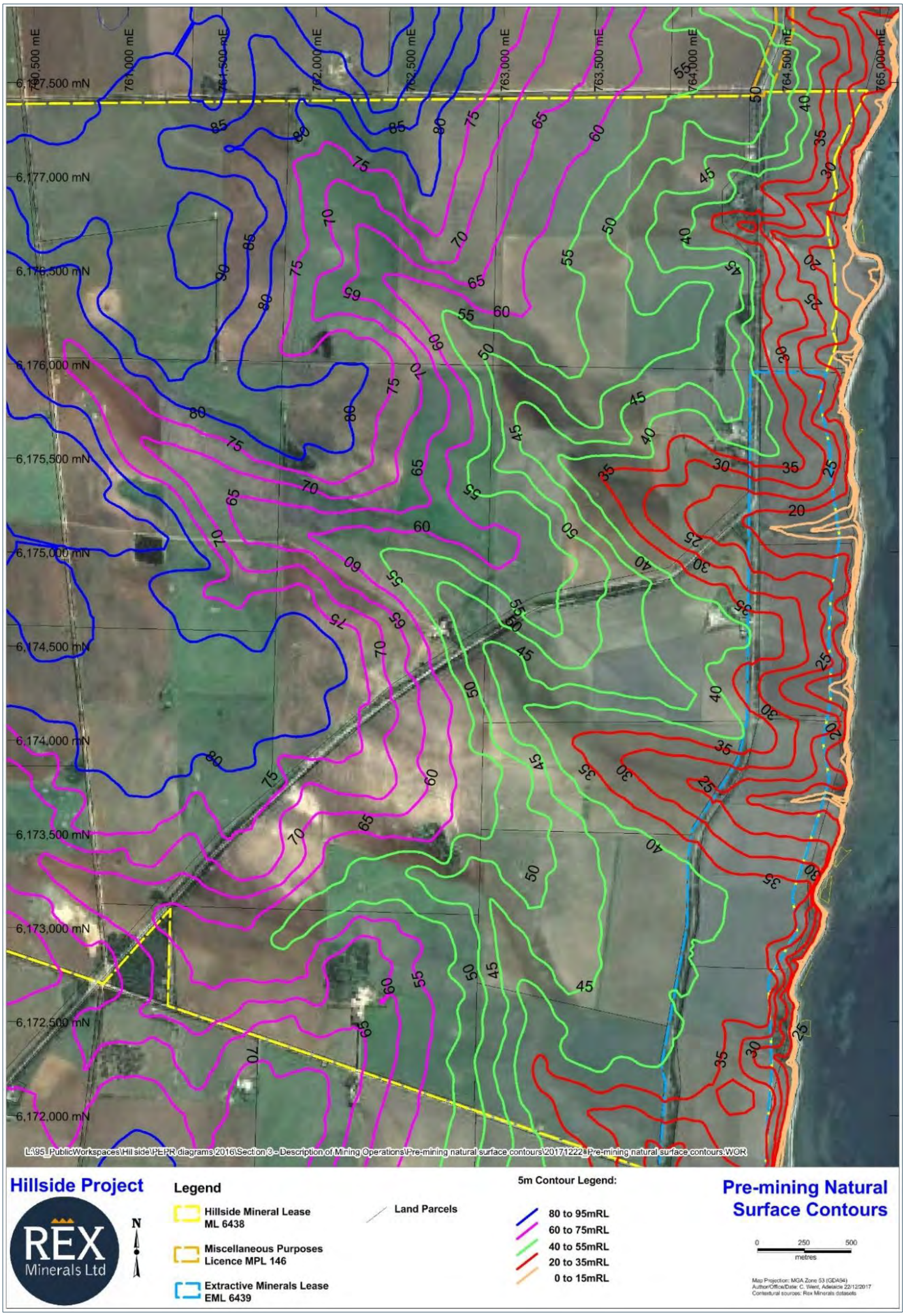


Figure 2-5: Pre-mining natural surface

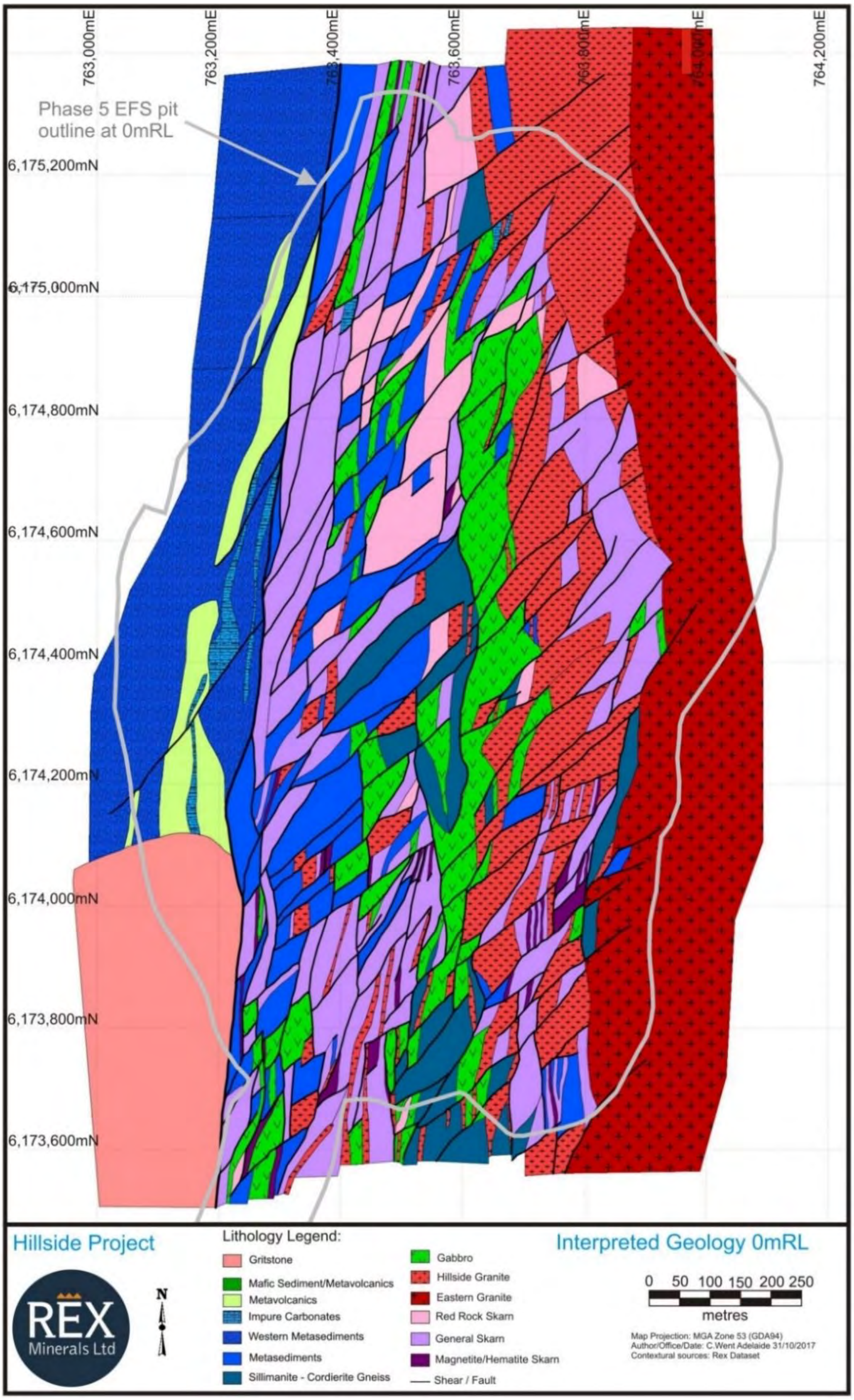


Figure 2-6: Interpreted geology plan at 0 metres reduced level (mRL)

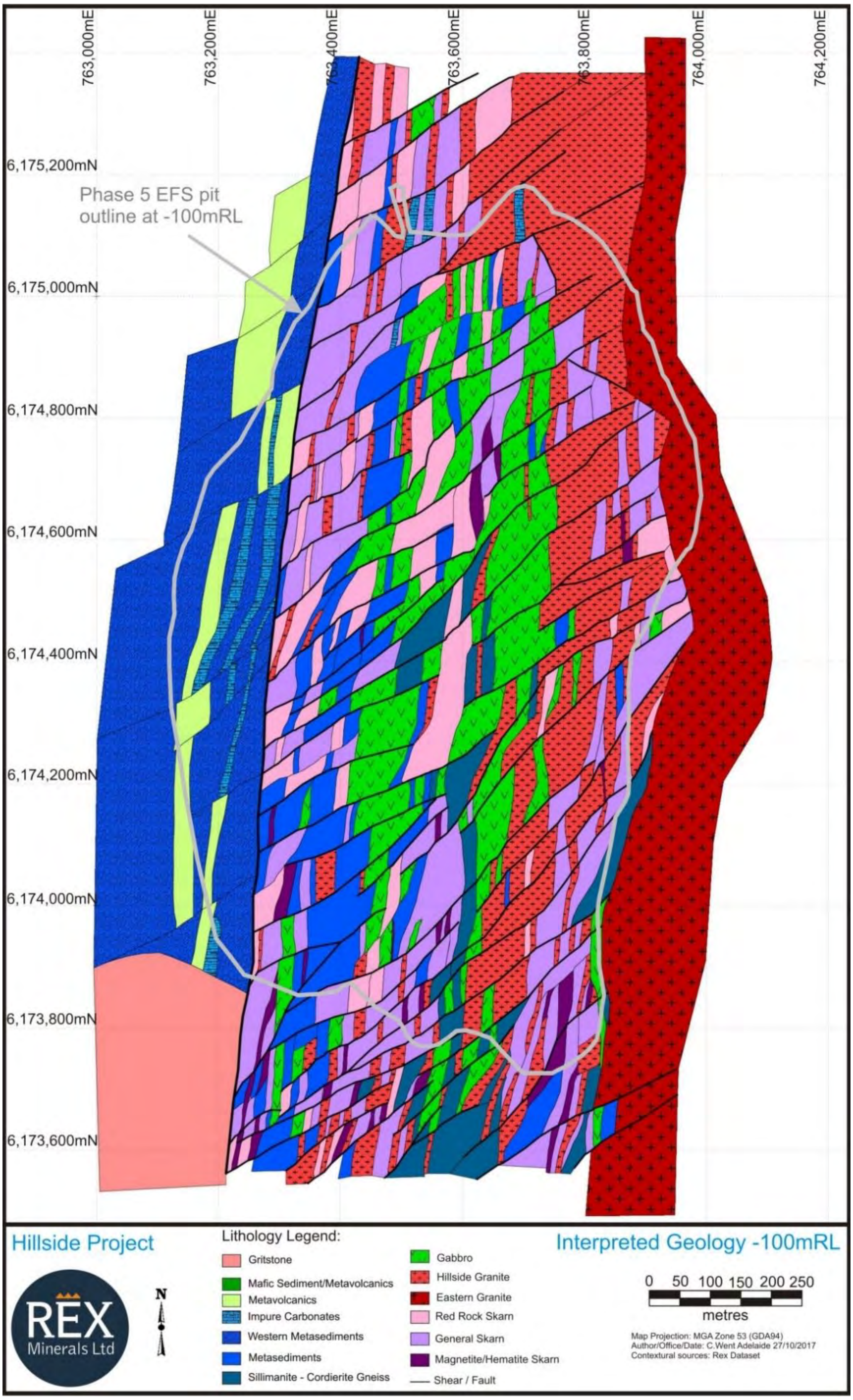


Figure 2-7: Interpreted geology plan at -100mRL

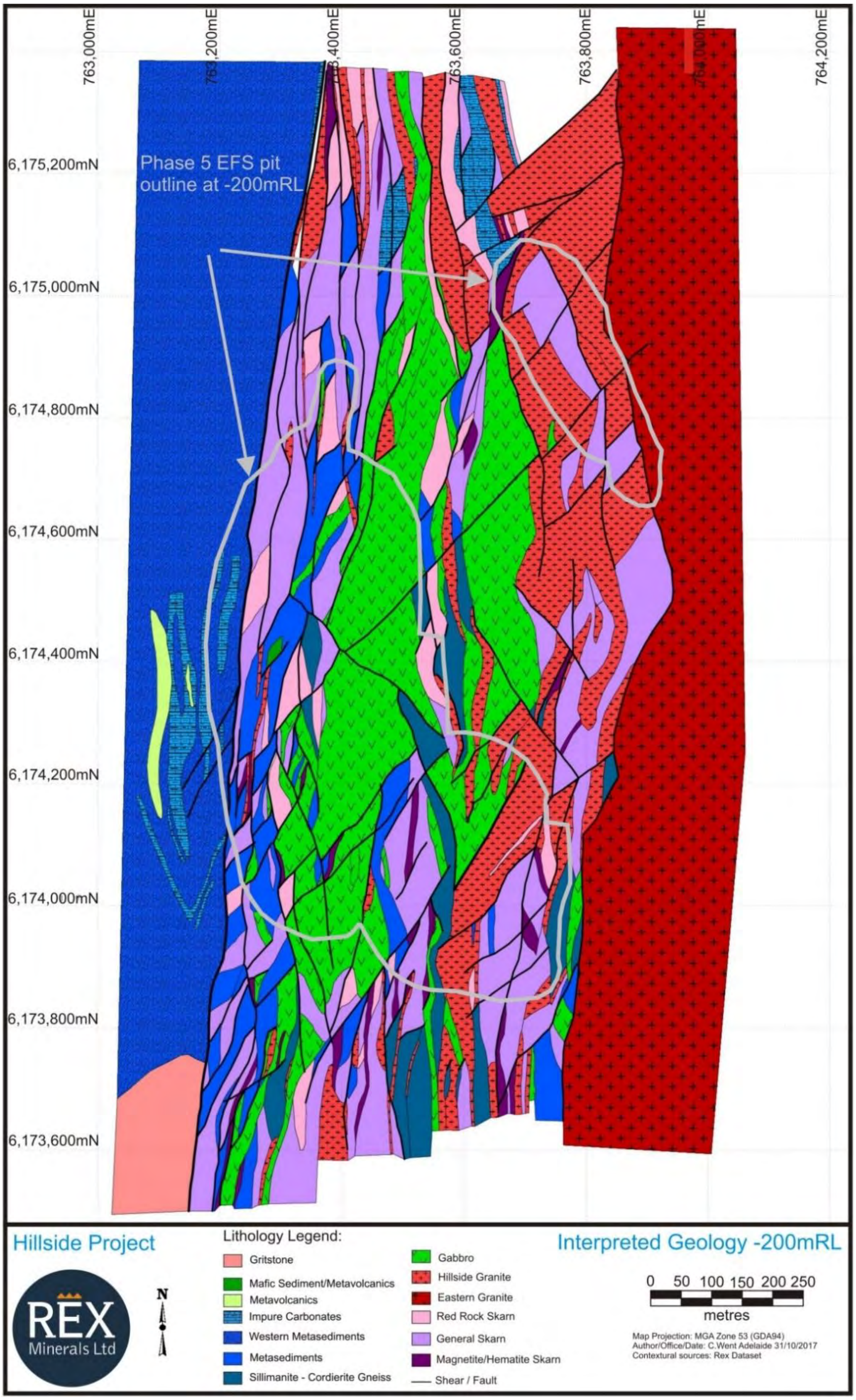


Figure 2-8: Interpreted geology plan at -200mRL

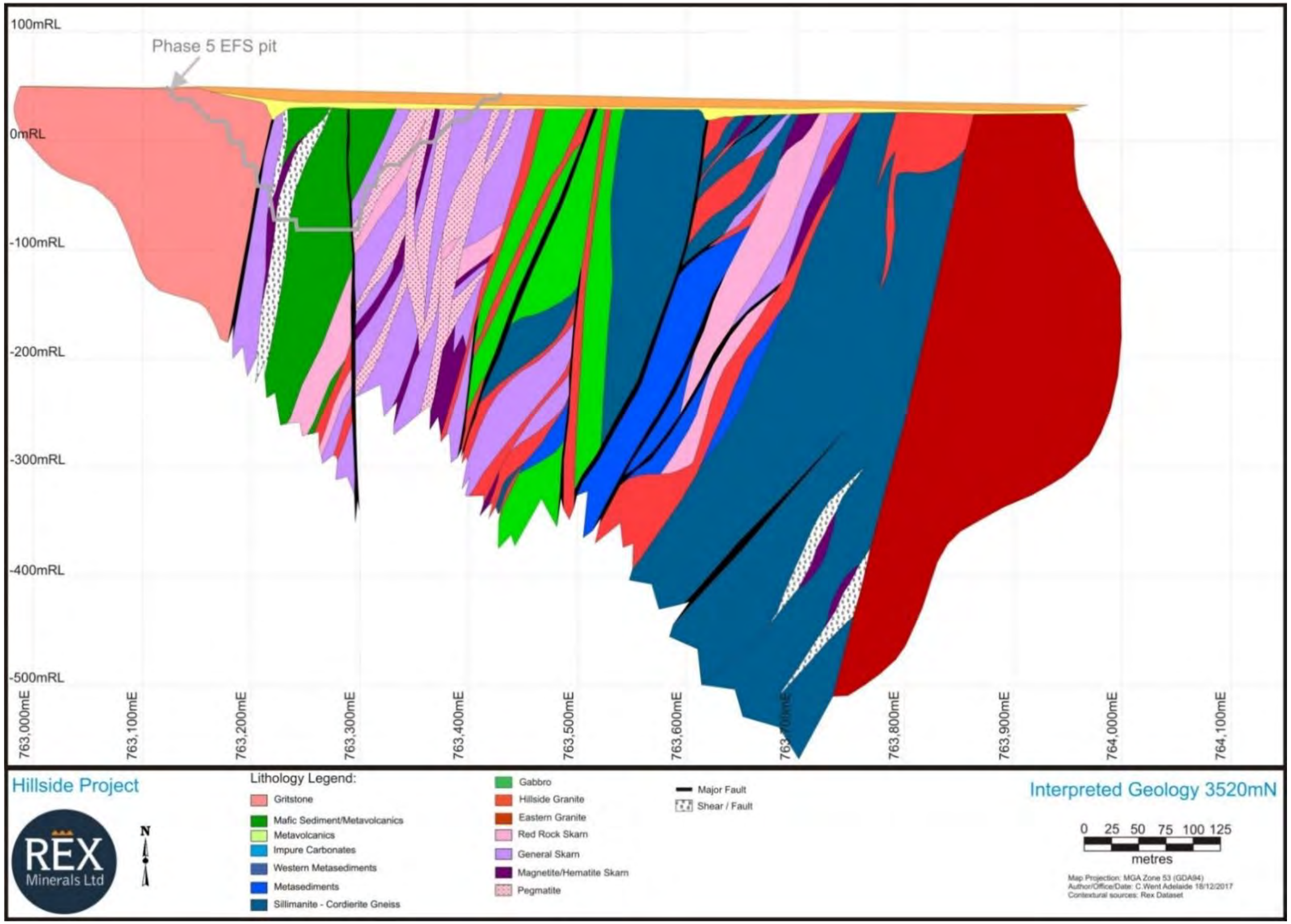


Figure 2-9: Interpreted geology cross-section at 6,173,520mN

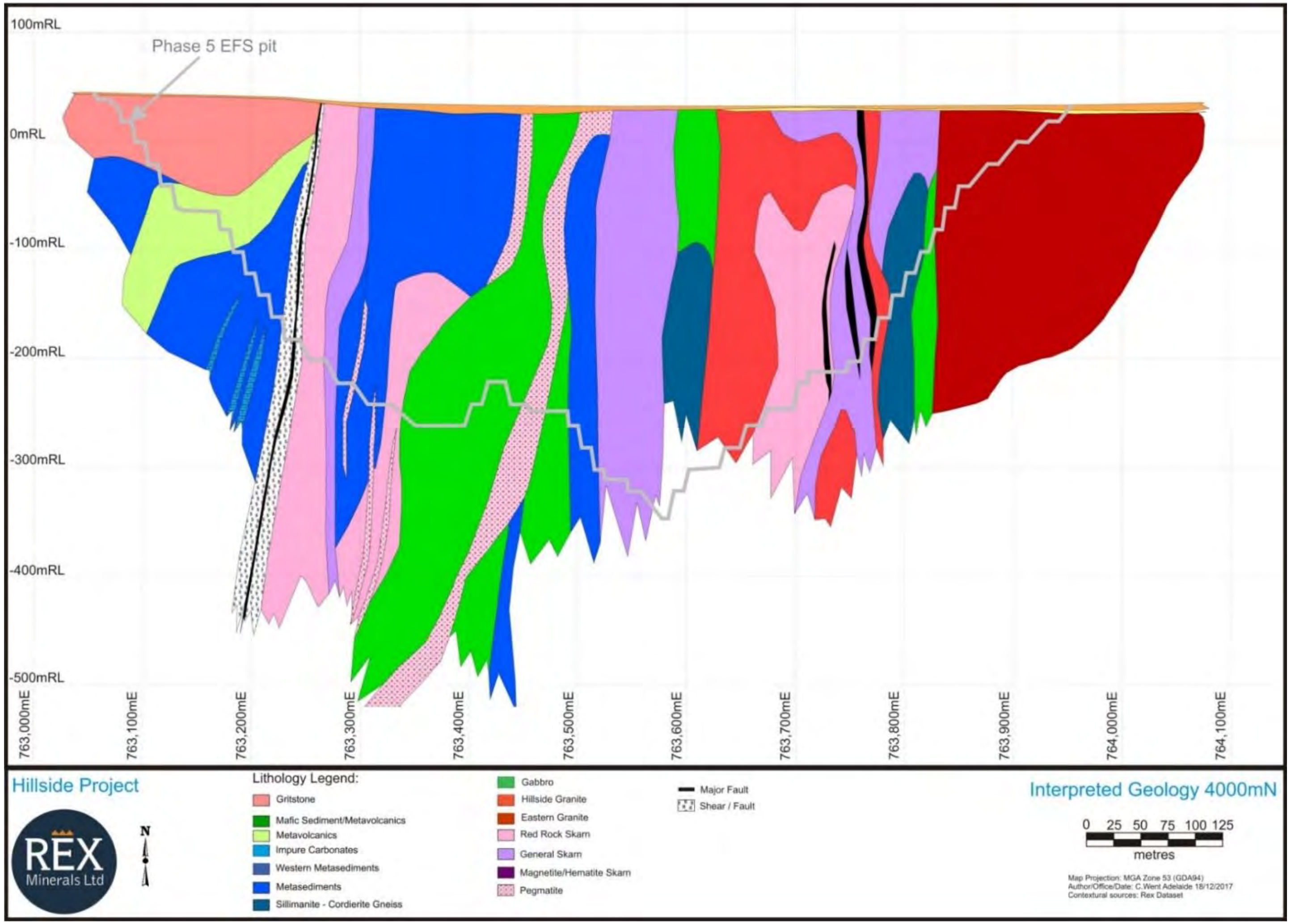


Figure 2-10: Interpreted geology cross-section at 6,174,000mN

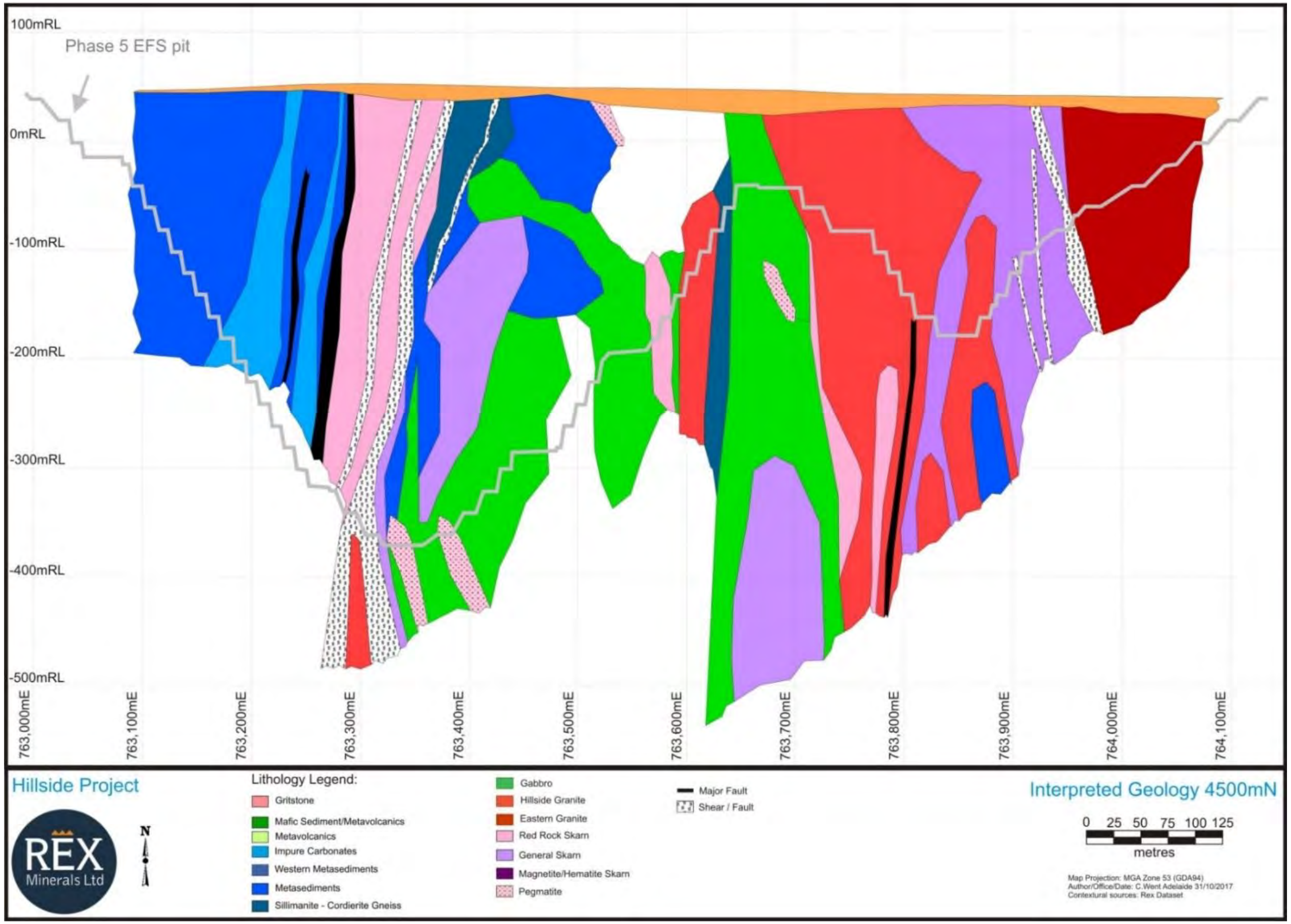


Figure 2-11: Interpreted geology cross-section at 6,174,500mN

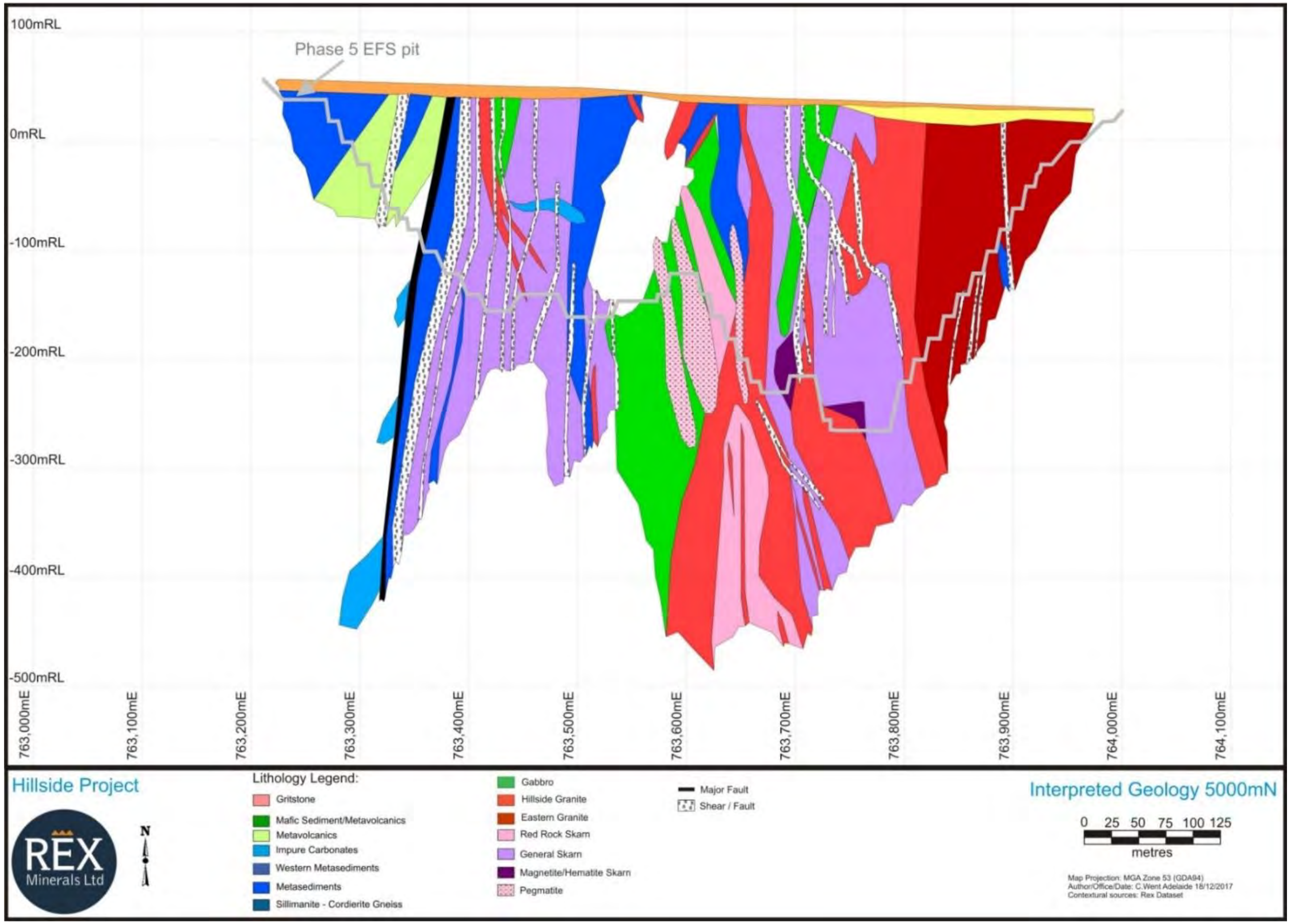


Figure 2-12: Interpreted geology cross-section at 6,175,000mN

2.4 Topsoil and Subsoil

A soil sampling program was undertaken in November 2017 to supplement the soil baseline data with agronomic soil properties. The study areas included the operational footprint and areas immediately adjacent within the ML (see Figure 2-13). A full agricultural soil analysis report is provided in Appendix 2.2-A. The analysis was conducted by APAL Agricultural Laboratory and includes a ‘desired level’ for each parameter for agricultural soils. This ‘desired level’ has been referenced in the results discussed below.

Table 2-1 presents the key data regarding agricultural soil properties found in topsoil samples collected from the operational mine footprint. The key soil textures are sandy-loam, loam and loamy-sands. The high cation exchange capacity (CEC) reflects the higher clay and organic matter content in the loams. The APAL agricultural soils ‘desired level’ for CEC is a range of between 5 and 25, similar to the range found in topsoils from the Hillside property.

Soil pH in the study area tends to be alkaline with a median of around pH 8; the ‘desired level’ soil pH range for cereal crops is between pH 6.0 and pH 7.0. Median soil salinity of all samples collected was EC1:5 0.16dS/m (‘desired level’ is <0.15dS/m), with site s5 showing the highest salinity of 0.22dS/m. The exchangeable sodium percentage and boron content are within the desired range for agricultural soils.

Table 2-1: Agricultural soil properties of soil (0–10cm) within the operational footprint

Site ID	Texture field test	CEC c.mol/kg	Organic carbon %	$pH_{1:5}$	$EC_{1:5}$ dS/m	ESP %	B parts per million (ppm)
s1	loamy sand	4.75	1.1	6.17	0.06	2.2	0.45
s2	sandy loam	13.4	1.3	7.84	0.17	0.9	0.75
s3	sandy loam	5.96	1.6	6.03	0.06	2.4	0.48
s4	sandy loam	22.1	1.8	8.05	0.16	0.6	1.7
s5	loam	32	2.3	8.38	0.22	1.4	4.2
s6	sandy loam	26.7	2.4	8.26	0.17	0.8	1.2
s7	loam	27.7	1.9	7.77	0.19	0.5	1.9
s8	loam	25.6	1.4	8.22	0.15	0.5	1.3
s9	loamy sand	24.3	1.4	8.31	0.16	0.5	2.1
Median		24.3	1.6	8.05	0.16	0.8	1.3
‘Desired level’*		5–25	>0.9	6-7	<0.15	<5	0.5–5.0

* APAL agricultural laboratory – Appendix 2.2-A.

A full suite of agricultural soil nutrients was also measured, with results presented in Appendix 2.2-A. Generally, all topsoil sampled has poor to acceptable soil fertility for agricultural production, with deficiencies, i.e., below ‘desired level’, in nitrates, sulphur and copper reported at most sites. Iron and manganese deficiencies were reported at some sites.

Soil samples were also collected from deeper layers 10–40cm and 40–60cm and tested. No soil samples were collected from site s4 past 10cm as a layer of calcrete was intercepted, and no soil samples were collected past 40cm in sites s1 and s9 for the same reason.

Soil clay content, as reflected in the CEC, increased with depth. The median CEC was 27.55 and 32.01 centimole per kilogram (c.mol/kg) for soils collected from 10–40cm and 40–60cm respectively.

The soils became more alkaline and saline with depth, site s5 and s7 were strongly alkaline in the 10–40cm layer (median pH 8.7) and all sites became strongly alkaline in the 40-60cm layer (median pH 9.4). Site s5 became strongly saline in the 40–60cm layer ($EC_{1:5}$ dS/m).

Sodic soils (ESP >5 c.mol/kg) were found in the 10–40cm layer at sites s3 and s7, and highly sodic soil (ESP >15c.mol/kg) was reported in site s5.

In the 40–60cm layer sites s2, s5 and s7 were all highly sodic and sites s2 and s6 were sodic. Only site s8 in the deeper layer, was not classified as sodic. Sodic soils tend to be disperive and prone to erosion.

Soil boron content was measured, as it is known to occur locally in potentially phytotoxic levels. None of the topsoil samples reported toxic levels of boron, but soil deeper than 10cm at site s5 and deeper than 40cm at site s7 reported high and potentailly phytotoxic levels of boron.

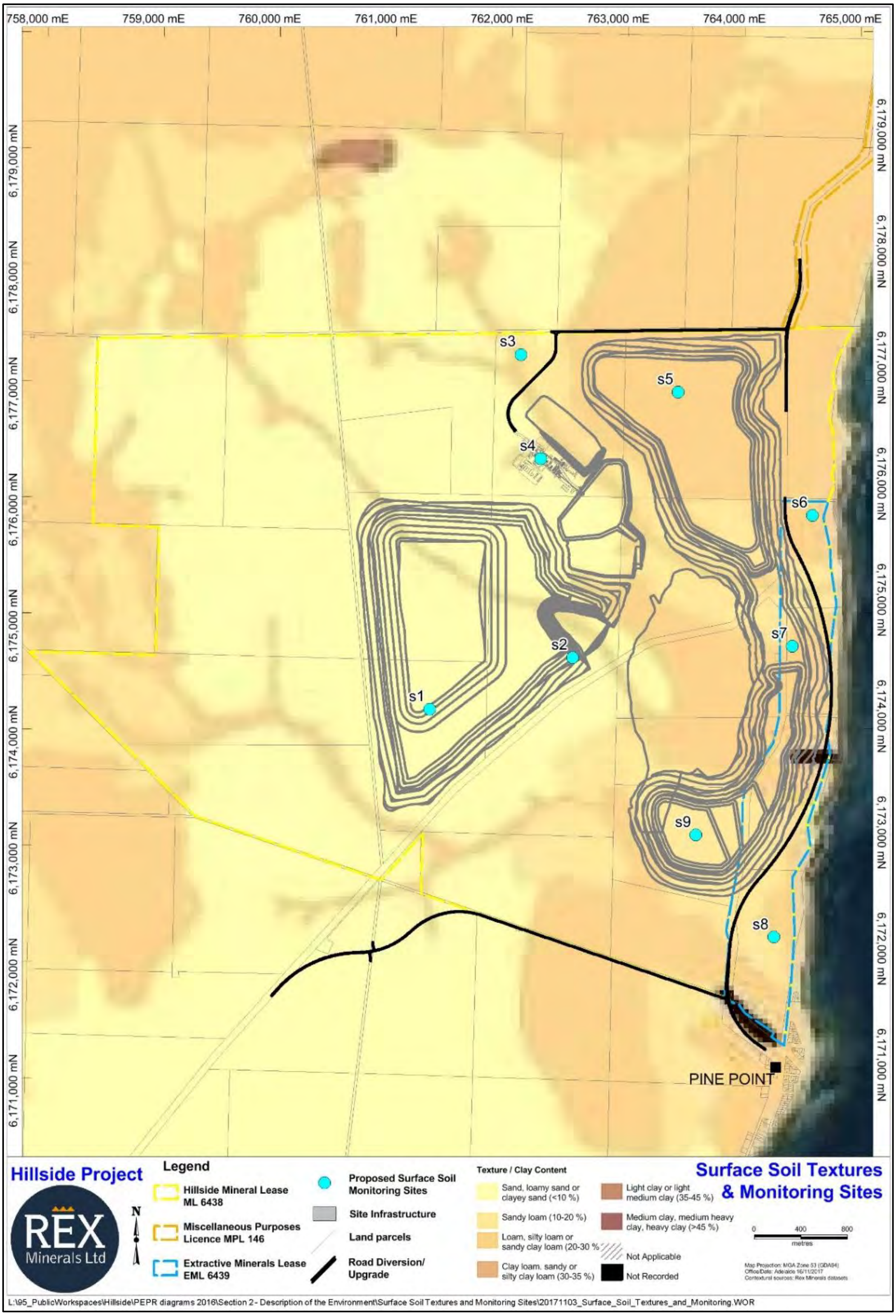


Figure 2-13: Baseline agricultural soil sampling sites

2.5 Hydrology (Surface Water)

The Project sits within the Central and Southern Yorke Peninsula catchment. There are no permanent watercourses on Yorke Peninsula although ephemeral watercourses do occur, as do numerous drainage pathways in small discrete catchments. Salt lakes and claypans also occur, particularly in the south.

The topography surrounding the Project is characterised by gently undulating hills, with elevations rising to just over 200m, separated by several broad gently sloping gullies. These ephemeral drainage channels cross the site in a south-easterly trending direction, with slopes less than 1.5% that gently increase to 3% towards the eastern end of the property, ultimately draining to Gulf St Vincent. Typically, the catchments within the project area vary in elevation from 60m to 20m from west to east. The defined catchment areas vary from between 48km² to 0.5km².

Soils in the project area are generally loams and sandy loams, with a typical clay content of less than 30%. The low rainfall (less than 350mm per annum) experienced in the region and permeable soils result in little overland flow. Run-off is only generated after very intense rainfall events which occur infrequently.

During these periods of high intensity rainfall, sheet flow can occur across the Project site. Any channel flow across the Yorke Highway and the St Vincent Highway is managed by Yorke Peninsula Council/ Transport SA via culverts. Runoff passing through the site during such rainfall events can reach Gulf St Vincent. Pre-development drainage pathways and catchments surrounding the Project are shown in Figure 2-14.

The estimated extents of the 100-year average recurrence interval (ARI) flood for the undeveloped site are shown in Figure 2-15.

2.6 Hydrogeology (Groundwater)

2.6.1 Site Investigations

Since the previous description of the hydrogeology in the MLP, an additional three groundwater investigation wells have been installed (see Figure 2-16), bringing the total to 41 investigation wells on the Hillside Project site. The information provided from the additional wells is detailed in Appendix 2.3-A.

2.6.2 Static Water Level

Rex continues to monitor monthly depth to water levels in all of the 23 vertical groundwater investigation wells. Eight investigation wells were chosen to represent the groundwater levels due to their dispersion over the Hillside Project site. Figure 2-18 displays the locations of the eight investigation wells. Figure 2-17 below displays the static groundwater levels of the eight investigation wells from August 2012 to January 2019 (note that there was an equipment malfunction in July 2018 hence the gap in results). Figure 2-17 identifies that there has been no material change to the depth to water during the six years of monitoring.

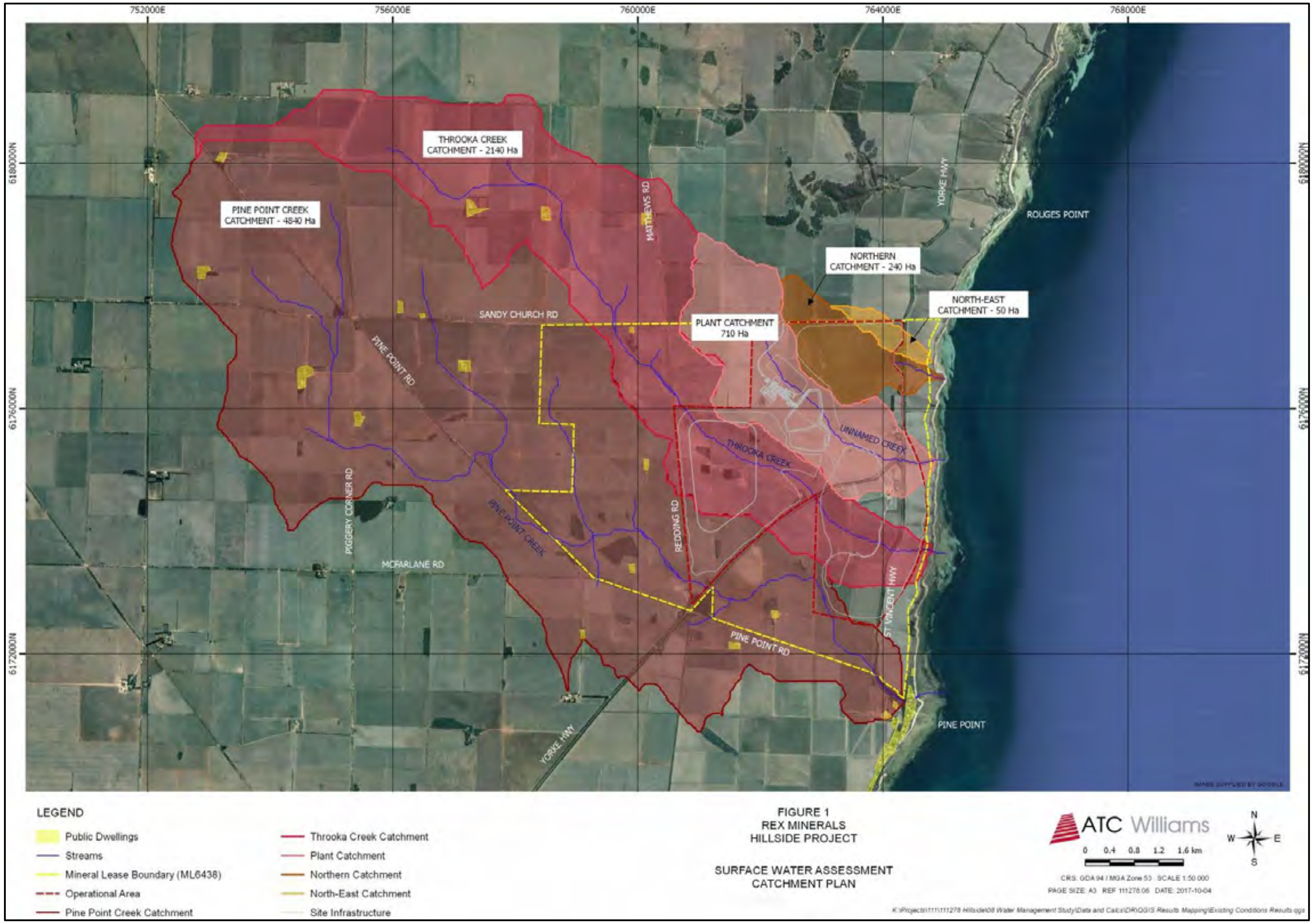


Figure 2-14: Pre-development drainage pathways and catchments

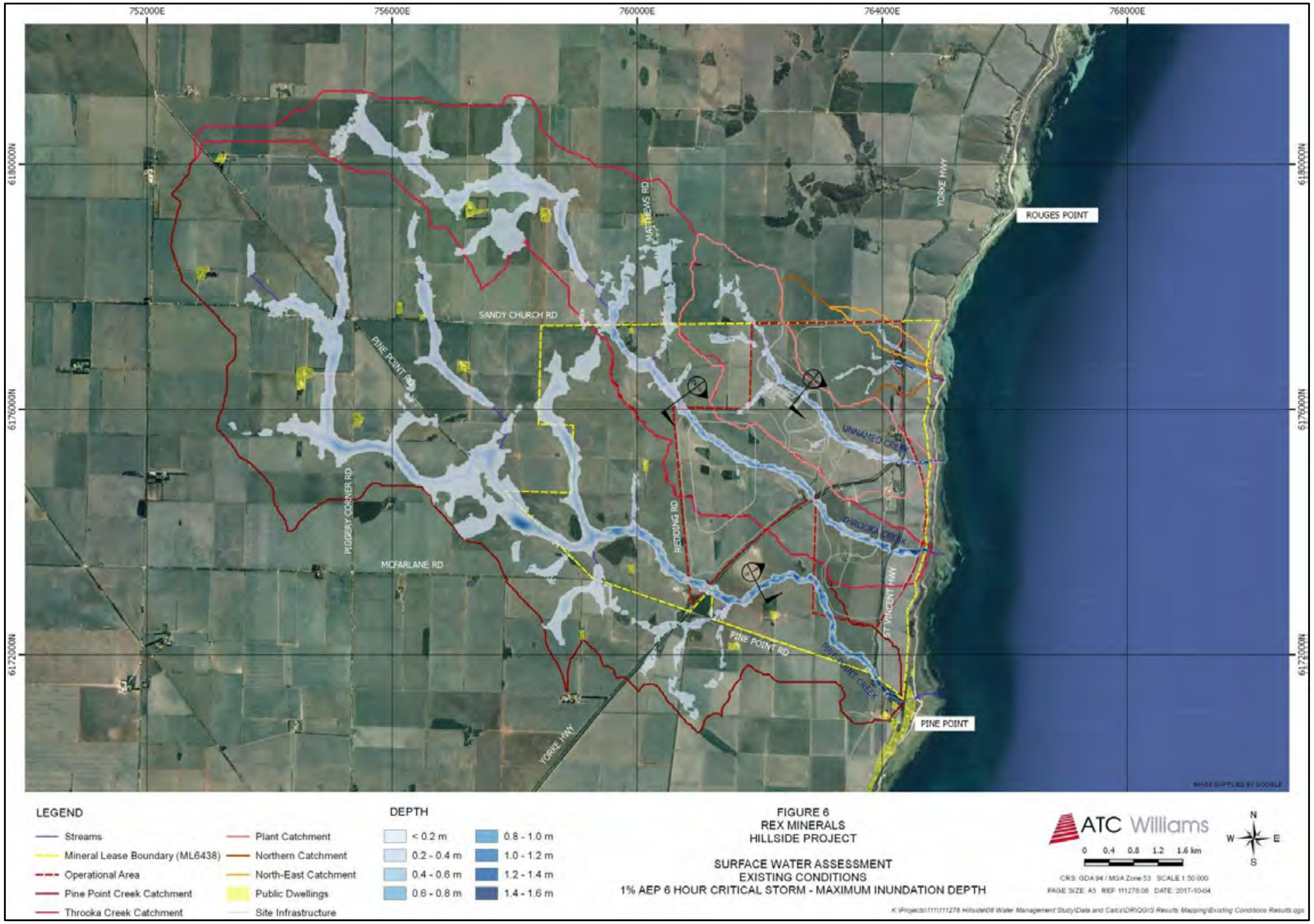


Figure 2-15: Estimated extents of the 100-year ARI flood pre-development

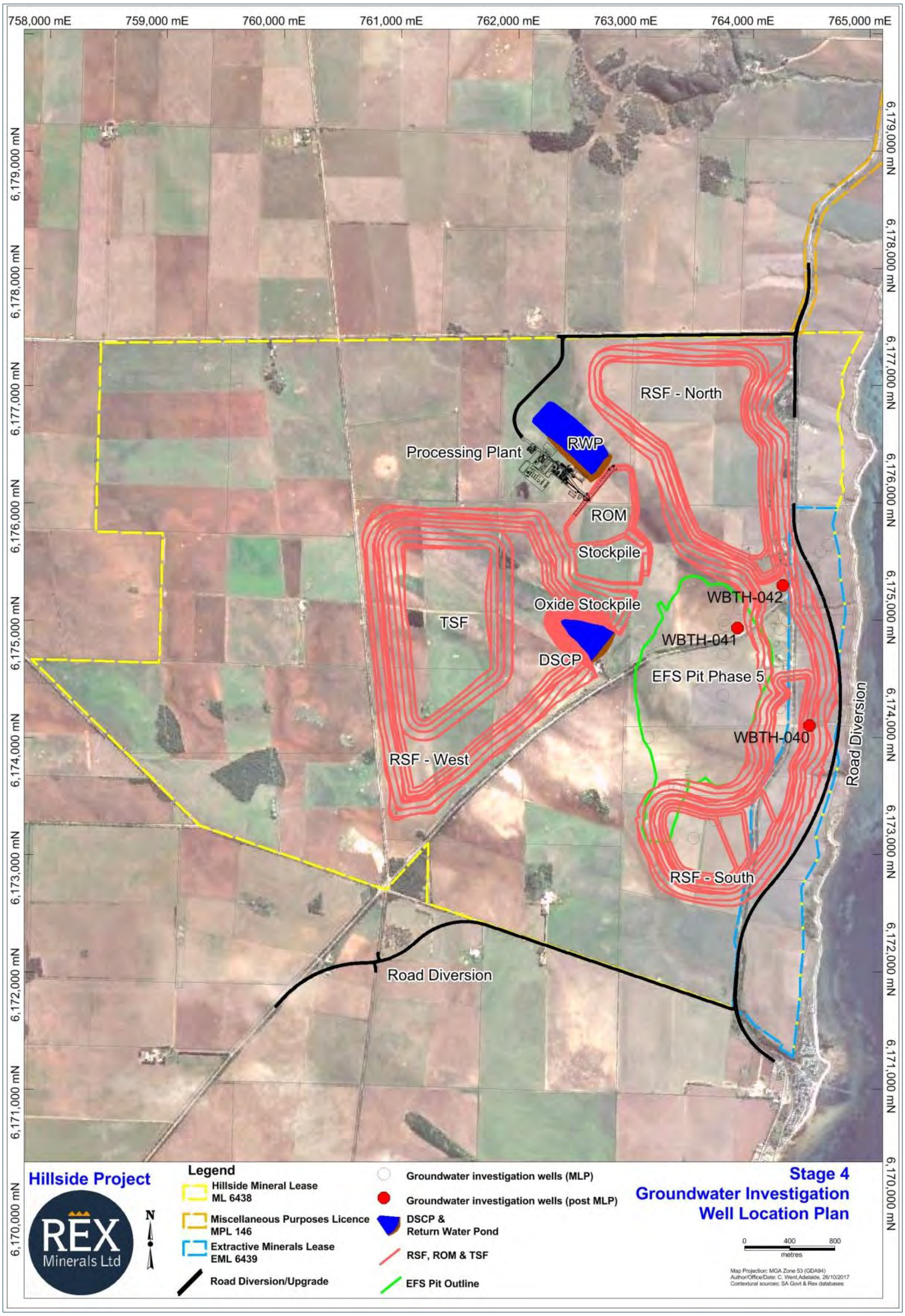


Figure 2-16: Stage 4 groundwater well locations

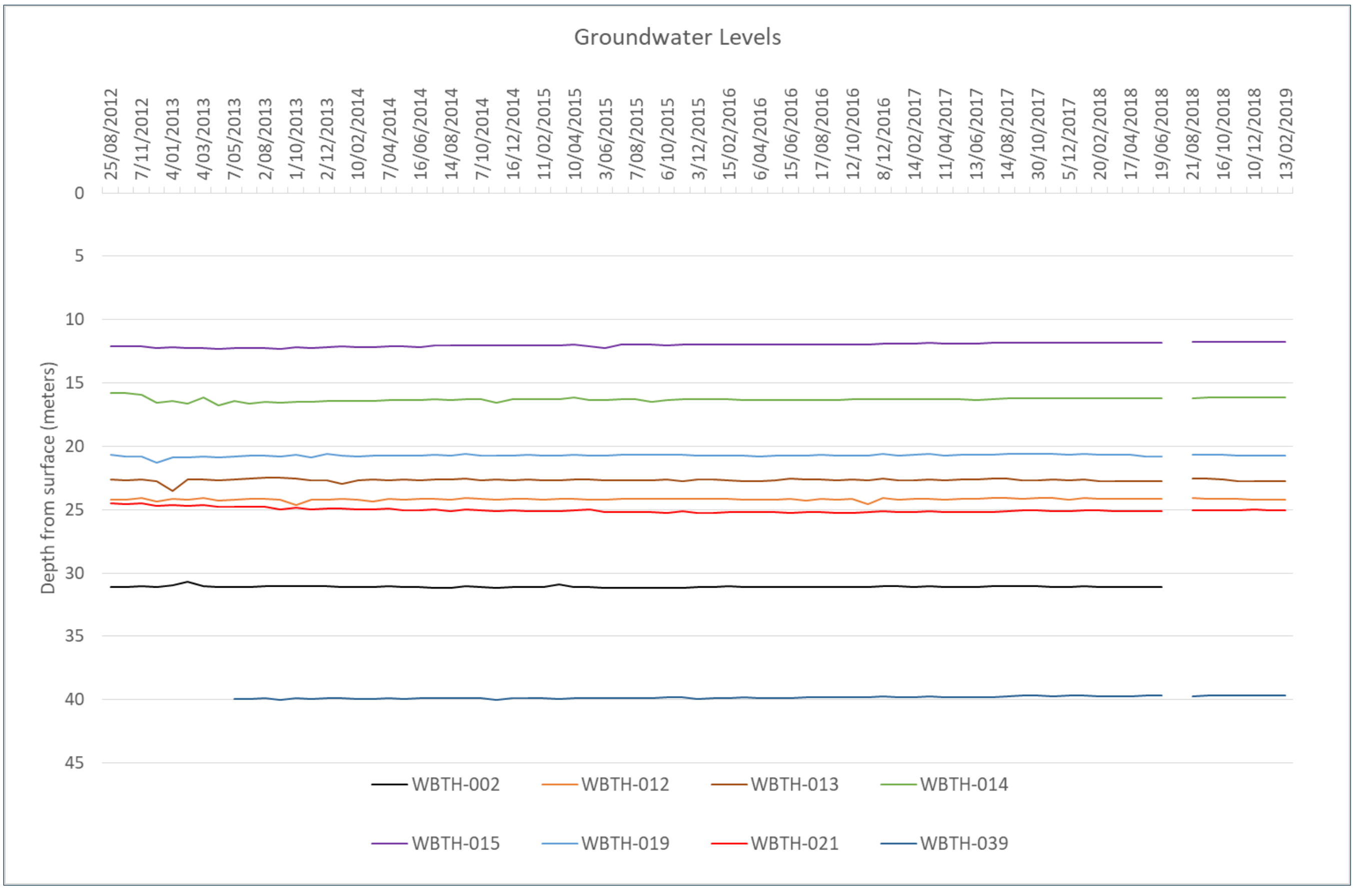


Figure 2-17: Depth to water levels in all of the eight vertical groundwater investigation wells (August 2012–January 2019)

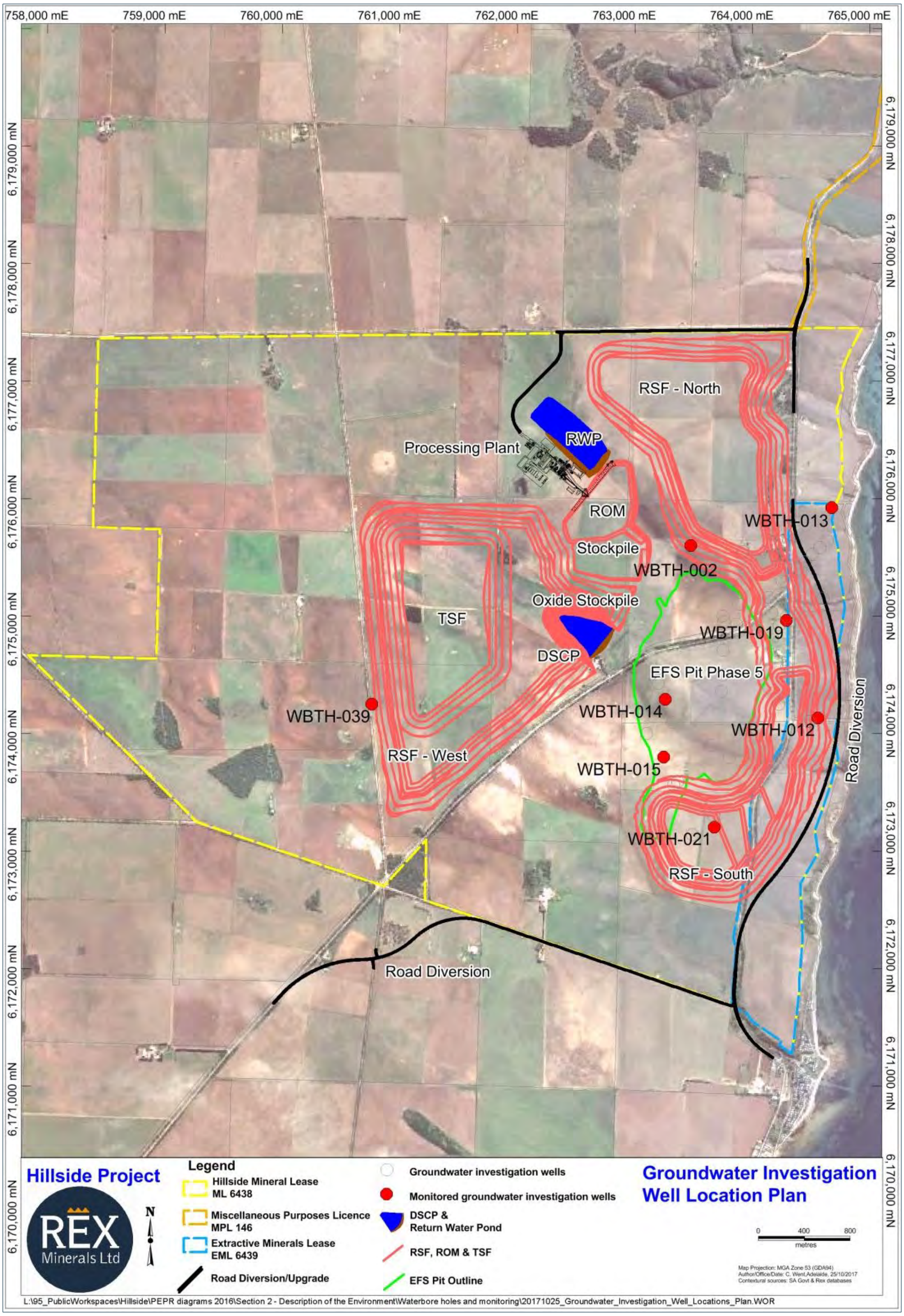


Figure 2-18: Eight representative groundwater investigation well locations

2.7 Vegetation, Weeds and Plant Pathogens

2.7.1 Nationally Threatened Species

As part of Rex's ongoing collection of environmental baseline information, flora surveys identified approximately 30 additional occurrences of *Acacia rhetinocarpa*. These *Acacia rhetinocarpa* are located within the roadside vegetation on Redding Road, north of the six-way intersection (see Figure 2-19). Rex highlighted the discovery of the additional occurrences of *Acacia rhetinocarpa* in May 2014. Additional information relating to the presence of these species and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) is presented in Section 3.9.2.

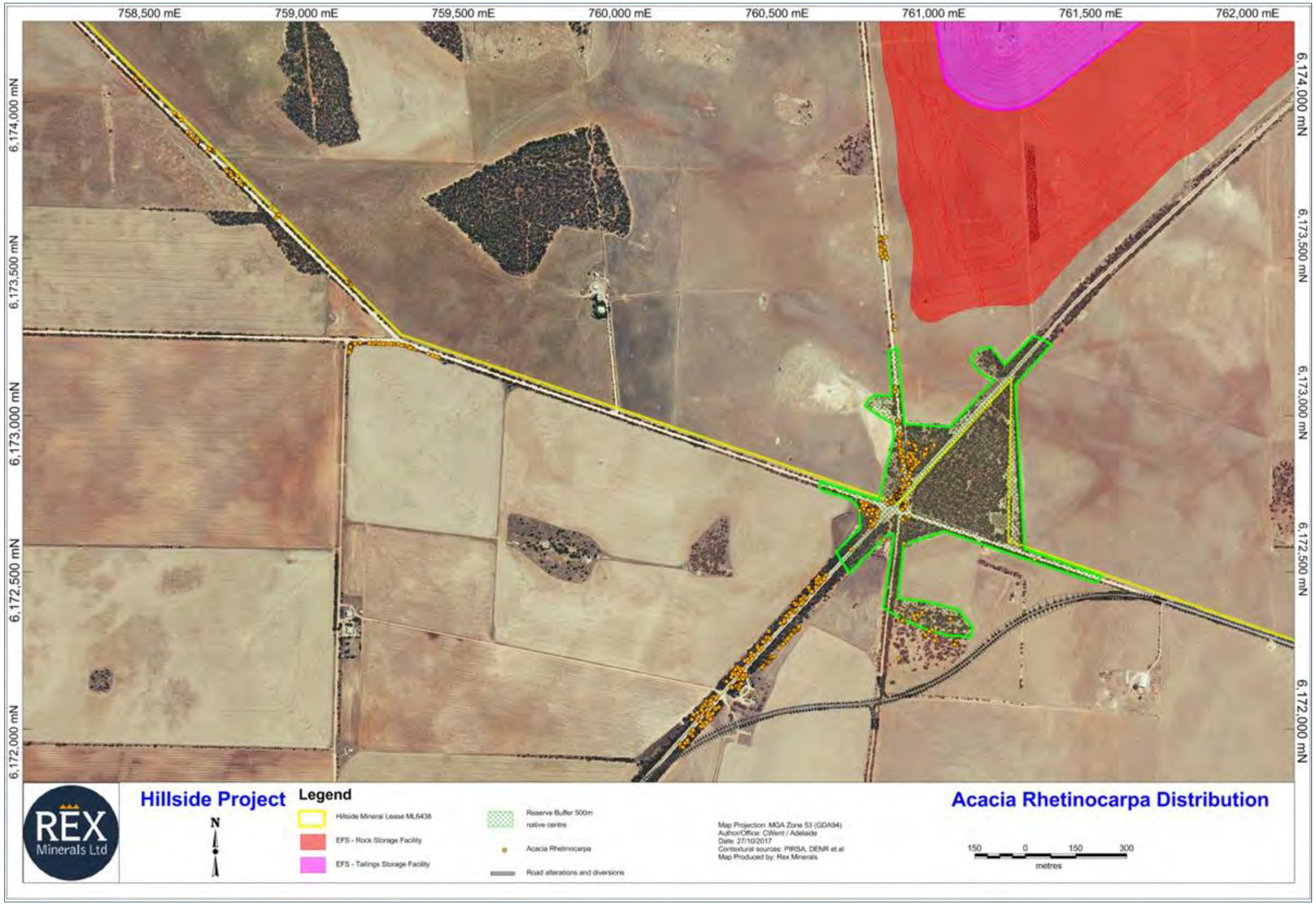


Figure 2-19: *Acacia rhetinocarpa* identified within Redding Road corridor and the Project operational footprint

2.7.2 Pest Plants and Pathogens

2.7.2.1 Declared plants

A range of plant species has been introduced to the Hillside area since settlement on the Yorke Peninsula (YP), both intentionally and unintentionally. Many have invaded and reproduced in areas of both degraded and intact vegetation. The extent of exotic plants in the area is further emphasised by the number of proclaimed plant species recorded and the frequency of occurrence of each. Declared plant species (DEWNR 2017) listed under the *Natural Resources Management Act 2004* (SA) (NRM Act) that have been identified, or known to occur, within and adjacent to the ML, EML and MPL are provided in Table 2-2. Declared species are regarded as particularly invasive and pose significant economic and environmental risk requiring a level of mandatory control of their infestation.

Table 2-2: South Australian Declared plants identified on or in proximity of ML, EML and MPL

Scientific Name	Common Name	Category	Abundance ML/EML	Abundance MPL	Comments	Control Required[1, 2]
Asparagus asparagoides	Bridal Creeper	Creeper	Up to 10% of understorey in sporadic patches.	Less than 5%.	Common throughout roadside remnant vegetation throughout YP. Subject to Northern Yorke NRM (NYNRM) biological control.	Must not transport or move on public roads (including soil). Control required.
Asparagus declinatus	Bridal Veil	Creeper	One area approx. 4m² on road verge.	No known occurrence.	Road verge only. Plants removed. Ongoing monitoring.	Must not transport or move on public roads (including soil). Control required.
Cenchrus incertus and C. longispinus	Innocent Weed	Grass	Narrow section of fence line approx. 1.2km length.	No known occurrence.	Controlled through annual cropping practices.	Must not transport or move on public roads (including soil). Control required.
Chondrilla juncea	Skeleton Weed	Herb	Infrequent seasonal occurrence restricted to paddocks.	No known occurrence.	Controlled through annual cropping practices.	Must not transport or move on public roads (including soil). Control required.
Diplotaxis tenuifolia	Lincoln Weed	Herb	Less than 5 plants.	Less than 30 plants.	Road verge only. Ongoing monitoring and control.	Must not transport or move on public roads (including soil). Control required.

Scientific Name	Common Name	Category	Abundance ML/EML	Abundance MPL	Comments	Control Required[1, 2]
Echium plantagineum	Salvation Jane	Herb	Less than 100 plants.	No known occurrence.	Ongoing monitoring and control	Must not transport or move on public roads (including soil).
Emex australis	Three Corner Jack	Herb	Frequently occurs in paddocks.	No known occurrence.	Controlled through annual cropping practices.	Must not transport or move on public roads (including soil).
Eragrostis curvula	African Lovegrass	Grass	Less than 50 plants.	Less than 50 plants.	Ongoing monitoring and control.	Must not transport or move on public roads (including soil). Control required.
Euphorbia terracina	False Caper	Herb	Up to 10 plants m² in roadside patches.	Up to 10 plants m² in roadside patches.	Ongoing monitoring and control.	Must not transport or move on public roads (including soil).
Lycium ferocisimum	African Boxthorn	Shrub and Tree	Less than 50 plants.	Less than 20 plants.	Subject to intensive monitoring and control.	Must not transport or move on public roads (including soil). Control required.
Marrubium vulgare	Horehound	Herb	Less than 100 plants.	Less than 100 plants.	Ongoing monitoring and control.	Must not transport or move on public roads (including soil). Control required.
Olea europaea	Olive	Tree	Four individual plants. Completely removed 2014.	No known occurrence.	Ongoing monitoring and control.	Control required.
Reseda lutea	Cutleaf Mignonette	Herb	Less than 10 plants.	No known occurrence.	Infrequently occurs. None located since 2015.	Must not transport or move on public roads (including soil). Control required. Notifiable to NRM group.
Solanum elaeagnifolium	Silverleaf Nightshade	Herb	Less than 30 plants.	No known occurrence.	Intense control program since 2013 reduced area from 190ha to small isolated patches.	Must not transport or move on public roads (including soil). Control required.

Scientific Name	Common Name	Category	Abundance ML/EML	Abundance MPL	Comments	Control Required[1, 2]
Tamarix aphylla	Athel Pine	Tree	Less than 10 plants.	No known occurrence.	Planted by previous landowner. To be removed for construction.	Must not transport or move on public roads (including soil). Control required within 100m of a watercourse.
Tribulus terrestris	Caltrop	Herb	Narrow section of fence line approx. 600m length.	No known occurrence.	Subject to intensive monitoring and control.	Must not transport or move on public roads (including soil). Control required.
Xanthium spinosum	Bathurst Burr	Herb	Historically recorded by previous landowners.	No known occurrence.	No plants located during Rex occupation.	Must not transport or move on public roads (including soil). Control required.
Retama monosperma	White Weeping Broom	Shrub	No known occurrence.	No known occurrence.	Known to occur at Rogues Point/James Well.	Must not transport or move on public roads (including soil).

[1] Consolidated List of Declaration of Animals and Plants, February 2017.

[2] Mandatory responsibility required under the Natural Resources Management Act 2004 within the Northern Yorke NRM region.

The locations and abundance of the declared plant species presented in Table 2-2 are documented below in Figure 2-20 for the ML and EML.

2.7.2.2 Plant pathogens

The site lies within a 'nil' or 'very low risk' area for *Phytophthora* (*Phytophthora* Technical Group 2003).

The potential for *Phytophthora* to become established is low. No evidence of the pathogen has been recorded at the site.

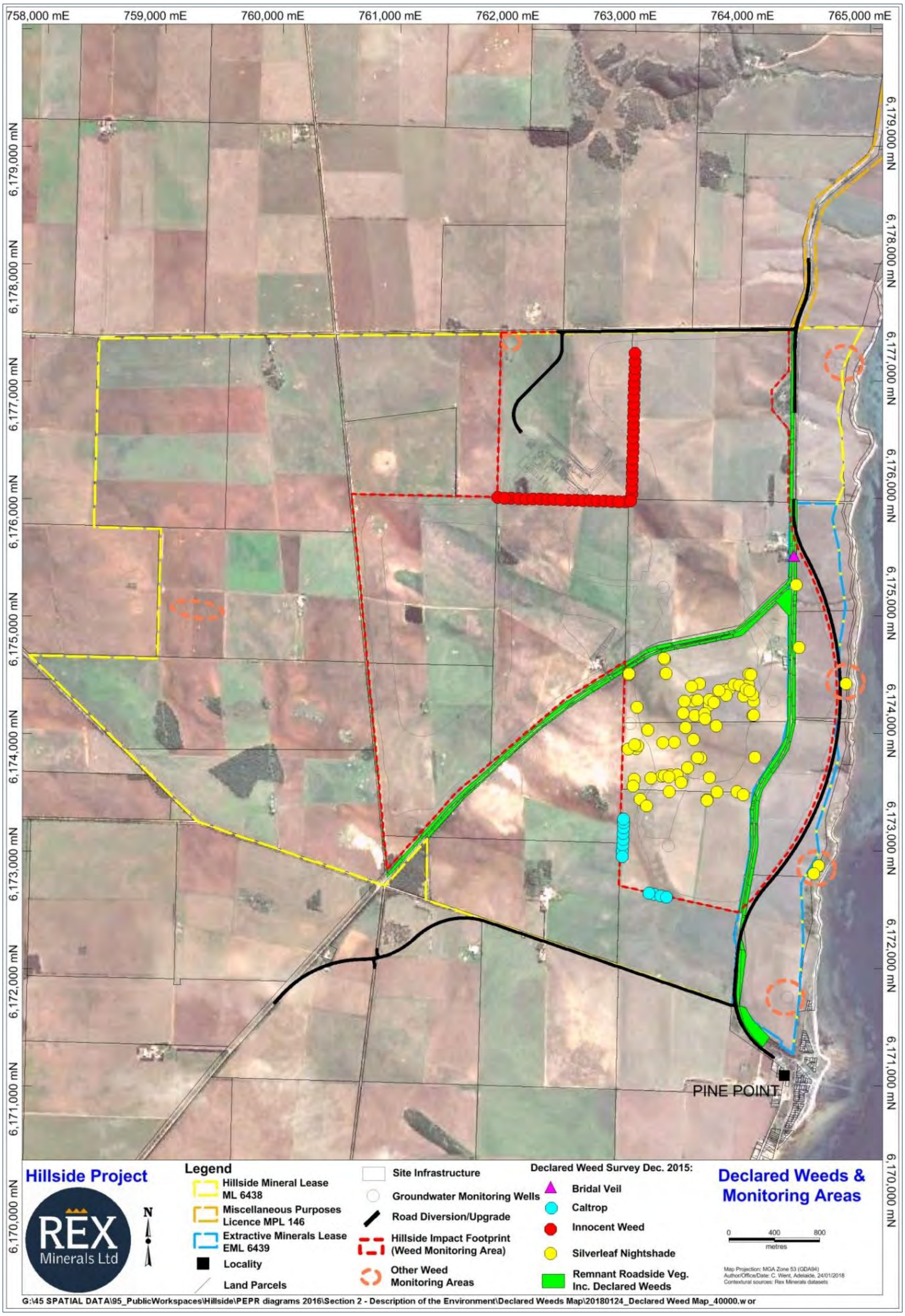


Figure 2-20: Declared weed map (pre-mining locations and abundance)

2.8 Air Quality

Ongoing baseline PM_{10} monitoring is occurring using the existing Environmental Beta-Attenuation Mass (EBAM) monitor at Hillside with the monitor located adjacent to the weather station (refer Figure 2-2).

The results for the monitoring 2012 to 2019 (to 3 June 2019) is summarised in Table 2-3.

The raw data was processed for validation considering data periods, instrument alarms, 75% data availability for calculation of daily average (minimum of 18 hours) and negative values (included as valid down to -0.005mg/m^3). The period 2014 to 2016 contained considerable instrumentation flow issues which has likely affected the PM_{10} concentration results for this period, likely resulting in lower than experienced values.

The assumed PM_{10} background concentration (18.1µg/m^3) used in the MLP impact assessment from the dispersion modelling in the dust impact assessment was based on Whyalla Schulz Reserve data (70th percentile). While the baseline monitoring data provides lower background levels, the Whyalla background concentration as assumed in the impact assessment can still be considered applicable and conservative, i.e., the higher background assumed provides less ‘room’ for additional air emissions from the Hillside Project before triggering non-compliance. Refer to Section 5.4 for future works and monitoring that will occur with respect to air quality.

Table 2-3: PM_{10} Hillside Project monitoring data summary

Year	Annual Average (µg/m^3)	70th Percentile (Daily (24-hour) Concentrations) (µg/m^3)	Maximum (Daily (24-hour) Concentrations) (µg/m^3)	Number of Times Criteria in Air EPP[3] for PM_{10} 24-hour Average of 50µg/m^3 Was Exceeded by Background	Data Valid Capture (%)
2012	13.6	13.0	198	6	57%
2013	13.7	13.3	141	7	78%
2014	7.8	9.0	29	0	82% [1]
2015	5.3	5.9	34	0	95% [1]
2016	4.7	5.5	39	0	86% [1]
2017	15.6	16.1	58	2	16%
2018	8.8	9.9	42	0	95%
2019	10.3	11.7	35	0	99% [2]

[1] Ongoing issues with flow.
[2] To 3 June 2019.
[3] Environment Protection Policy.

2.9 Project Receptors

The Hillside Project has changed in scale from the original MLP to this PEPR (see Section 3.1 for details). As such, the mining operations described in the PEPR require less land for mining infrastructure and do not require the closure of a portion of Redding Road which was required for the MLP mine plan. Furthermore, there is no plan to cover the three residential dwellings or cropping land to the west of Redding Road with a tailings storage facility (TSF) and integrated rock storage facility (RSF), as originally proposed in the MLP.

The receptors specifically affected in the transition from the larger Stage 2 Project originally presented in the 2013 MLP to the smaller Stage 1 (Extended Feasibility Study (EFS)) Project presented in this PEPR are:

- Redding Road, due to the original MLP requirement to implement the road closure;
- three residential dwellings (two Redding family dwellings and one Dodd family dwelling); and
- cultivated land (agricultural land) within the ML and to the west of Redding Road.

The impacts on these receptors were specifically addressed in the approved MLP which represents the larger Stage 2 Project. The change to these receptors as a result of the reduced Stage 1 (EFS) Project detailed throughout this PEPR is identified in this section.

2.9.1 Public Roads

The Yorke Peninsula rural roads located within and bordering the ML include Redding Road to the west, Sandy Church Road to the north and Pine Point Road to the south (see Figure 2-22). These roads are unsealed roads under the control of the Yorke Peninsula Council (YPC) and are used for local traffic, grain haulage and school bus routes.

2.9.1.1 Redding Road – EFS

The MLP required the closure of a section of Redding Road between Sandy Church Road and Pine Point Road. No diversion was planned for the closure of the portion of Redding Road.

The following result from the section of Redding Road remaining open for the Stage 1 (EFS) Project, noting the portion of Redding Road that will remain open is a similar distance from mining infrastructure as Sandy Church Road and the approved Yorke Highway realignment.

- Access will be maintained to three rural properties (landowners have entrances to land parcels on Redding Road and one resident who accesses their residential dwelling from Redding Road);
- The public will maintain the use of the portion of Redding Road;
- The YPC access to the Muloowurtie Conservation Reserve (parcel ID F216753A106) as shown in Figure 2-21, for the purposes of extracting road base material for road upgrades in the local area, will be maintained;
- The drainage structures associated with Redding Road will be maintained;
- The remnant roadside vegetation will not be required to be removed (including the nationally vulnerable Resin Wattle (*Acacia rhetinocarpa*);

- Redding Road will not be used as a main access/egress point, as the site entrance is consistent with the MLP onto Sandy Church Road;
- Redding Road is outside of the 'fly rock zone' and therefore will remain unaffected by blasting activities; and
- The SA Water pipeline (see Figure 2-22) that runs within the Redding Road corridor and supplies water to Pine Point will remain active.

The intention for Redding Road to remain open during the Stage 1 operation was presented to and discussed with the YPC at a workshop meeting held in July 2017.

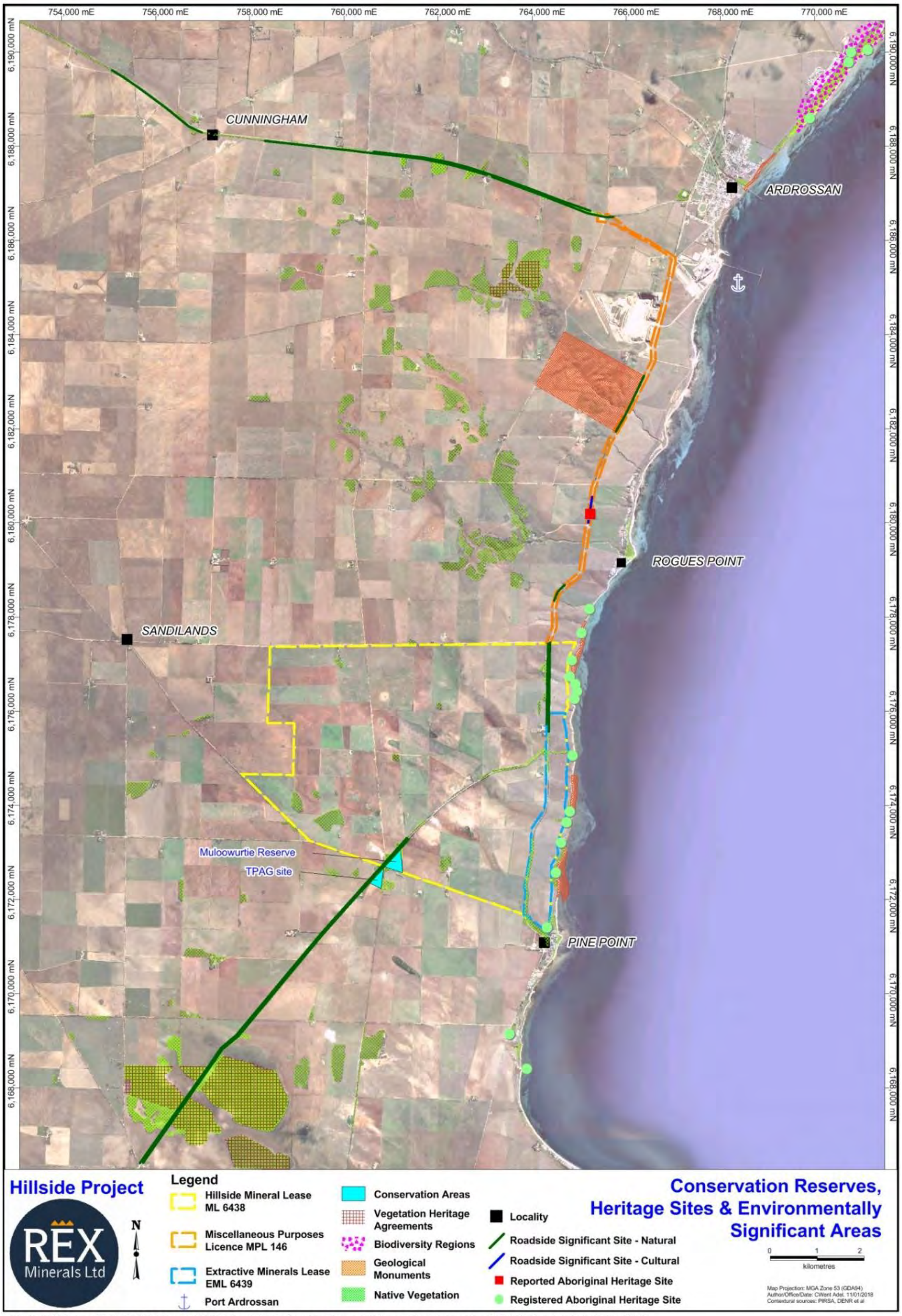


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Figure 2-21: Location and extent of adjacent conservation reserves, heritage sites, and other environmentally significant areas

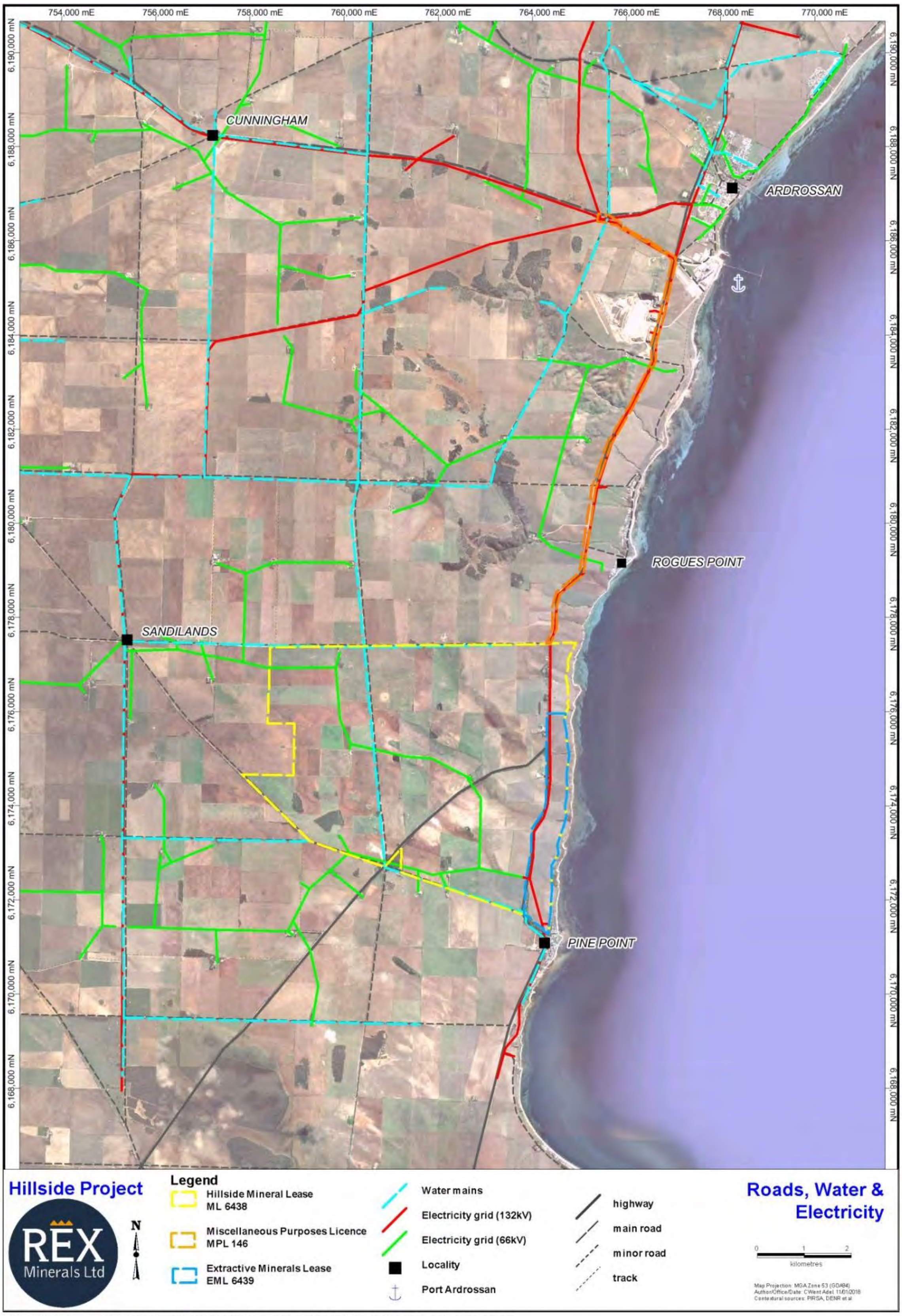

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Figure 2-22: Regional location of roads, water mains and transmission lines

2.9.2 Receptors and Exempt Land

The MLP stated that there are five residential dwellings located within the ML area (excluding the three residential dwellings and associated farm sheds on land owned by Rex). Of these five residential dwellings, one had a relocation agreement in place. The four residential dwellings that were either unoccupied or under negotiation were not considered as sensitive residential dwellings in the MLP. Under the Stage 1 (EFS) Project, three of these will now become receptors, being on the land immediately to the west of Redding Road, as there is now no requirement for access to this land for the Project. The owners of this land have been advised of this during the course of landholder engagement (see Section 4 and Section 7.6).

The cultivated land and residential receptors are detailed below in Table 2-4.

Table 2-4: Receptors and Exempt Land within ML6438

Owner	Area (ha)	EFS Receptor Consideration	EFS Outcome
Rex Hillside (Property) Pty Ltd	1327.4	Exempt (cultivated) land. No house – no receptor.	No changes from the MLP.
DB and MB Linke	62.8	Exempt (cultivated) land no longer required for the mining operations described in the PEPR. No house – no receptor.	Exempt (cultivated) land can continue being farmed by owner. Cultivated land not assessed as a receptor in the MLP.
MJ Redding	534.7	Two residential receptors on property not assessed in the MLP (one formerly unoccupied). Exempt (cultivated) land no longer required for the mining operations described in the PEPR. Dam located within 150m of life of mine TSF embankment.	Residential dwellings to remain during the life of the mine. Exempt (cultivated) land can continue being farmed by owner. Cultivated land not assessed as a receptor in the MLP.
Seaview Downs	119.4	Exempt (cultivated) land no longer required for the mining operations described in the PEPR. No house – no receptor.	Exempt (cultivated) land can continue being farmed by owner. Cultivated land not assessed as a receptor in the MLP.
Rockleigh Nominees Pty Ltd	158.3	Land purchase under negotiation.	Exempt (cultivated) land required for mining operations described in the PEPR. No changes from the MLP.
P Redding, and Y and G Dodd	345.2	A residential receptor not assessed in the MLP. Exempt (cultivated) land no longer required for the mining operations described in the PEPR.	Residential dwelling to remain during the life of the mine. Exempt (cultivated) land can continue being farmed by owner. Cultivated land not assessed as a receptor in the MLP.
BH Davey	332.3	Portion of land within the blast zone during operation. Exempt (cultivated) land and residential dwelling (receptor) to remain during the life of the mine.	No changes from the MLP.
Estate of JT Germein	62.5	Exempt (cultivated) land. Waiver granted – house will not be occupied, hence not considered a receptor.	No changes from the MLP.

2.9.2.1 Exempt (cultivated) land

As stated above in Table 2-4, cultivated land was treated as a sensitive receptor in the MLP.

The ML conditions are applicable to all agricultural land that has the potential to be impacted as a result of mining operations. As such, all the ML conditions protecting the associated cultivated land are now applicable to the cultivated land on the Redding, Dodd, Linke and Seaview Downs properties.

Unlike the MLP mine plan, the landowners property that is not required for the Stage 1 (EFS) Project (as shown in Table 2-4) are able to continue to access and utilise their cultivated land during and post-mining operations at Hillside.

2.9.2.2 Residential receptors

The closest residential dwelling (Davey) under the MLP continues to be the closest dwelling under the EFS mining operations described in the PEPR (see Figure 2-23).

The ML conditions are applicable to all residential dwellings that have the potential to be impacted as a result of mining operations. As such, all the ML conditions protecting the closest residential dwelling are applicable for the residential dwellings not originally included in the ML assessment.

Unlike the MLP mine plan, the landowners property that is not required for the Stage 1 (EFS) Project (as shown in Table 2-3) are able to continue to access and utilise their residences during and post-mining operations at Hillside.

2.9.3 Other Infrastructure

Other infrastructure associated with the three additional residential dwellings and cultivated land (which are discussed above) not included in the mining operations described in the PEPR includes the following:

- fences;
- sheds;
- one disused dam adjacent to Redding Road; and
- farm tracks.

The public infrastructure includes:

- transmission lines – single-wire earth return lines to the three residences west of Redding Road will remain in place (see MLP 2013 Figure 5.3-2);
- telephone lines (fibre optic) – no changes from the MLP 2013; and
- the SA Water pipeline – will remain as the Redding Road corridor will be unaffected by the Project (SA Water have been made aware of the pipeline no longer requiring relocation).

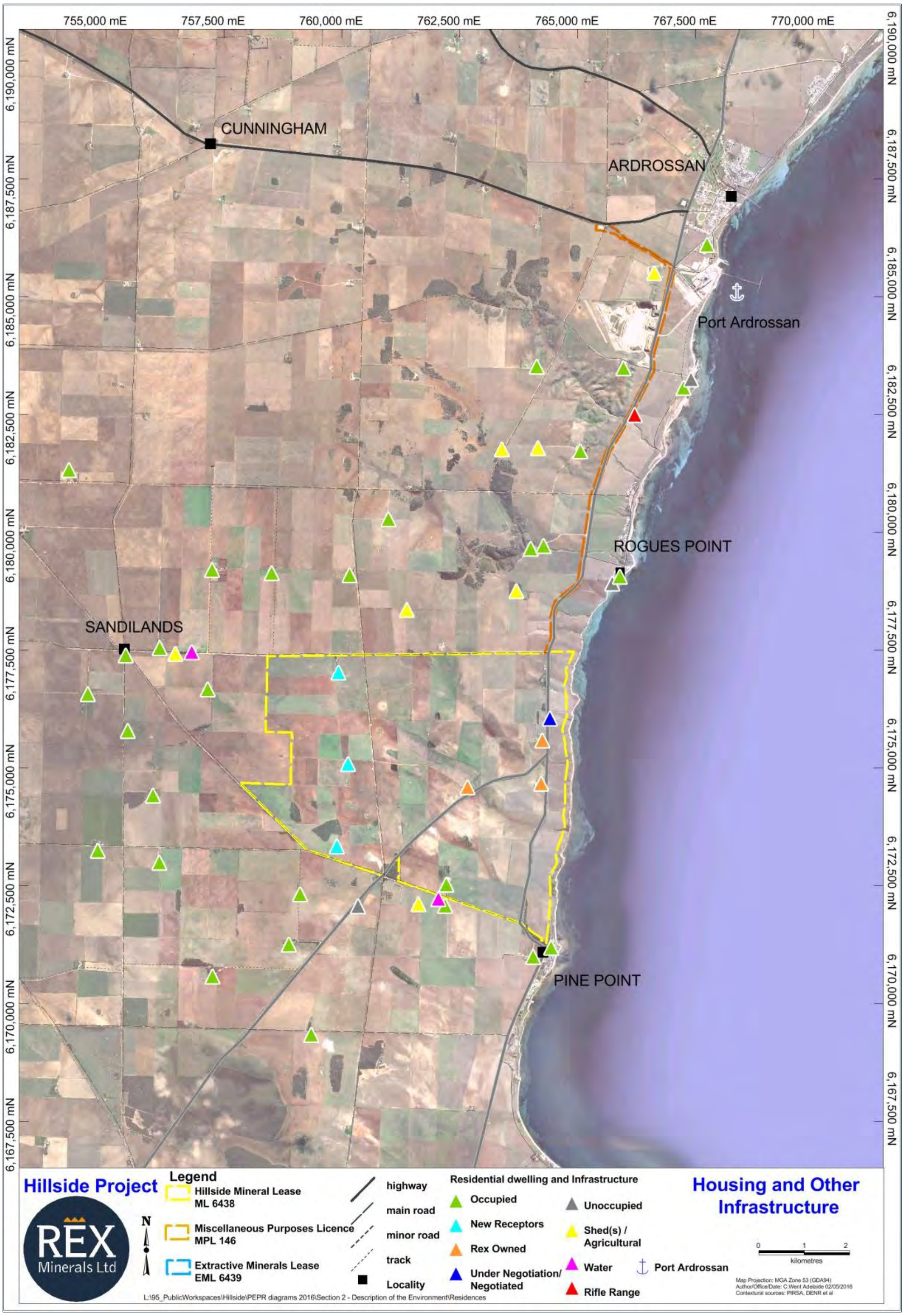


Figure 2-23: Housing and other infrastructure surrounding the Hillside Project

2.10 Pre-existing Site Contamination and Previous Disturbance

Existing site contamination from past agricultural practices is contained/included in the existing house/shed/infrastructure areas. These include sheep dips (which contain traces of arsenic from chemicals used to delouse sheep), fuel storage and refuelling areas, agricultural chemical storage (pesticides and herbicides), historic rubbish dumps (which could contain asbestos, chemical containers, metal, plastics, white goods, etc.) and asbestos contained within existing buildings (see Figure 2-24).

For information regarding the historic Hillside mine, background groundwater quality, historic agricultural disturbance and the Council quarry, refer to the MLP (Rex Minerals Ltd 2013).

2.11 References

DEWNR, 2017. Consolidated List of Declaration of Animals and Plants, Natural Resources Management Act 2004, February 2017.

Phytophthora Technical Group, 2003. Phytophthora Management Guidelines, Government of South Australia, Adelaide.

Rex Minerals Ltd, 2013. Hillside Copper Mine Mining Lease Proposal and Management Plan, Adelaide, South Australia.

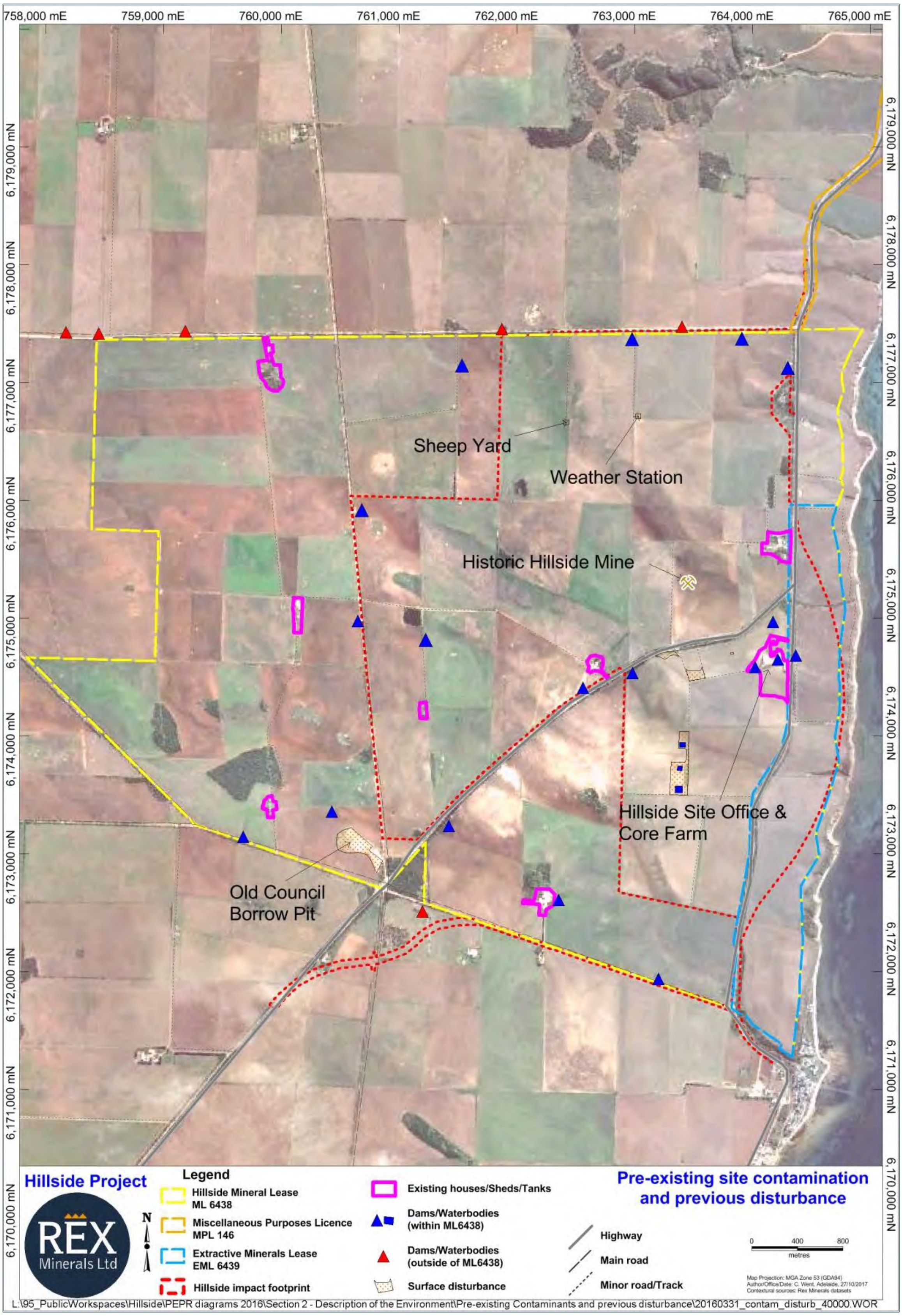


Figure 2-24: Pre-existing site contamination and previous disturbance

Section 3

Description of the Mining Operations

3. Description of the Mining Operations

Note – Boxes throughout this section identify the PEPR Minerals Regulatory Guideline MG2b requirements.

Each of the elements listed in Sections 3.1–3.10 must be described only to the extent that they apply to the mining operation. If the element (or part of the element) is not applicable to the mining operation, a statement to that effect must be made and the element (or part of the element) description may be omitted.

3.1 Change of Project from Mining Lease Proposal to Program for Environment Protection and Rehabilitation

3.1.1 Primary Project Changes

The Hillside Project was initially progressed to Pre-Feasibility Study phase in late 2012 to focus on a larger scale 15Mtpa operation. Subsequent work leading to a Bankable Feasibility Study (BFS) which continued with the larger project until August 2014 when a sharp fall in commodity prices, particularly for iron ore, prompted Rex to change its focus towards a smaller copper-gold only project with lower capital investment and higher copper head grades. This became the Extended Feasibility Study (EFS) with the outcomes announced by Rex in May 2015.

The EFS Project (also referred to as Stage 1) mining operations described in the PEPR has a smaller footprint than the full potential mine plan (Stage 2 or BFS Project) presented in the Mining Lease Proposal (MLP) in 2013. The difference in these footprints is illustrated in Figure 3-1 for the Stage 1 (EFS) Project detailed throughout this PEPR and Figure 3-2 which illustrates the full potential Stage 2 (BFS) Project, which would require additional approvals.

The key differences between the Stage 1 and Stage 2 projects are highlighted in Table 3-1.

Table 3-1: Summary of changes of operation from Stage 2 MLP to Stage 1 PEPR

Project Component	Stage 2 (BFS) Project (MLP 2013)	Stage 1 (EFS) Project (PEPR 2019)
Site Layout		
Tenement boundaries	Mineral Lease. Extractive Minerals Lease. Miscellaneous Purposes Licence (infrastructure corridor). Miscellaneous Purposes Licence (Ardrossan Port).	Unchanged. Unchanged. Unchanged (no raw water or slurry pipeline required, still have power line and freshwater pipeline). Not required or issued (no operations at Ardrossan Port).
Operations footprint	Operations footprint 1,753ha.	Reduced operations footprint to 1,388ha.
Mining and Processing		
Commodities and mining rate	75kt copper, 60koz gold and 1.2Mtpa iron-ore.	35kt copper and 24koz gold. No iron-ore being processed. Reduction in tonnage and increase in copper grade.
Mining method	Excavator and truck.	Unchanged.

Project Component	Stage 2 (BFS) Project (MLP 2013)	Stage 1 (EFS) Project (PEPR 2019)
Mine life	15+ years.	14+ years (including pre-strip). *(Reserve is a function of future commodity prices.)*
Open pit	223ha (2.4km x 1.2km x 450m deep).	Smaller open pit of 169ha (2.3km x 1.2km x 440m deep).
Underground mining	Underground included.	No underground operations proposed (expansion/future opportunity).
Material movements	1,400Mt (1,219Mt + 181Mt).	Less material movements of 685Mt (603Mt of waste + 82Mt of ore).
Mining rate (average ore and waste rock)	100Mtpa.	Lower mining rate of up to 65Mtpa.
LOM strip ratio	7.1:1.	7.4:1.
Rock storage facilities (RSF) volumes	1,400Mt.	Smaller RSFs of 603Mt.
Soil stockpiling method	Topsoil and subsoil stockpiled prior to use in rehabilitation.	Unchanged.
Tailings storage facility (TSF), RSF and pond construction and operation	Downstream TSF 10°, 15° and 20° concave slopes of RSF progressively rehabilitated. Ponds are lined as per MLP.	Unchanged design/method. Operational parameters remain unchanged, although rate of rise reduced.
TSF	511ha (catchment area 378ha). 7 lifts – 189Mt at a final RL130.	Smaller TSF, 391ha (catchment area 167ha). 6 lifts – 80Mt at a final RL125.5.
Processing ore stockpile (max)	45Mt.	12Mt. Crushed ore stockpile removed.
Processing plant	Standard flotation process and reagents. 2 ball mills (120dBA each). 1 semi-autogenous grinding (SAG) mill. Cone crusher.	Unchanged copper flotation with less reagents used per annum as per reduction in production rate. 1 SAG mill only (no ball mills). Jaw crusher. No processing of iron ore.
Hours of operation	24 hours a day.	Unchanged.
Mining phases	7 phases.	5 phases.
Haul trucks	Year 1: 36 trucks. Year 9: 62 trucks. Indicatively CAT 793D (218t).	A quarter of the haul trucks are required for the EFS. Year 1: 9 trucks. Year 9: 16 trucks (maximum number). Indicatively Hitachi EH5000AC-3 (296t).

Project Component	Stage 2 (BFS) Project (MLP 2013)	Stage 1 (EFS) Project (PEPR 2019)
Diesel storage	2.4ML.	Less diesel storage required – 0.6ML.
Site access	Access from Sandy Church Road.	Unchanged.
Supporting Surface Infrastructure		
Highway diversions	Yorke Highway/St Vincent Highway diversion approved under the Development Act.	Unchanged.
Minor roads	Redding Road required to be closed.	Redding Road remains open.
Port of Ardrossan	Filtration shed at Port of Ardrossan.	No facility at Port of Ardrossan.
Transportation of concentrate	Slurry pipeline. Sea-shipping out of Port of Ardrossan. Supply trucks: 13 (26 truck movements) per day.	No slurry pipeline. Concentrate to be transported by truck from site to Port Adelaide using sealed containers and the ‘rotainer’ system. B-double trucks to be used. Concentrate trucks and supply trucks: 7 (concentrate) + 5 (supply) = 12 (24 truck movements) per day.
Powerlines	Powerline from Ardrossan west substation along highway to Hillside Project.	Unchanged.
Energy usage (annual)	583GWh/a.	180GWh/a.
Workforce and Accommodation		
Workforce	600 average over life-of-mine (LOM).	500 average over LOM.
Accommodation during operations (excluding construction)	Emergency camp 120 beds.	No camp required for operation.
Short-term accommodation for construction	Provided by third party.	Unchanged.
Water		
Fresh water source	SA Water pipeline within the road reserve.	Unchanged.
Fresh water usage	600ML/a fresh water,	220ML/a fresh water
Saline water	Raw water pipeline from Ardrossan. 170L/s make-up sea water for processing pumped from Ardrossan Port.	No raw water pipeline from Ardrossan required. 86L/s make-up saline water for processing pumped from groundwater borefield within the Mining Lease Proposal.

Project Component	Stage 2 (BFS) Project (MLP 2013)	Stage 1 (EFS) Project (PEPR 2019)
Mine dewatering	Dewatering for open and underground.	Less dewatering due to smaller open pit and no underground.
Surface water management	Clean water diverted around operations. Water within operations contained onsite.	Unchanged.

Potential transition from the Stage 1 to Stage 2 Project and associated decision points are detailed in Section 3.5.12.

3.1.2 Port Facility Miscellaneous Purposes Lease

The MLP included a Miscellaneous Purposes Licence (MPL) application for the proposed facility at the Ardrossan Port. The EFS does not require the installation of infrastructure associated with shipping magnetite through Ardrossan Port, including the concentrate filtration and handling at the Port of Ardrossan. The EFS only includes producing a copper-gold concentrate which will be filtered within the ML processing plant and trucked to Port Adelaide. The MPL application was withdrawn by Rex.

If iron ore (magnetite and haematite) becomes economically viable, and is processed, it would require the infrastructure associated with the Port of Ardrossan including the concentrate filtration and handling at the port. An MPL application would need to be submitted and approved, along with additional approvals, for the expansion to Stage 2 to allow the mining and processing of iron ore.

3.1.3 Infrastructure in MPL146

Similarly, the EFS does not require the installation of infrastructure associated with shipping magnetite through Ardrossan Port, namely the slurry and sea water pipelines, as the EFS is only producing a copper-gold concentrate. Thus, the only infrastructure in the MPL for the EFS will be the high voltage power line. SA Water will also install a freshwater line from Port Wakefield to site via Ardrossan within the road corridor under their own approvals.

If iron ore (magnetite and haematite) becomes economically viable, and is processed, it may require the originally proposed slurry pipeline to be constructed and would require additional approvals.

3.1.4 Lease Conditions Not Relevant to PEPR

As a result of the amendment of the project from the MLP to the current Hillside Project presented in this PEPR, the following lease conditions are not applicable to the Stage 1 Project, hence are not addressed throughout this PEPR.

ML6438 Second Schedule – Condition 31

31. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder:

31.1. Obtains ownership of CT 5707/273; or

31.2. obtains a registered Waiver of Exemption under the Act or agreement to undertake mining operations (inclusive of future geotechnical subsidence) on CT 5707/273; or

31.3. satisfies the Director of Mines that there is no risk that the proposed mining operations below that plane could impact on third party property and the Director of Mines has approved the proposed operations in writing (subject to such conditions as he thinks fit).

Underground mining is not part of the Hillside Project presented in this PEPR.

MPL146 Second Schedule – Condition 2

2. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Soils Outcome Schedule 2 – Condition 2;

2.1. the location and depth below the natural surface of the concentrate and water pipelines must prevent any foreseeable damage due to accidental excavation or surface disturbance.

MPL146 Second Schedule – Conditions 5 and 6

5. The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the Land as a result of site operations.

6. The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the Land after mine completion.

The Hillside Project presented in this PEPR does not include a concentrate pipeline nor a sea water pipeline. There are no other activities that would influence the shallow aquifer planned for the MPL as part of the Hillside Project presented in this PEPR.

MPL146 Second Schedule – Condition 8

8. In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters:

8.2. The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from:

8.2.1. An independent slurry pipeline engineering expert (i.e.: for verification of the design of the concentrate slurry pipeline).

Condition 8.2.1 does not apply with the removal of the concentrate slurry pipeline from the Hillside Project presented in this PEPR.

MPL146 Second Schedule – Condition 9

9. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Groundwater Outcome Schedule 2 – Condition 5;

9.1. design and management strategies are to be provided for pipeline leak detection which includes automation of operational controls for the monitoring and control of all pipelines on the related Mineral Lease and this Mining Tenement. This should include (but is not limited to);

9.1.1. continuous and automatic monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment;

9.1.2. continuous and automatic monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities;

9.1.3. the integration of data through a central computer-based control and monitoring system.

Condition 9 does not apply with the removal of the concentrate slurry pipeline from the Hillside Project presented in this PEPR.

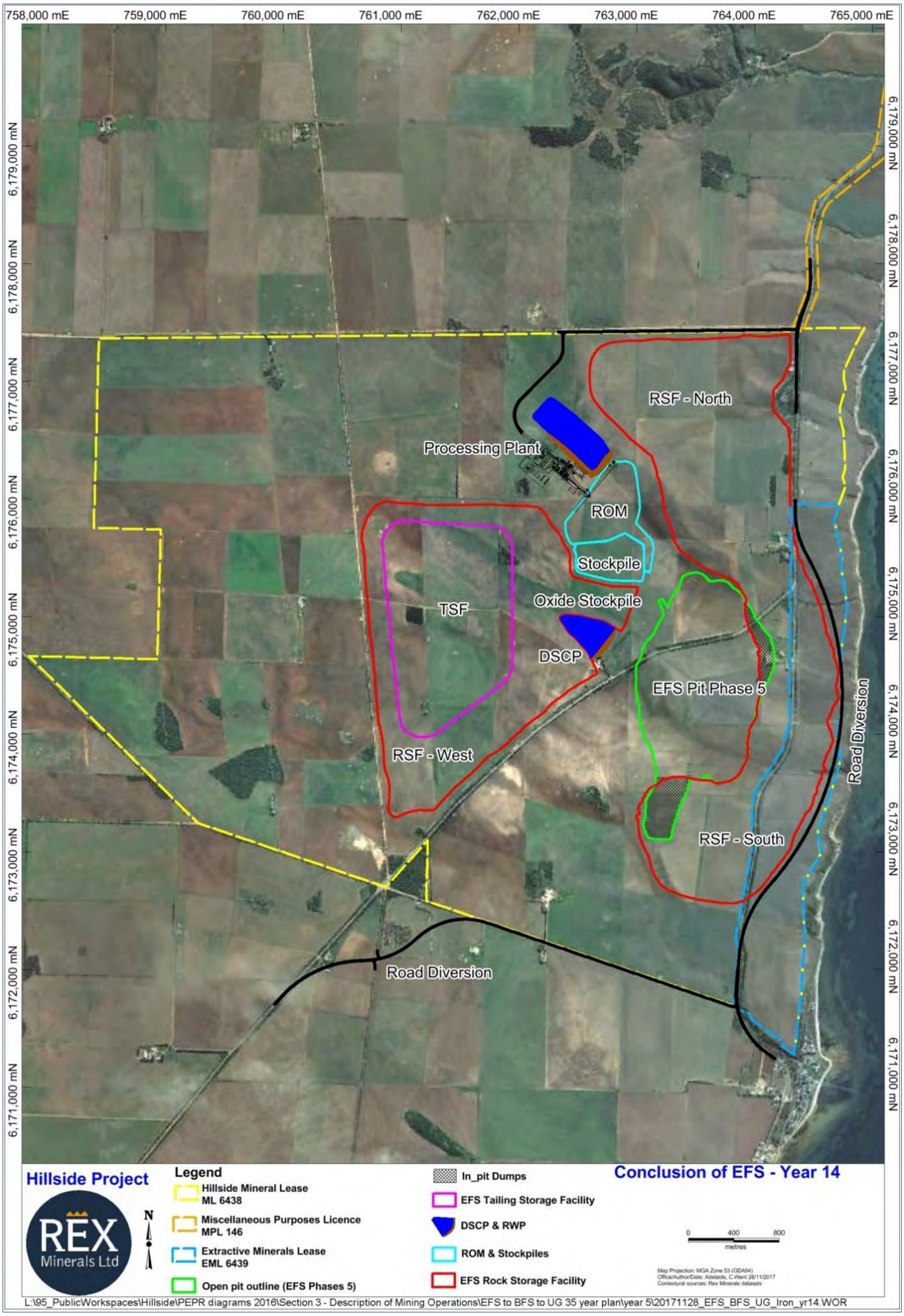


Figure 3-1: Stage 1 (EFS) Project plan with no expansion

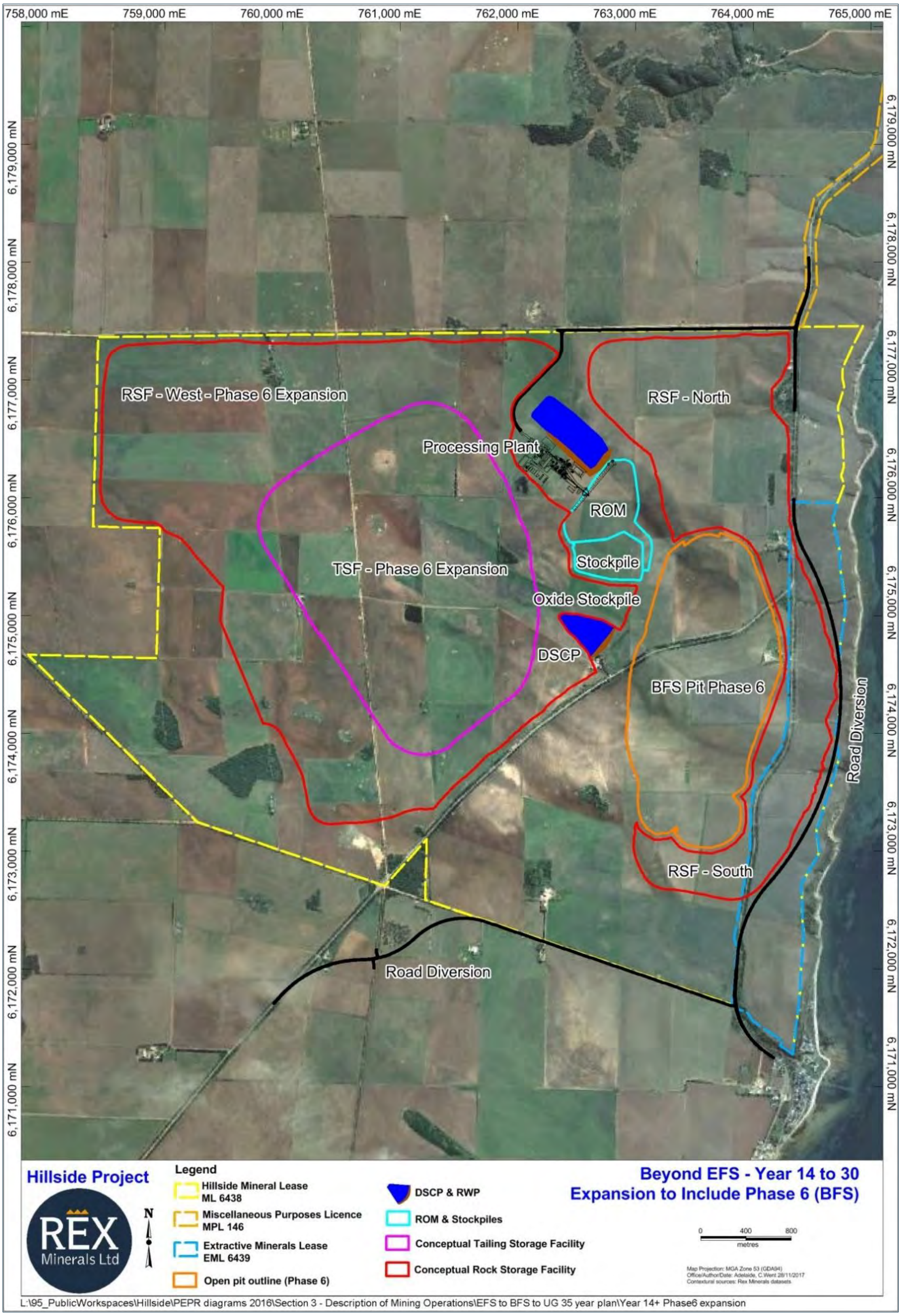


Figure 3-2: Stage 2 (BFS) Project plan

3.2 General Description and Maps/Plans of Operations

Provide:

- *a summary description of all elements of the operation, including mining, processing and waste management (include maps/plans).*

Rex Minerals Ltd (Rex) will use open cut mining techniques to extract copper-gold ore. Ore processing will occur on the Mineral Lease (ML6438) to produce a copper (with gold credits) concentrate. The concentrate will be filtered on site in an enclosed concentrate filtration and storage facility. It will then be loaded into closed containers and trucked to the Flinders Ports loading facility at Port Adelaide and shipped in bulk form to domestic and offshore smelters.

The Project layout and location of related infrastructure are shown in Figure 3-3. Key characteristics of Stage 1 (i.e., the EFS Project) are summarised in Table 3-2.

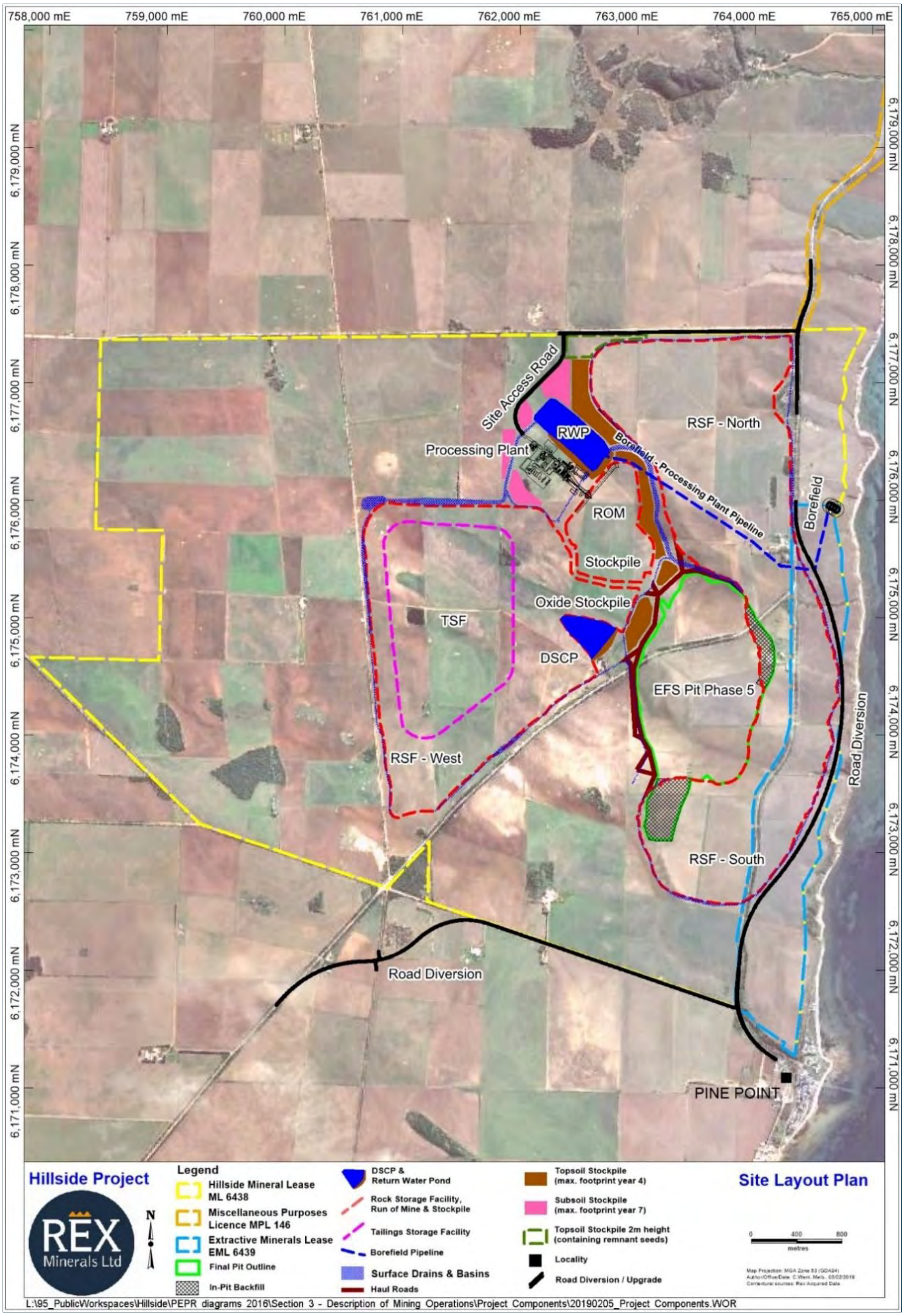


Figure 3-3: Project layout and location of related infrastructure

Table 3-2: Key characteristics of the Stage 1 Project (EFS)

Characteristic	Description
Project location	12km south of Ardrossan, South Australia
Leases/Licences	Mineral Lease (ML) 6438, Extractive Minerals Lease (EML) 6439 and Miscellaneous Purposes Licence (MPL) 146
ML area	2997.84ha
EML area	224.53ha
MPL area	94.34ha
Fenced project area (operational footprint)	1,388ha
Mining method	Open pit
Commodity to be mined	Copper, gold and iron (although iron will report to tailings)
Mining inventory	82Mt (from the commencement of operations)
Mine life	14 years
Mining rate	Up to 23 million bank cubic metres per year or 65Mt total material movement
Processing rate	Up to approximately 750tph
Processing method	Conventional crushing, grinding and flotation
Product average	118,000tpa of copper-gold concentrate (range 88,000 to 207,000tpa), with an average of 35,000tpa of copper concentrate and 24,000oz pa of gold produced
Transport route	Site access road to Yorke Highway, then National Highway A1 to the Port of Adelaide
Operating hours	Continuous (24-hours-per-day, 365-days-per-year)
TSF	Integrated waste landform, TSF with an underdrainage system and compacted clay liner. Final height 46m to 66m above land surface (due to undulating surface) or RL125.5 above sea level
Electricity source	State grid, via a purpose-built 12km overhead transmission line from the existing Ardrossan West substation
Electricity requirement	180GWh/a
Process water source	Saline water from borefield on lease – 86L/s
Potable water source	Treated water from SA Water through pipeline
Potable water requirement	Up to 600ML/a
Workforce	Approximately 500 people average during operations

The major components of the Project and their footprints are identified in Table 3-3 and described in the following sections, which corresponds to the Project layout shown in Figure 3-3 above.

Table 3-3: Project components and approximate disturbance footprints

Component	Total Disturbed Area (ha)
Extended Feasibility Study (EFS) Pit to Phase 5 (i.e., maximum disturbance)	169
Process plant (including return water pond (RWP) Throoka Creek Diversion Pond (TCDP), administration, workshop)	45.5
TSF including integrated RSF – West	391
RSF – North (including in-pit backfill surface area)	262
RSF – South (including in-pit backfill surface area)	212
Run of mine (ROM) and ore stockpile	72.4
Oxide stockpile	Included in RSF – West
Haul and internal site roads	16.6
Topsoil stockpile (variable due to progressive rehabilitation with maximum disturbance footprint in Year 4)	35.5
Subsoil stockpile (variable due to progressive rehabilitation with maximum disturbance footprint in Year 7)	15.6
Decant seepage and collection pond (DSCP)	10.2
Surface drains and basins	26.8
Evaporation pond and embankment	2.4
Road diversions/new roads	10.3
Saline water borefield	0.3
TOTAL	**1,269.5**

This section details the proposed operations to be undertaken within the ML, EML and MPL.

3.2.1 Mining

Rex established the following pit optimisation criteria for the EFS:

- copper production ≥30,000tpa;
- shortest life of mine consistent with life of the major mining equipment, i.e., approximately 12 years;
- constrain the operational land use to within the ML; and
- pre-production capital expenditure ≤A$500 million.

Following a multi-stage optimisation process, the following results were achieved:

- ore production rate of 6Mtpa;
- LOM of 14 years;
- final pit dimensions of 2.3km north-south and 1.2km east-west and 440m depth; and
- final pit contains 685Mt of total material including 82Mt of ore.

3.2.2 Open Pit Design Overview

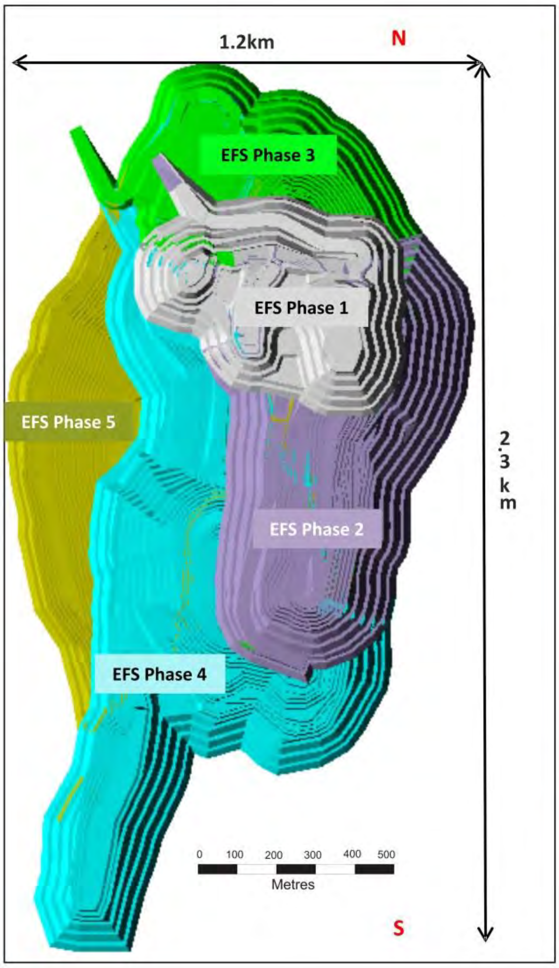
The EFS has final pit dimensions, mine life and tonnages as identified above. The 2015 ore reserves are based on this design.

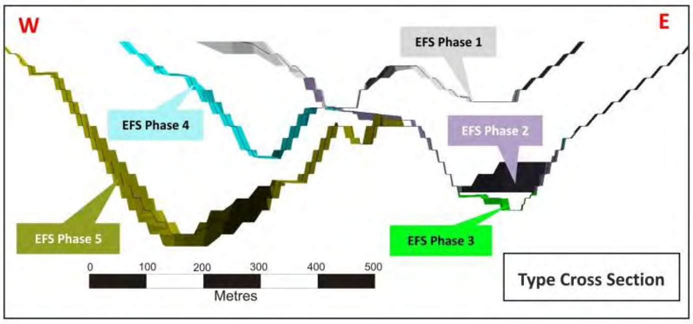
The EFS final pit shape is referred to as Phase 5. The EFS pit design includes in-pit dumping of 106Mt of waste with another 16Mt over the pit in the form of an integrated landform. This design does not prevent future expansion of the pit nor does it sterilise any of the remaining mineral resource.

The open pit is value optimised and designed in five phases. Rock movement is scheduled to ensure adequate operating area and access to ore. The mine schedule by material type is shown below in Table 3-4 and the major features of the open pit design are illustrated in Figure 3-4.

Table 3-4: EFS mine pit phase summary schedule by materials type

EFS Phase	1	2	3	4	5	Total
Waste						
Waste unmineralised (Mt)	25.6	80.4	55.5	211.4	212.0	585.0
Oxide (Mt)	2.3	9.1	3.1	4.0	0.0	18.5
Total waste (Mt)	**27.9**	**89.5**	**58.6**	**215.4**	**212.0**	**603.5**
Ore						
Transition (Mt)	0.75	5.85	1.88	2.91	0.01	11.49
Fresh (Mt)	0.76	6.92	8.30	26.39	28.06	70.43
Total ore (Mt)	**1.5**	**12.8**	**10.2**	**29.3**	**28.2**	**81.9**
Scheduled strip ratio	18.5	7.0	5.8	7.4	7.5	7.4





Pit Phase	Year Mined
EFS Phase 1	Year 1
EFS Phase 2	Year 1 – 3
EFS Phase 3	Year 2 – 5
EFS Phase 4	Year 3 – 10
EFS Phase 5	Year 7 – 13

Hillside Project

Extended Feasibility Study (EFS)
Open Pit Phases

N

Map Projection: MGA Zone 53 (GDA94)
Author/Office/Date: C. Went, Adelaide, 14/11/2017
Contextural sources: Rex Minerals Datasets

Figure 3-4: Pit design major features, in-pit dumps excluded for clarity

3.2.3 Production Schedule Overview

The schedule was designed for 6Mtpa ore production using the following criteria:

- maximum of 65Mtpa total material movement;
- the vertical sink rate was constrained to 10 x 10m benches per annum;
- maximise in-pit placement of waste rock; and
- restrict stripping ratio in any given year to 10:1 (waste to ore).

Ore mined during pre-strip will be stockpiled until plant construction is complete and commissioning commences. Rex expects this to be approximately 13 months from the start of excavations. After an initial pre-strip of around 54Mtpa, the annual total material movement rate is held generally constant at approximately 60Mtpa (see Figure 3-5).

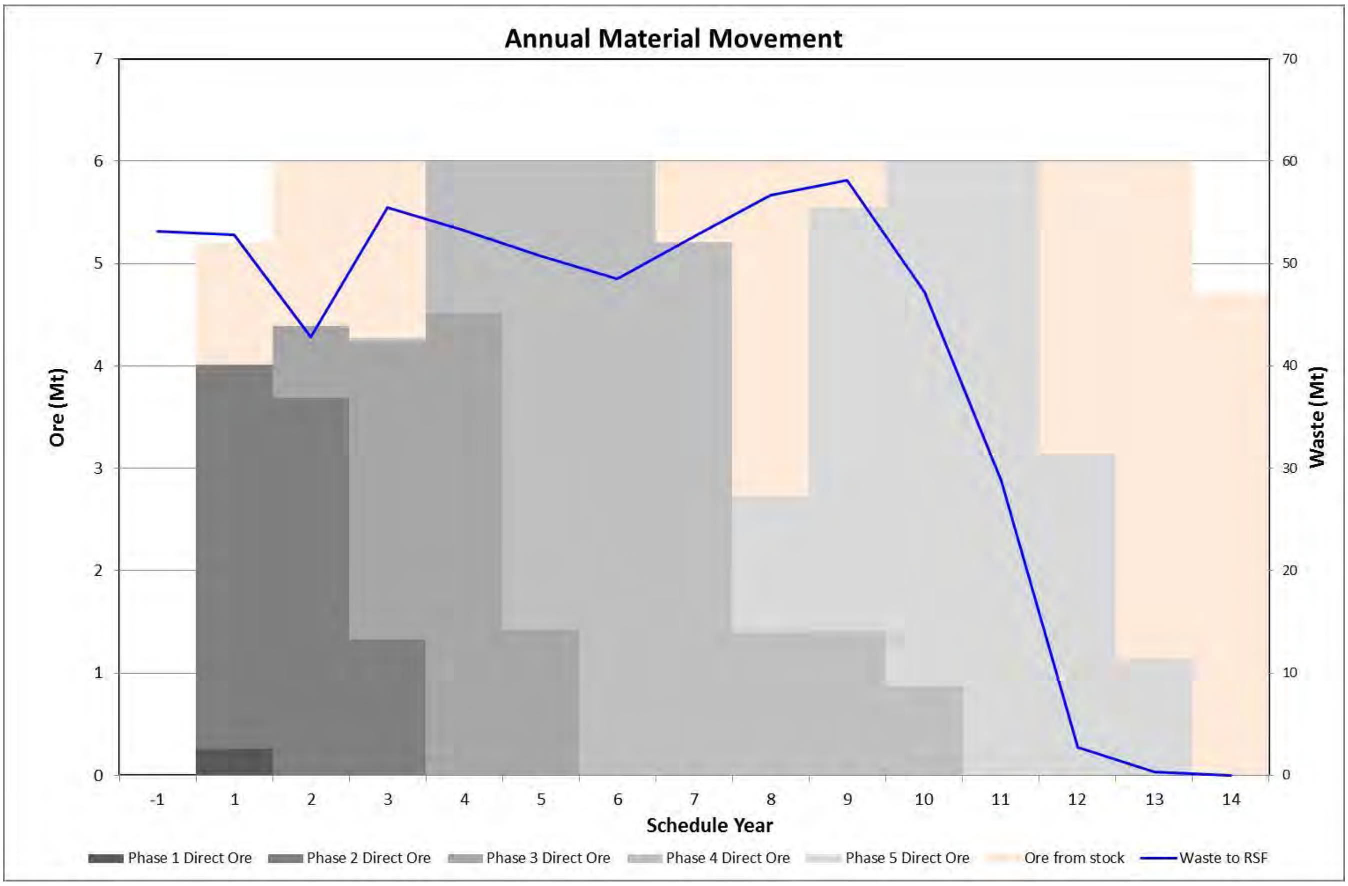


Figure 3-5: Indicative annual ore movement

3.2.4 Open Pit Fleet Overview

During the EFS, mining fleet selection was made to cater for the 95% of pit ore volumes that are best suited to large bulk mining equipment and the remainder which requires more selective mining techniques to reduce dilution. In the narrow vein areas and on contacts with wide geological structures, selective mining with around 250t excavators will be used. These units are capable of loading the approximate 300t haul trucks chosen for the mine fleet. In bulk mining areas, 800t or similar excavators will be used.

Operating requirements are for two 800t excavators or similar and two 250t excavators or similar. Haul truck requirements (EH5000- 296t or similar) increase steadily from nine in Year 1, to a maximum of 16 by Year 8.

There will also be a support fleet including large and mid-sized graders, tracked and wheel dozers, front-end loaders and water and service trucks. The drill requirements for the Project include large diameter drilling on 10m bench heights for production and trim shots using large rotary drills, and smaller diameter holes for pre-split, depressurisation and grade control by ITH hammer units with a reverse circulation kit.

3.2.5 Mining Options

The Project deposit is relatively large with a sub-crop quite close to the surface. Mining of it is economically viable (at current and projected commodity prices and exchange rates) by using low cost bulk mining methods at an ore production rate of 6Mtpa. The other option, i.e., the Stage 2 Project, has been assessed however is uneconomical under current circumstances. It may in future be possible to extend mine life beyond 14 years but further studies will be required after production commences.

RSF – West and the TSF are designed to function as a single stable landform, designated the Integrated Waste Management System (IWMS). The pit will be backfilled with 122Mt of waste, 16Mt of which will be in the southern part of the pit forming part of the above ground RSF – South.

The Project is designed such that all groundwater and any surface water runoff from the active mining areas will be retained within the ML during operations.

3.2.6 Mine Waste

3.2.6.1 Rock storage facilities

There are three RSFs (West, North and South) and separate oxide, low grade and ROM stockpile areas. The dimensions of the rehabilitated shapes are presented below in Table 3-5 and illustrated in Figure 3-6. In establishing them, topsoil will be removed and stored for future Project rehabilitation. Work is ongoing regarding the potential processing of oxide material through the plant. Any material not treated will be stockpiled. As the RSFs are built they will be shaped as close as practical to the final landform design to minimise rehabilitation costs and maximise visual amenity as mining advances. Testing has shown the waste rock materials from the Project have low potential to generate acid and to date this has identified approximately 5% of materials requiring selective storage and encapsulation to prevent acid rock drainage (ARD) (see Section 3.7 for more information).

Table 3-5: Approximate volume, footprint and heights of the RSFs and stockpiles

Location	Volume (Mm^3)	Tonnes (Mt)	Footprint (ha)	Indicative Final Level (mRL)	Indicative Final Maximum Height Above Land Surface at Highest Point (m)
Rock Storage Facilities					
RSF - West (including TSF)	22	47	391	125.5	66
RSF - North	60	132	262	100	65
RSF - South	86	188	212	60~110	68
RSF - in-pit	62	122	n/a	60	0
Tailings Storage Facilities					
TSF embankments	37	81	154	125.5	66
TSF tailings	48	80	92	124.5	65
TSF total	**85**	**161**	**245**		

Location	Volume (Mm^3)	Tonnes (Mt)	Footprint (ha)	Indicative Final Level (mRL)	Indicative Final Maximum Height Above Land Surface at Highest Point (m)
ROM and Stockpiles					
ROM pad/ore stockpile	11	13	52	90	43
ROM live	1		N/A	100	51
Live ore stockpile	2	5	Included in ROM pad/ore stockpile	70	23
Oxide stockpile	9	20	Included in RSF – West	110	62

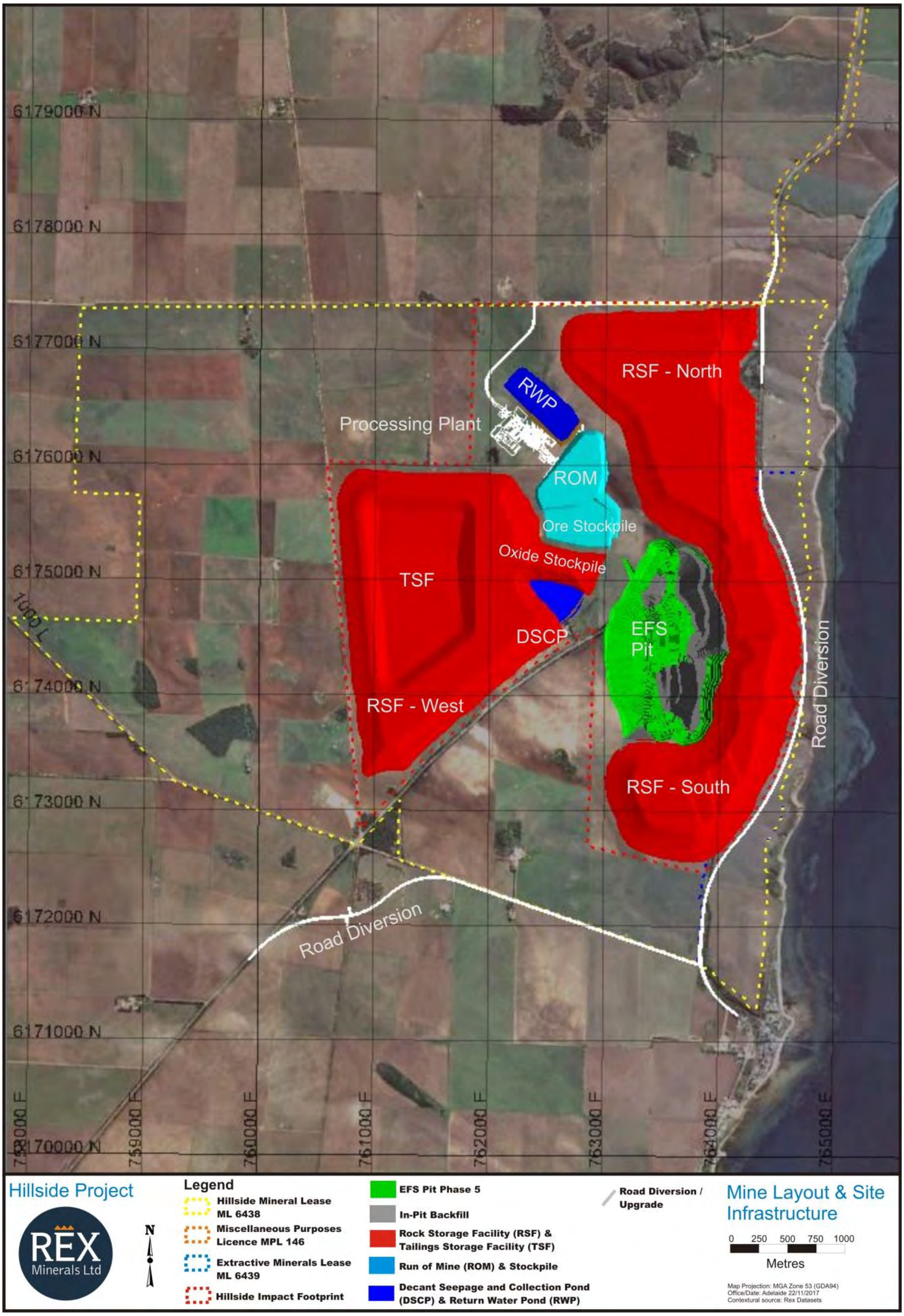


Figure 3-6: Hillside Project site plan showing LOM RSFs and stockpiles

3.2.7 Ore Processing

Rex specified the following criteria for the process plant design and operation:

- copper recovery was to be >92%;
- concentrate grade >25% copper; and
- removal or limiting of deleterious elements including uranium and chlorine to ensure saleable concentrate produced.

The ore milling and copper and gold recovery processes used as the basis for the EFS were developed by way of an extensive metallurgical testing program.

The focus of the metallurgical testing included the following:

- defining the primary grinding and flotation characteristics of ore;
- optimisation of the regrinding and cleaner flotation process;
- mineralogy of primary ore and various flotation products;
- mineralogy and rheology of final tailings;
- metallurgical testing to support trade-off studies of alternative processing routes for both ore and concentrates;
- detailed chemical analysis of concentrates and final tailings to support environmental and commercial requirements; and
- physical testing of ores, concentrates and tailings to support the engineering activities relevant to the completion of the EFS.

3.2.8 Processing Options

A number of processing options were considered when assessing the metallurgical aspects of the Project. A conventional flotation processing method was chosen as the most technically and economically viable method for the separation of copper from the ore.

Saline water will be used in the flotation process. This will be sourced from groundwater available from dewatering the open pit and supplemented with saline water drawn from a borefield located within the ML. Final copper concentrate will be filtered and cake washed using fresh water to remove chloride ions (<200 parts per million (ppm)). This is the only point in the process flowsheet that requires the use of fresh water, hence Rex has minimised the freshwater requirement for the overall process.

3.2.9 Flotation Results

The copper grade and recovery test work results from the two stage (coarse and fine) cleaner flotation and regrind circuits result in a predicted overall copper recovery of 92.4% and concentrate grade of 27% copper, 5.9ppm gold, 41ppm uranium and chloride below 200ppm.

3.2.10 Concentrator Design

The Hillside Project's copper concentrator facility will include all ore processing facilities from primary crushing to concentrate storage and tailings disposal. The proposed design flowsheet consists of unit processes in general use throughout the minerals processing industry and commonly used in copper flotation processing. Typical of feasibility level studies, composite, variability and semi-continuous pilot test work has been conducted to support the design basis flowsheet.

The plant design is based on a single processing train configuration, with a nameplate capacity ore feed rate of 6Mtpa.

The key unit steps in the process flowsheet are, including study design parameters:

- comminution circuit consisting of primary crushing and a two-stage grinding circuit to achieve a P80 of 125µm (in Year 1 to 2 of the operation) to a P80 of 15µm (in Year 3 and beyond);
- conventional copper rougher flotation;
- regrind of copper rougher concentrate to P80 of 26µm;
- cleaner flotation and mechanical cleaner scavenger flotation at a P80 of 2µm, (28% copper @ 70% copper recovery);
- regrind of cleaner scavenger concentrate (P80 of 26µm) to a P80 of 14µm;
- cleaner flotation and mechanical cleaner scavenger flotation P80 of 14µm, (26% copper @ 22% copper recovery);
- final copper concentrate grading 27% copper @ 92.4% copper recovery;
- impurity levels for the final copper concentrate are very low, with the main impurity being silica at around 3.0%, uranium and arsenic levels are also low at less than 41ppm and 42ppm respectively;
- copper concentrate thickening, pumping, washing, filtration and storage;
- copper concentrate transportable moisture level 10.8% for proposed particle size – filtration test work achieves 9.5% moisture content; and
- tailings thickening and disposal.

3.2.11 Product Handling

The concentrate storage shed has been designed to provide an environmentally sound storage for the concentrates. The total storage capacity allowed for within the shed is around 1500t of concentrate. A front-end loader will operate inside the shed to reclaim the concentrate dried by the filter and load the concentrate trucks on a dedicated truck weighbridge located within the concentrate shed.

The copper concentrate will be transported from the mine site to Port Adelaide, by road train trucks of 55t payload. Each truck will carry two covered containers, specially designed to transport concentrate and to be emptied by rotating them in the hold of a carrier vessel. Transport will be operated by a subcontractor. It is estimated that an average of seven trucks per day will be required to transport the concentrate to the port. Concentrates will be stored at the port in the containers prior to loading.

3.2.12 Tailings Storage Facility

The main design concept for an IWMS is to incorporate the deposition of tailings with the deposition of waste rock, thereby minimising the number of freestanding facilities.

This will utilise the existing topography by constructing the confining embankments along ridge lines and depositing tailings within the enclosed valley. Construction of the West RSF around the perimeter of the TSF will form the IWMS.

An estimated annual average of 5.73Mtpa of tailings will be produced and deposited into the TSF. Tailings are thickened to a density of approximately 58% solids. Tailings thickener underflow is pumped to the TSF, while the tailings thickener overflow gravitates to the process water pond.

Geochemistry test work has determined that 25% of the tailings are classified as potentially acid forming (PAF), however, this material has an ANC/MPA ratio of 2.16 indicating the there is a high probability that all of the tailings material will remain circum-neutral in pH (Australian Government 2016a) (see Section 3.7 for further information). Pilot plant test work conducted on a composite representative ore sample from the open pit ore body indicates that the tailings have a very low potential of acid generation as the acid neutralising capacity far exceeds the acid generating capacity.

The design criteria adopted for the TSF are based on South Australia's Environment Protection Authority's (EPA) guidelines and the Australian National Committee on Large Dams' (ANCOLD 2012) guidelines. The design has been assessed and approved by ATC Williams Pty. Ltd. (refer to Appendix 3.4-A) and reviewed by independent TSF consultant Dr D. Williams (see Appendix 7.3-E).

Tailings levels in the TSF over time, the rainy season storage allowance, extreme storage allowance and contingency storage allowance have been considered. The embankment staging schedule is shown in Table 3-6.

Table 3-6: TSF staged storage duration summary

Stage	Embankment Raise Elevation (mRL)	Tailings Volume	
		Incremental Storage Duration (Years)	Cumulative Storage Duration (Years)
Lift (TSF Stage) 1	81.5	1	1
Lift (TSF Stage) 2	92.5	2	3
Lift (TSF Stage) 3	102.5	3	6
Lift (TSF Stage) 4	111.5	3	9
Lift (TSF Stage) 5	119.5	3	12
Lift (TSF Stage) 6	125.5	3	15

*Note: These are heights above sea level – heights above land surface are lower – ranging from 45–70m maximum height for Stage 6. Note also the term TSF stage refers to the TSF lift ('stage' is the terminology used by ATC Williams) and is not linked to the EFS Stage 1 or BFS Stage 2 project terminology. All six lifts/TSF stages are for the EFS (Stage 1) Project.

3.3 Reserves, Product and Market

3.3.1 Ore Reserves and Mineral Resources

Provide:

- *a statement of the current ore reserve and mineral resource estimates in the tenement area and a brief description of the basis of this estimate; include Australasian Joint Ore Reserves Committee (JORC) compliant reserve and resource estimates (and categories) if available; and*
- *a statement of what reserve and/or resource forms the basis for the mining operation, or,*
- *an estimate of the resource to be mined, the basis of this estimate, and demonstrate that the resource can be economically mined at current commodity prices, and*
- *steps that have been taken to ensure mining operations will not sterilise/prevent future extraction of mineral resources.*

The Hillside Project mineral resource is estimated to be 337Mt at 0.6% copper and 0.14g/t gold at a copper cut-off grade of 0.2%. This equates to approximately 2.0Mt (4.3 billion pounds) of copper and 1.4Moz of gold (see Table 3-7 and Appendix 3.2-A).

Table 3-7: Hillside measured, indicated and inferred mineral resource summary table – May 2015

Zone	Resource Category	Tonnes (Mt)	Copper (%)	Gold (g/t)	Contained Copper (t)	Contained Gold (oz)
Oxide copper	Measured	16	0.54	0.23	86,400	118,315
	Indicated	4	0.51	0.13	20,400	16,718
	Inferred	0.2	0.7	0.2	1,400	1,286
Secondary sulphide	Measured	9	0.61	0.20	54,900	57,871
	Indicated	3	0.55	0.12	16,500	11,574
	Inferred	0.1	0.6	0.1	600	322
Primary sulphide	Measured	47	0.54	0.16	253,800	241,774
	Indicated	144	0.59	0.13	849,600	601,862
	Inferred	114	0.6	0.1	684,000	366,519
Total		**337**	**0.6**	**0.14**	**1,967,600**	**1,416,240**

Copper Resources reported above 0.2% cut-off grade.
Measured and Indicated Resources are rounded to two significant figures and Inferred Resources are rounded to one significant figure.

The Hillside Project mineral resource includes information from 608 diamond holes and 245 reverse circulation (RC) holes for a total of 239,000m.

The Hillside Ore Reserve is 82Mt at 0.62% copper and 0.16g/t gold, equating to approximately 0.51Mt (1.12 billion pounds) of copper and 0.43Moz of gold (see Table 3-8).

Table 3-8: Hillside Ore Reserve – May 2015

Category	Tonnes (Mt)	Copper (%)	Gold (g/t)	Contained Copper (t)	Contained Gold (oz)
Proved	42	0.55	0.19	228,049	250,454
Probable	40	0.70	0.14	281,213	181,051
Total	**82**	**0.62**	**0.16**	**509,262**	**431,504**

The Hillside Ore Reserve estimate was created from a detailed mine design. A pit shell was selected using discounted cash flow methodology from a Lerch Grossman open pit optimisation which was used as a starting basis for the mine design.

Metallurgical recoveries of 92% for copper and 78% for gold were based on extensive geometallurgical test work studies. Key input parameters including commodity prices and exchange rate for this estimate are shown in Table 3-9 below. All Ore Reserve tonnes exist within an open pit design that has been fully scheduled and costed in-line with work completed as part of the Hillside EFS. Detailed information with regards to JORC compliance for the Ore Reserve report is provided in Appendix 3.2-A.

Table 3-9: Commodity price and exchange rate assumptions for Hillside Ore Reserve estimate – May 2015

Commodity and Exchange Rate	Assumptions
Copper (US$ real)	US$3.00/lb
Gold (US$ real)	US$1,250/oz
Exchange rate (AUD:USD)*	0.70

* Quotes for the pre-production capital cost estimates in the EFS assumed an exchange rate of 0.75. A longer term exchange rate forecast of 0.70 was used for the life of the operation.

The Project's ore processing plant will produce a copper/gold concentrate which will be marketed and sold to a variety of smelters throughout the world. Table 3-10 below indicates the schedule of annual production of mine gate copper concentrate production over life of mine.

Table 3-10: Annual copper concentrate production over life of mine

Year	Copper/Gold Concentration (kt)	Assay Copper (%)	Assay Gold (g/t)	Contained Copper (kt)
1	109.8	30.8	10.8	33.8
2	108.1	29.3	7.1	31.7
3	87.6	29.5	8.4	25.9
4	120.7	28.1	6.0	33.9
5	139.3	28.1	5.9	39.1
6	129.0	27.0	7.2	34.9
7	110.6	27.0	7.9	29.9
8	86.4	27.4	6.8	23.6
9	127.0	27.0	5.2	34.3
10	183.7	27.0	4.6	49.6
11	206.8	27.0	4.1	55.8
12	150.3	27.0	4.0	40.6
13	102.5	27.3	4.9	28.0
14	34.6	27.8	9.7	9.6

3.3.1.1 Future conversion of Mineral Resources to Ore Reserves and Iron Ore

The EFS is based on the Ore Reserve (derived from Indicated and Measured Resources) as shown in Figure 3-7. There exists a small proportion of oxide resource within the pit shell that has the potential to be converted to an Ore Reserve once further metallurgical test work is complete.

Iron ore has been removed from the May 2015 Mineral Resource Statement. Given the 2015 Iron ore market conditions which are still relevant and which drove the reduction in scale of the initial mine plan and plant design, the removal of iron ore from the Mineral Resource and the Ore Reserve estimates is appropriate. Rex may look to reinstate iron ore as a Mineral Resource in the future should circumstances change.

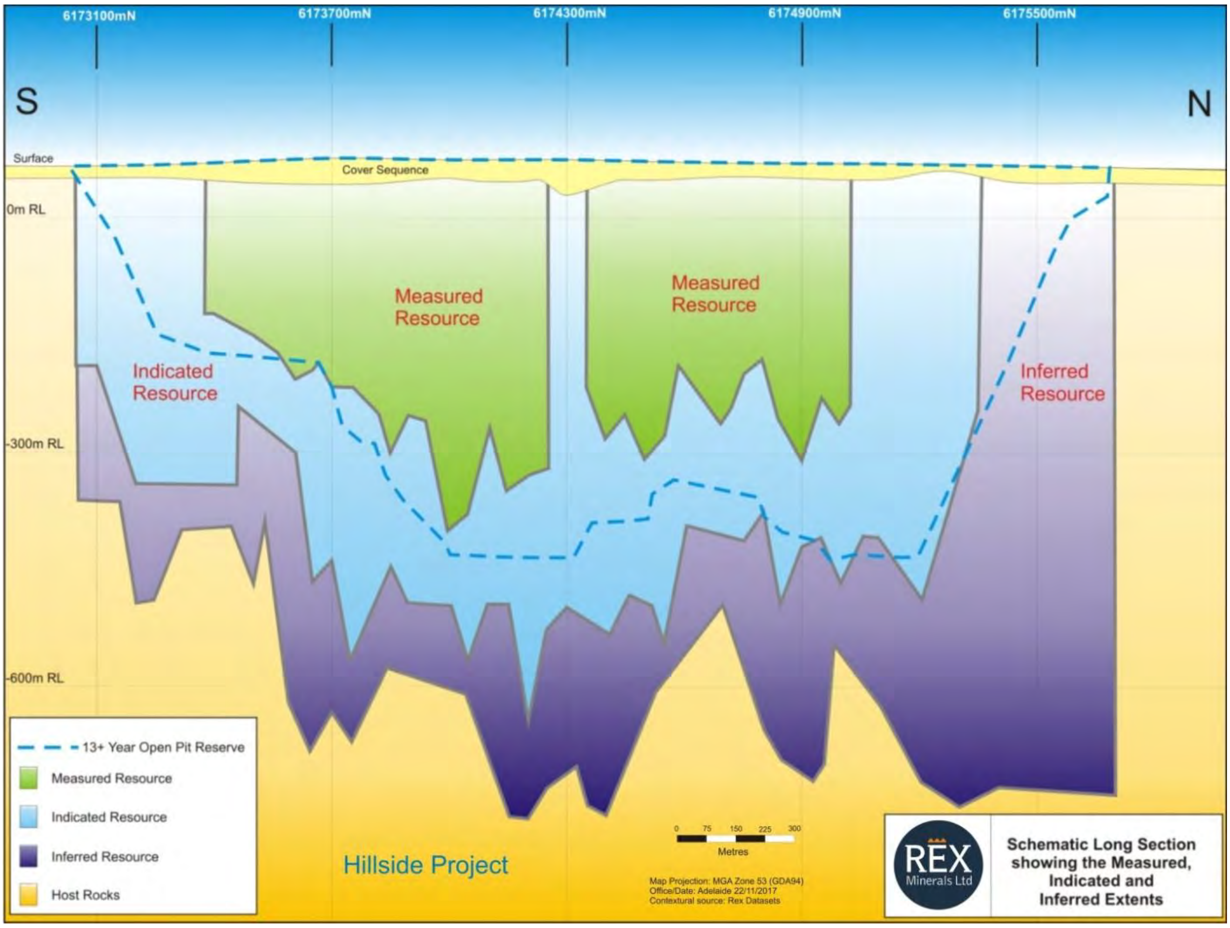


Figure 3-7: Schematic long section showing the location of the Measured, Indicated and Inferred Resources (view looking to the west)

3.3.1.2 Assessment and reporting criteria table Mineral Resource and Ore Reserve – JORC 2012

The full Hillside Project – Mineral Resource and Ore Reserve Update was released to the ASX on 25 May 2015[1]. This document is available on the Rex website and as Appendix 3.2-A, and includes the Competent Person Statements and the Assessment and Reporting Criteria Table for Mineral Resources and Ore Reserves – JORC 2012.

3.3.1.3 Steps that have been taken to ensure mining operations will not sterilise/prevent future extraction of mineral resources

There are a range of options for the transition from the Stage 1 pit (EFS) design to a Stage 2 design if the economic situation warrants an expansion of the pit and exploitation of the resources at depth.

During the Stage 1 Project, the iron ore is not processed concurrently with the copper-gold ores but stored as tailings. The containment of iron ore in the TSF ensures that all the iron in the ore can be recovered at any stage.

[1]<http://www.rexminerals.com.au/-/rex/Lib/Docs/20150525_Mineral%20Resources%20and%20Ore%20Reserves_Hillside_Statement%20and%20Table%201.pdf>

The iron ore in the tailings can be retreated in a reconfigured processing plant after the cessation of copper-gold mining if the iron ore price can support the processing.

The remaining copper-gold Mineral Resources extend below the current Ore Reserves. Hence access to these would require enlarging and deepening the existing pit to the size outlined in the Mining Lease Proposal (MLP), and if future economics are favourable continuing with a potential underground operation.

The two most practicable options for continuation of copper-gold mining and potential recovery of iron ore in the future are provided below:

Stage 2 – Option 1:

In this scenario, all the material is mined within the Stage 1 Project (EFS) and the mine is closed, RSFs are rehabilitated, and the plant put on care and maintenance until the metal price recovers sufficiently to warrant an economically viable continuation of the Project.

If economic conditions can be justified, the mine may be restarted. This would require the relocation of waste materials to provide room for a pit cut-back necessary to access ore at greater depths. The original RSF and TSF footprint will be used to relocate the waste materials. The pit design would be like that outlined in the MLP (i.e., Stage 2 or BFS Phase 6 design).

RSF Option 1 would require the use of land outside the proposed Stage 1 footprint but within the existing ML for expansion of the RSF after Year 14. This would require additional negotiation over land access and purchase.

The iron ore in the tailings could be re-claimed and processed either concurrently or later if this proved economically viable. Figure 3-8 to Figure 3-12 show the cross-sections of the Stage 1 (EFS Phase 5) and MLP (BFS Phase 6) pits together with the in-pit waste stockpiles and RSF.

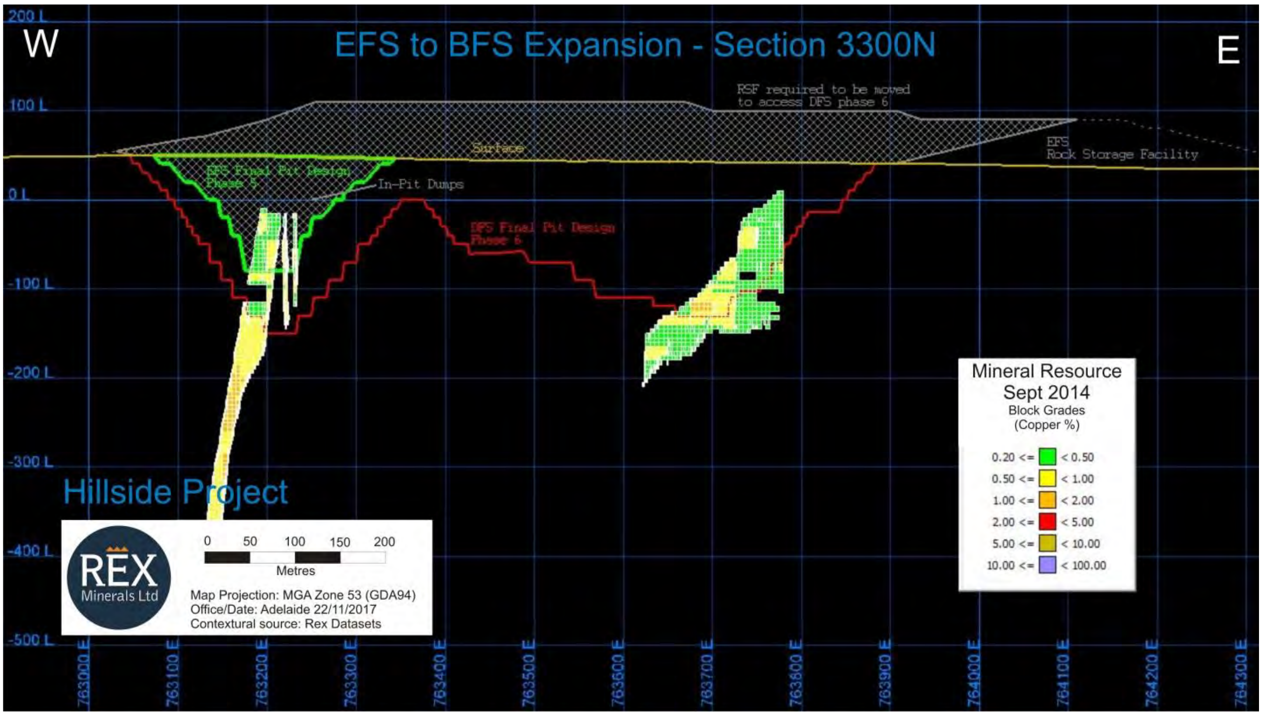


Figure 3-8: Section 3300N looking north

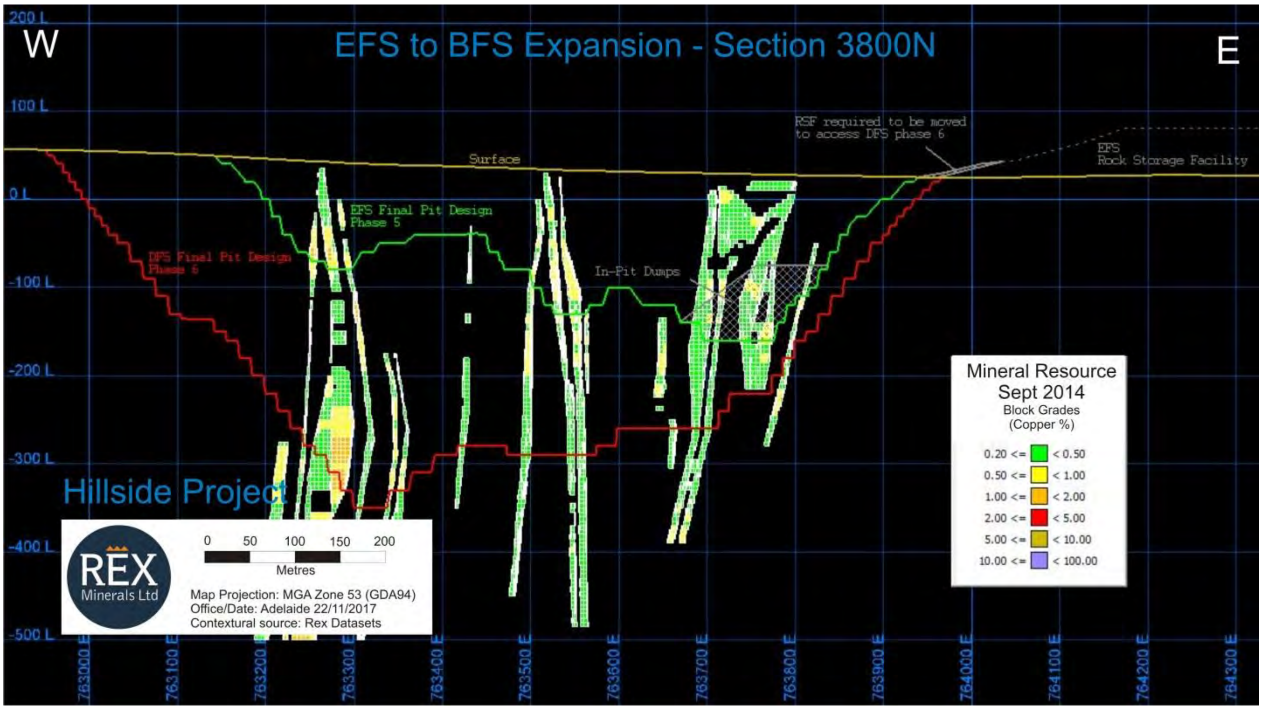


Figure 3-9: Section 3800N looking north

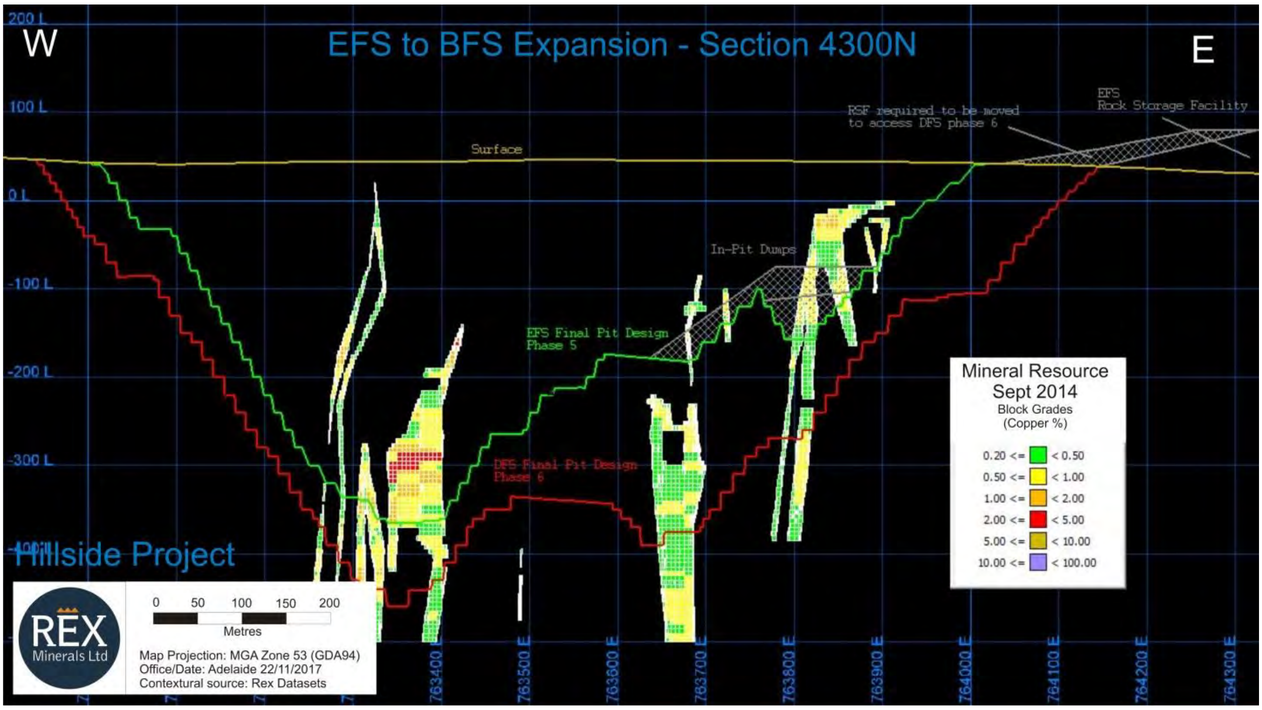


Figure 3-10: Section 4300N looking north

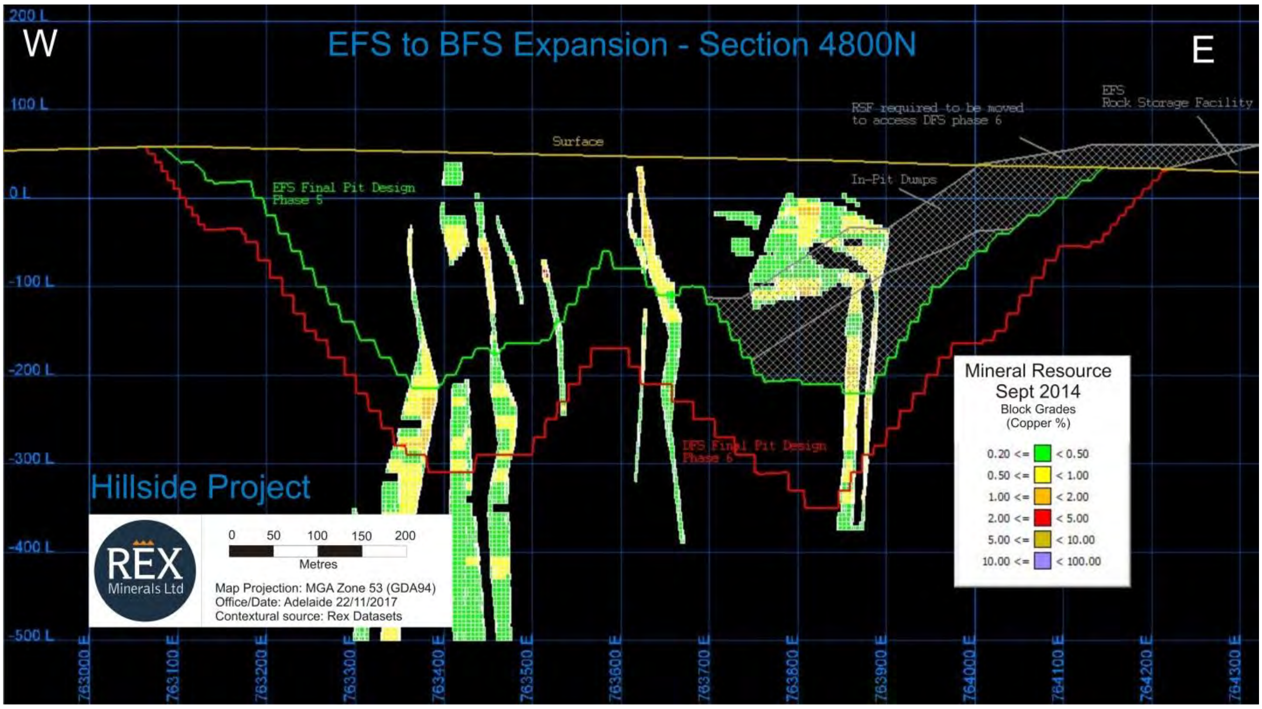


Figure 3-11: Section 4800N looking north

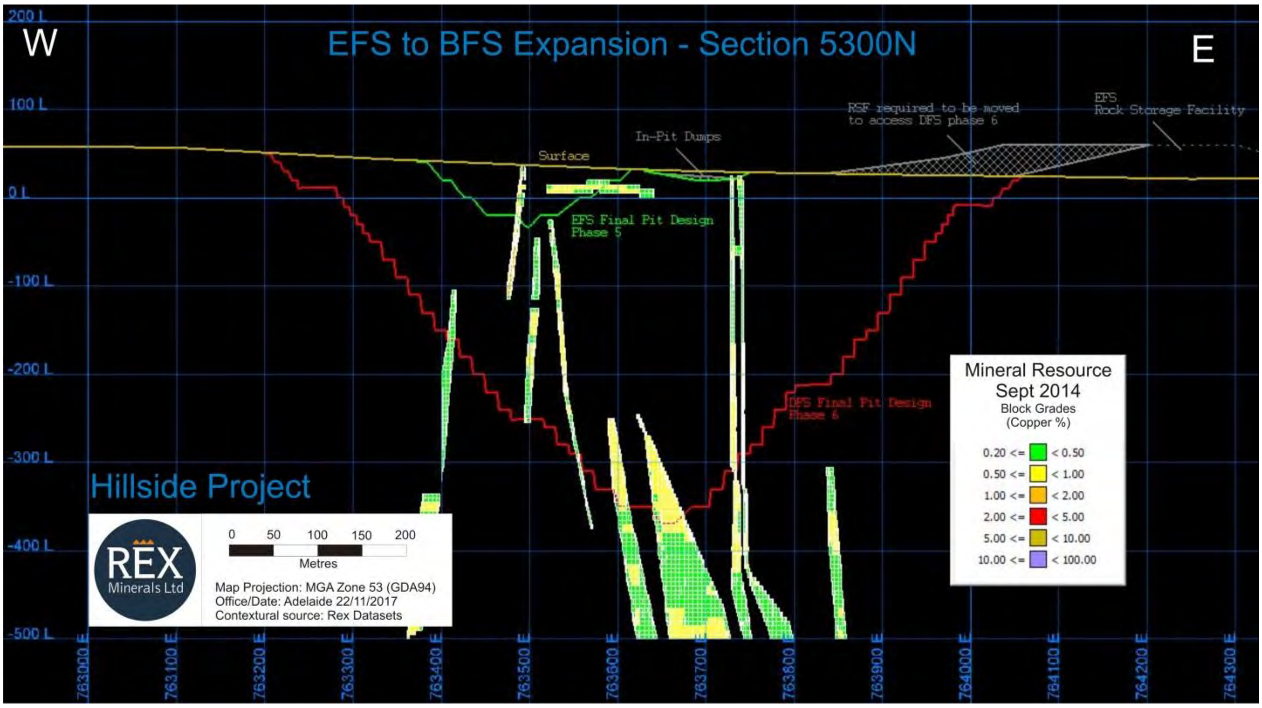


Figure 3-12: Section 5300N looking north

Stage 2 – Option 2:

In this option, mining proceeds as per the Stage 1 (EFS) Project, and by approximately Year 5 of operation, a decision is made that the pit could expand to the full MLP design (Stage 2 or BFS Stage 6) based on recovery in metal prices which support an economically viable project. The placement of RSF over the southern end of the Stage 1 pit and later to the north is delayed preventing rehandle. Hence Option 2 would also require the use of land outside the proposed Stage 1 footprint but within the existing ML for expansion of the RSF after Year 5 of operation. If the decision was made to expand then, an additional 93Mt of waste material on the RSF could be placed further away from the expanded pit to avoid rehandle. Additional approvals would be required to progress this option.

3.3.1.4 Extractive minerals

The proposed EML will produce approximately 60,000m^3 of excess materials from the construction of the Yorke Highway diversion. The material will be a mixture of sand, clay, limestone and gravel to be predominantly used as fill material for the Pine Point Road diversion southwest of the proposed EML. The transport of extractive material is required for approximately three years.

3.3.2 Commodities List

3.3.2.1 Refined metals

No refined metals will be produced at the Hillside Project processing plant.

3.3.2.2 Mineral ores and concentrates

The copper and gold ores being treated each year are tabulated below in Table 3-11 (for concentrate grades pertaining to output from the concentrator refer to Table 3-10).

Table 3-11: Copper and gold ore being treated each year

Year	Mill Feed (kt)	Copper Grade (Cu%)	Gold Grade (Au g/t)	Contained Copper (kt)	Contained Gold (koz)
1	5200	0.728	0.267	37.9	44.7
2	6000	0.586	0.157	35.2	30.3
3	6000	0.482	0.151	28.9	29.2
4	6000	0.616	0.152	37.0	29.3
5	6000	0.708	0.170	42.5	32.8
6	6000	0.624	0.199	37.5	38.3
7	6000	0.537	0.189	32.2	36.5
8	6000	0.429	0.134	25.8	25.9
9	6000	0.614	0.152	36.8	29.4
10	6000	0.880	0.184	52.8	35.6

Year	Mill Feed (kt)	Copper Grade (Cu%)	Gold Grade (Au g/t)	Contained Copper (kt)	Contained Gold (koz)
11	6000	0.989	0.186	59.3	35.8
12	6000	0.723	0.138	43.4	26.6
13	6000	0.503	0.117	30.2	22.6
14	4721	0.228	0.100	10.8	15.2
Total/*Average*	**81,921**	***0.623***	***0.164***	**509.3**	**431.5**

3.3.2.3 Gems and semi-precious stones

No gems or semi-precious stones will be produced.

3.3.2.4 Industrial minerals

No industrial minerals will be produced.

3.4 Exploration Activities

Provide information that details all exploration activities to be undertaken within the tenement area as a part of the mining operation, including:

- *purpose of the activities (i.e., resource drill-out or resource extension);*
- *types of drilling;*
- *geophysical techniques likely to be used;*
- *earthworks required to conduct exploration activities;*
- *equipment required to conduct exploration activities; and*
- *rehabilitation methods for exploration works (including that not yet rehabilitated from previous tenure).*

Any clearance of native vegetation due to exploration activities that had not been rehabilitated at the grant of the mining lease or licence must be included within the significant environmental benefit calculations detailed within the native vegetation management plan.

The Hillside discovery was made as a result of exploration drilling of discrete magnetic and gravity features observed to be spatially associated with the regional north-northeast trending Pine Point Fault Zone and coincident with the historical Hillside copper-gold mine.

The exploration program at Hillside has relied heavily on the use of geophysical techniques, surface geochemistry and various drilling methodologies. This style of work will continue throughout the proposed operation of the Hillside Project, within the proposed EL area with the aim of further delineating extensional and additional resources and producing samples for future geotechnical and metallurgical testing.

3.4.1 Drilling Techniques

Drilling activities will utilise a combination of diamond core, reverse circulation, rotary mud and aircore methodologies.

3.4.1.1 Diamond drilling

The majority of drilling to be undertaken will be diamond core drilling. Hole depths will typically range between 50m and 1,000m. Drill collar spacings will vary depending upon the specific requirement. Diamond drill core sizes will typically range from PQ (122mm diameter) to NQ (76mm diameter).

The drill rigs utilised for this type of work will vary depending on the contractors engaged to provide drilling services and the equipment they have available. Rigs may be track mounted or based on conventional trucks. Rex requires drillers to have an operational configuration that is as compact as possible to minimise disturbance by vehicles to farming land. Access to the exploration sites will be as per the drilling programs completed to date at Hillside, along existing roads and farm tracks as far as possible, and then by driving over open, cleared farmland. Field inspection of the potential drill sites indicates no disturbance of native vegetation will occur.

Over the course of exploration at Hillside, Rex has constantly improved the design for drill pads, and will continue to do so as new materials become available and methodologies are improved. The key elements of the current drill pad design are summarised below.

- No sumps are dug; above ground tanks are used to receive return drilling muds for recirculating back down the drill hole.
- No earthworks are required for pad preparation. A length of plastic is laid out under the entire drill site, with coconut fibre pinned down on top of the plastic to provide a non-slip work area.
- The dimensions of a drill pad do not exceed 20m by 30m.
- Access to drill sites is determined in consultation with the relevant landholder, and generally abides by the following protocols:
  - existing tracks are used wherever possible;
  - if new tracks are to be created, they follow paddock edges wherever possible; and
  - coconut fibre/coir matting is used where deemed necessary.

Water for diamond drilling will generally be sourced from Rex’s own independent supply and supplemented, if required, by mains water supplied by the SA Water pipeline then carted to the proposed drill site.

Spent drilling muds and associated drill cuttings will be pumped out of the above ground storage tanks at each drill site and disposed of at an authorised location, such as a purpose-built facility at Hillside or the TSF. The drilling mud additives are biodegradable and do not pose any long-term waste management issues.

3.4.1.2 Reverse circulation drilling

Reverse circulation (RC) drilling is used both as a pre-collar to diamond drill holes, and as a stand-alone drilling method. The protocols around RC drilling are very similar to those applying to diamond core drilling. An additional requirement for RC drilling is to manage water intersected down hole. Drill site preparation for RC drilling will involve plastic sheeting placed under the immediate operational area. Intersected water is contained in tanks at the drill site and pumped out and disposed of as per diamond drilling. Should unexpected volumes of water be intersected, drilling would cease. Drill cuttings will be bagged at the drill site, and disposed of post-drilling at an authorised location, such as a purpose-built facility at Hillside or within the TSF.

3.4.1.3 Mud drilling

Mud drilling will occasionally be used as a pre-collar to diamond drill holes, or as a standalone method for drilling water bore holes. The protocols for mud drilling are essentially the same as those used for diamond core drilling.

3.4.1.4 Aircore, rotary air blast and auger drilling

Aircore (AC), rotary air blast (RAB) and auger sampling are utilised to provide systematic drill coverage and media for geochemical sampling in areas that are typically subject to thin cover sequences obscuring basement rocks or their weathered equivalents. The protocols for AC, RAB and auger sampling are essentially the same as those used for diamond core drilling. Aircore drill holes are typically up to 75mm diameter, and the depth of drill holes typically range from 0m to 50m, with holes on some occasions drilled as far as 100m.

Access to AC drilling locations will be via formed tracks wherever possible, and beyond this by driving vehicles off tracks and through paddocks. Vehicles are maintained in a single file configuration when required.

Drill site preparation for AC drilling will involve plastic sheeting or shade cloth being placed under the immediate operational area of the rig to catch any miscellaneous drill cuttings that may be spilled. Samples will be laid out on an impermeable plastic sheet, enabling more effective final rehabilitation.

A small reserve of drilling water will be maintained on the drill rig to enable water injection if required to assist the drilling process. This water will be sourced as per the protocols outlined for RC and diamond drilling.

Drill cuttings from RAB or AC drilling will be initially laid out on plastic matting whilst a hole is being drilled. Upon completion of the hole, unrequired drill cuttings will be tipped back down the hole, on a last out – first in basis. Excess material may be buried in a shallow pit or bagged and removed from site, to be disposed of at either the Hillside facility or an approved waste disposal location.

3.4.1.5 Other exploration methods

Trenching, costeaning and bulk sampling activities may be conducted over the life of mine. If these activities occur within the lease area, it will occur within the open pit footprint for grade control in the saprolite or transition zone. As such, any trenches, costeans or bulk sampling areas will be excavated as part of the normal open pit mining activities. While trenching, costeaning or bulk sampling outside the final pit footprint is not currently planned, there may be some use of these techniques on a small scale within the lease area. Any such disturbance would be filled and rehabilitated after use in line with the general land disturbance rehabilitation techniques detailed in Section 3.10.

3.4.2 Rehabilitation for Exploration Works

Rehabilitation of drilling operations is undertaken in line with the current guidelines and generally immediately following completion of work. In some instances, completion of rehabilitation may be delayed due to seasonal factors. For example, the ripping of soil and application of gypsum is best undertaken at the onset of autumn rain as opposed to the middle of summer. On occasion, Rex may seek the input of an independent agronomist for advice on how a rehabilitation issue should be addressed.

Rex owns and manages 1,250ha of cereal cropping land within its leases at the project site, with the Hillside deposit being approximately 2km long by 600m wide (120ha) within this land. The Hillside Project site was intensively drilled over the period 2009–2013. Commercial cropping was not undertaken over the Hillside area during this time period. However, after rehabilitation as per the procedures below, cropping resumed in the 2014 season and analysis of the crop yields has shown that 97% of the 616 drill pads showed no discernible reduction in yield over those drill pads compared to yields prior to exploration work (see Figure 3-13 and Figure 3-14).

Figure 3-13: Hillside site – circa 2011. Intensive exploration drilling activities

Figure 3-14: Hillside site – July 2014. Fully cropped

3.4.2.1 Diamond, RC and mud drilling

The modern forms of these drilling methods have minimal impact. Rehabilitation of impacts is undertaken as follows:

- following the completion of drilling activities, all vehicles and equipment are removed from site;
- any rod grease or other foreign materials that may have accumulated around the drill collar are collected, removed from site, and disposed of at an appropriate facility;
- for diamond and RC drilling, the coir matting and the plastic sheeting underlying it are rolled up and removed;
- coir matting laid on access tracks is rolled up and removed from site;
- polyvinyl chloride (PVC) collar pipes are initially capped upon completion of drilling. Final rehabilitation involves the pipe being cut off and removed at a depth of at least 50cm, plugged with a tapered concrete plug or PVC end cap, and backfilled with topsoil to restore the original landform; and
- a photo record is maintained of sites before drilling and after rehabilitation, together with periodic monitoring post-rehabilitation (typically to record crop regrowth). All holes are recorded with differential GPS to ensure the right location can be found post-rehabilitation.

3.4.2.2 Aircore, rotary air blast and auger drilling

Aircore, RAB and auger drilling also have minimal rehabilitation requirements as a result of the protocols employed during drilling. Some aspects of drill site rehabilitation are discussed in Section 3.4.2. In addition to these measures, the following steps are undertaken:

- drill holes are plugged with a suitable plug (e.g., with suitable plastic cones, 'octoplugs' or similar) to a depth of at least 50cm and backfilled with topsoil;
- all materials brought to site (e.g., plastic sheeting) are removed to be either reused or disposed of at an appropriate facility; and
- a representative photographic record of all impacts and rehabilitation is maintained.

3.4.3 Geophysical Techniques

In conjunction with proposed drilling techniques, various geophysical methods will be used from time to time. The following methods are likely to be used:

- magnetic surveys, both ground and airborne;
- gravity surveys (ground based) and/or airborne surveys;
- electromagnetic (EM) surveys, both ground based and airborne;
- induced polarisation (IP) surveys (ground based); and
- down hole surveys (e.g., EM).

All the proposed geophysical methods are low impact in nature, and as such no specific management protocols are outlined. Geophysical surveys will be undertaken in accordance with the Department's generic PEPR for Low Impact Mineral Exploration in South Australia.

3.4.4 Rehabilitation of Core Farm

The existing core farm will be removed prior to open pit operations commencing. The resultant disturbance footprint will then be incorporated into the open pit and RSF – South and will be rehabilitated as per the closure plan for those domains (see Section 3.10.2).

The core farm will be relocated to the west of the mine access road. The size of the new core farm will be approximately 12ha as shown in Figure 3-15.

All core is and will be stored on pallets with the top core trays of each pallet covered to protect the core from weather and prevent degradation. Pulp samples will be stored in drums with lids. Both core and pulp samples will be stored for the life of the project.

Prior to any core or pulp disposal, Rex will contact the relevant Department so the Department can select core they wish to retain at the State Core Library. Any remaining core or pulp samples (removed from any bags) will be disposed of either in an RSF or, should all areas have been rehabilitated, at an EPA licenced landfill.

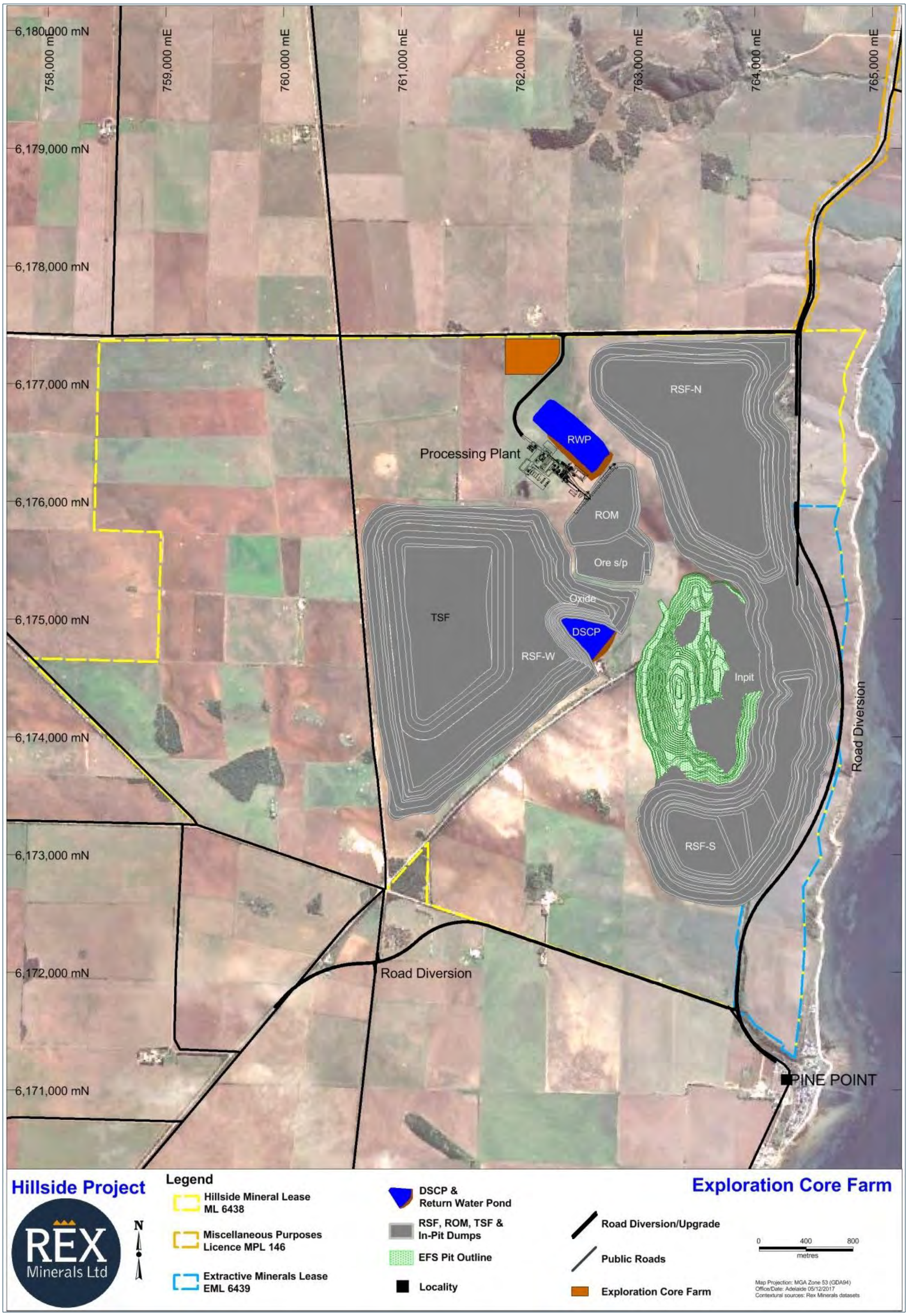


Figure 3-15: Exploration core farm

3.4.5 Ancillary Earthworks and Equipment

Farm machinery such as tractors with ploughs or rippers may be required from time to time to rehabilitate compaction of trafficked areas.

3.5 Mining Activities

3.5.1 Type of Mining Operations

Type or types of mining operation to be carried out. Provide a clear statement on the type or types of mining operation to be carried out, such as: the mining method(s) to be adopted.

3.5.1.1 Mining method(s) adopted

The Hillside Project Mineral Resource is to be mined using conventional open pit mining methods. The overburden will be free dug. The harder transitional to fresh ore and waste will be drilled and blasted. The material will be loaded using hydraulic backhoe excavators and hauled using ultra-class trucks. The pit will be mined in a series of five phases (pushbacks) with generally two sequential phases active at a time. During the Stage 1 Project, some parts will be backfilled to minimise haulage and surface disturbance. This can be easily removed later if the pit is to be extended.

3.5.2 Open Pit

Describe, for the life of mine from inception to cessation, all open pit workings, including (but not limited to):

- *overall pit wall angles, bench height, berm width;*
- *dimensions and depth of pit;*
- *access ramps; and*
- *maps, plans and cross-sections.*

3.5.2.1 Overall pit wall angles, bench heights and berm widths

The area of interest for the open pit has been divided into different geotechnical domains based on the geotechnical assessment conducted by Mine Technics 2013 (see Figure 3-16) below. Each domain was carefully assessed and a set of recommended pit wall design parameters (including batter angle, berm width and inter-ramp slope angle) under three operating regimes were given. Due to the selected mining rate, the regime C design guidelines were selected and will require stability monitoring, micro-seismic monitoring and real-time pit wall depressurisation monitoring.

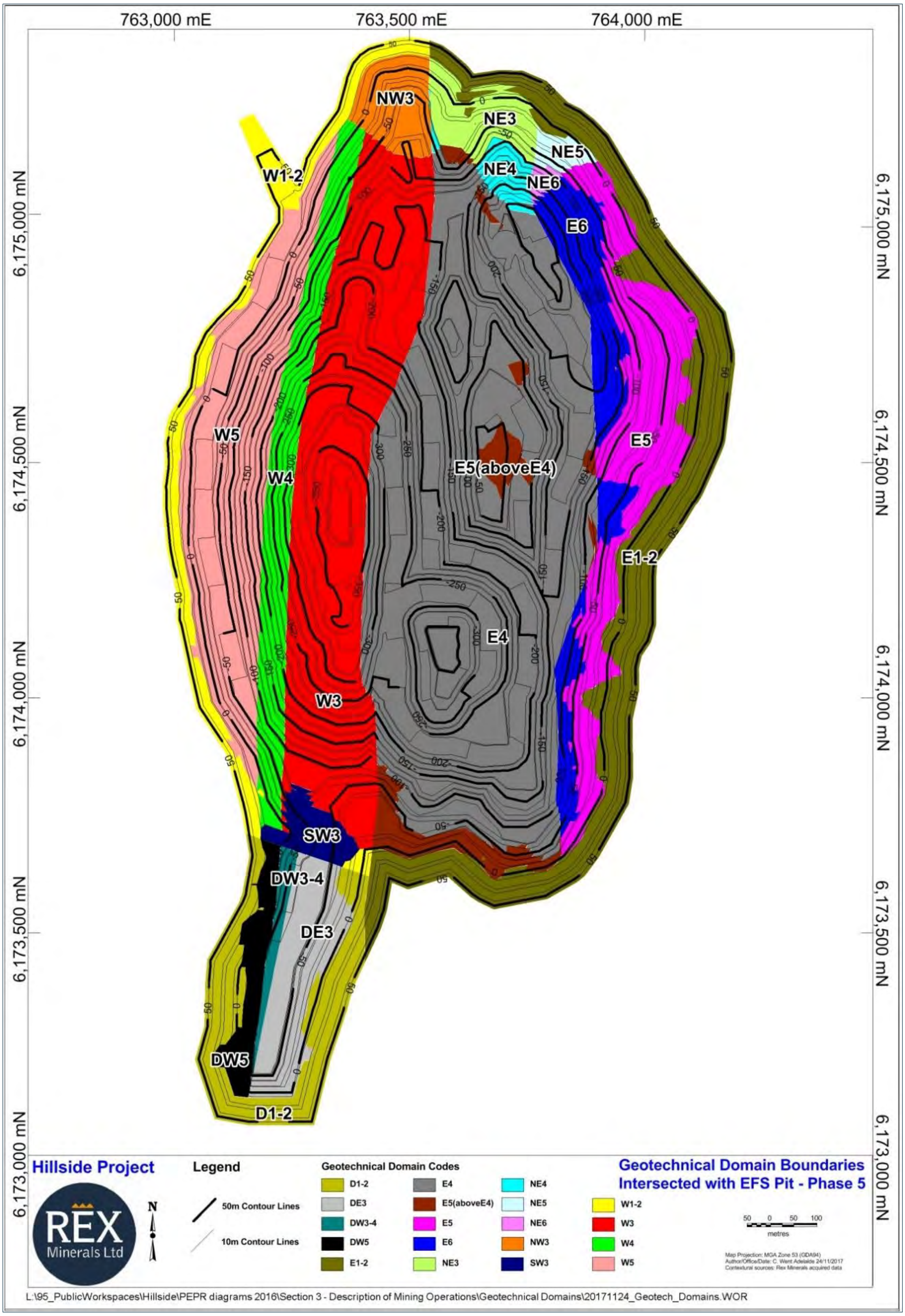


Figure 3-16: Geotechnical domain locations

The mine design of the five phases, including the progressive waste backfill, follows as closely as practicable the regime C recommended parameters (see Table 3-12).

The parameters stipulate a mix of single 10m high benches in the weathered and transition rocks, and double 10m high benches in the fresh rock. This means that the berm would be excavated every 20m vertically. The complete set of parameters for the mine design takes into account the size of the excavators and trucks based on consultation with the original manufacturer's recommendations. They are listed below in Table 3-12.

Table 3-12: Mine design parameters

Description	Unit	Value
Ramp/Road dual lane	Metre	35
Ramp/Road single lane	Metre	18
Ramp/Road maximum gradient	%	10
Switchback internal radius	Metre	10
Mining bench height	Metre	10 or 2 x 5
Berm interval	Metre	10 in oxide, 20 in fresh
Berm width	Metre	5 to 10
Inter-ramp slope angle	Degrees	37 to 60
Overall pit wall angles	Degrees	40 to 52
Mining width minimum floor	Metre	35
Mining width minimum pushback	Metre	100

The open pit is located several hundred metres from existing major infrastructure and approximately 100m from the closest third-party property boundary located to the west. The pit has been designed for long-term stability during the mining operation. Any instability post-mining and subsequent infilling of water is not expected to have any long-term impact on surrounding infrastructure or third-party property due to the large separation. The final integrated landform designs post-mining which include the open pit, backfilling, RSFs and TSF are designed to ensure long-term stability. Therefore, the open pit is not expected to have any further long-term surface disturbance post-mining.

3.5.2.2 Dimensions and depth of the pit

The pit is designed in five main phases to access high grade ore early in pit life and maximise in pit dumping volumes. The approximate final pit dimensions are 2.3km north-south, 1.2km east-west and 440m deep. The total tonnage excavated will be approximately 685Mt. The final size after backfilling will be 1.8km north-south, 1.2km east-west and 440m deep. The total tonnage of 685Mt includes the 2015 Ore Reserve of 82Mt of ore grading 0.62% copper and 0.16g/t gold. A breakdown of the high-level mine schedule including ore, waste and mine phases is shown in Section 3.5.4.

3.5.2.3 Access ramps

The access to the pit will be via 1:10 gradient ramps generally exiting at the north of the pit. During the later stages of the pit, a ramp will be constructed across in pit dumping to exit the pit to maximise the in pit dumping and minimise haulage distances.

3.5.2.4 Maps

Plan view contour maps of the five EFS phases of mining with geotechnical domains and overlain geotechnical design parameters, with and without the sequential backfilling are given in Figure 3-17 to Figure 3-22. Cross-sections along selected northings are given in Figure 3-23 to Figure 3-26. Four oblique cross-sections are given in Figure 3-61 and Figure 3-62.

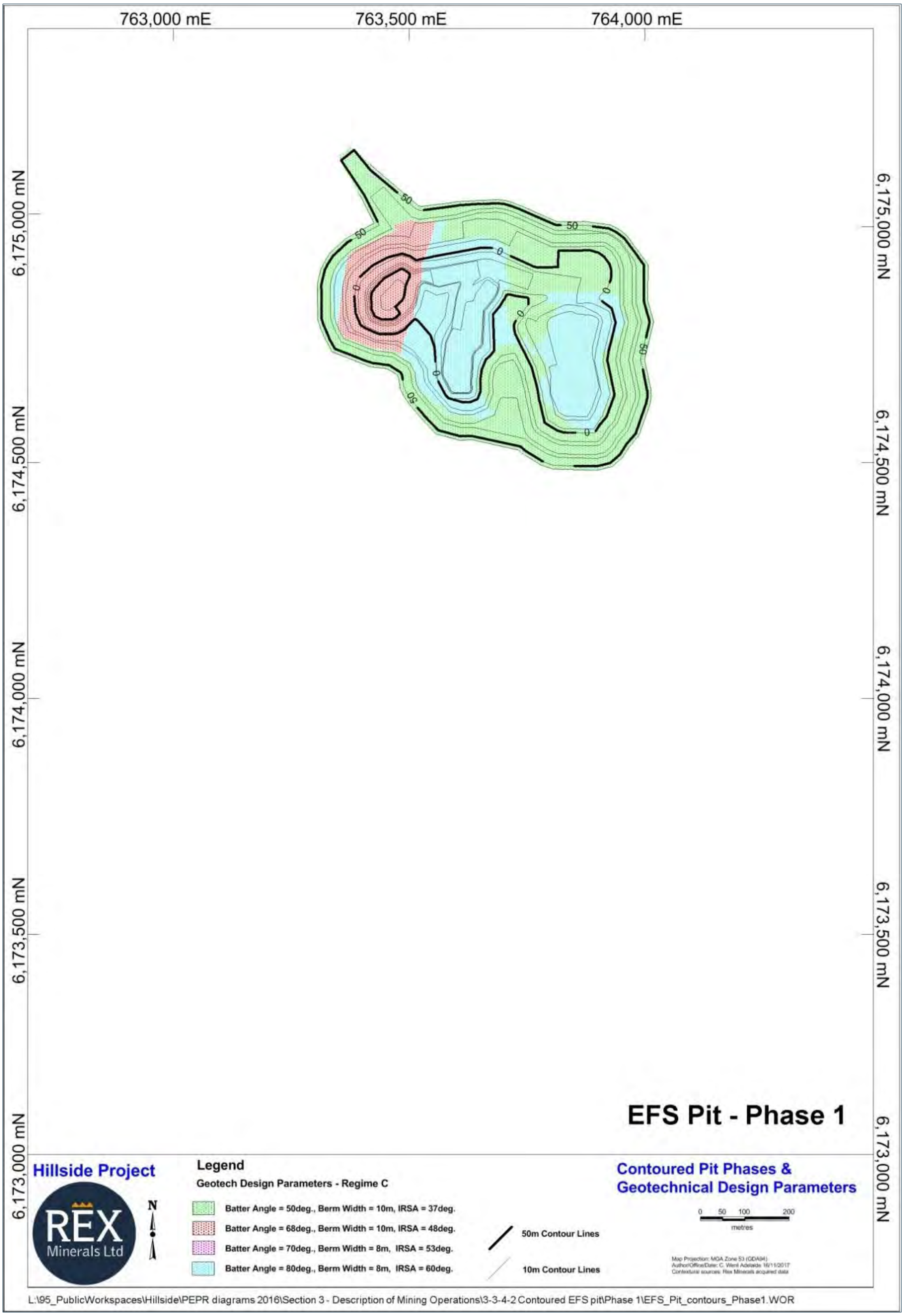


Figure 3-17: Pit Phase 1

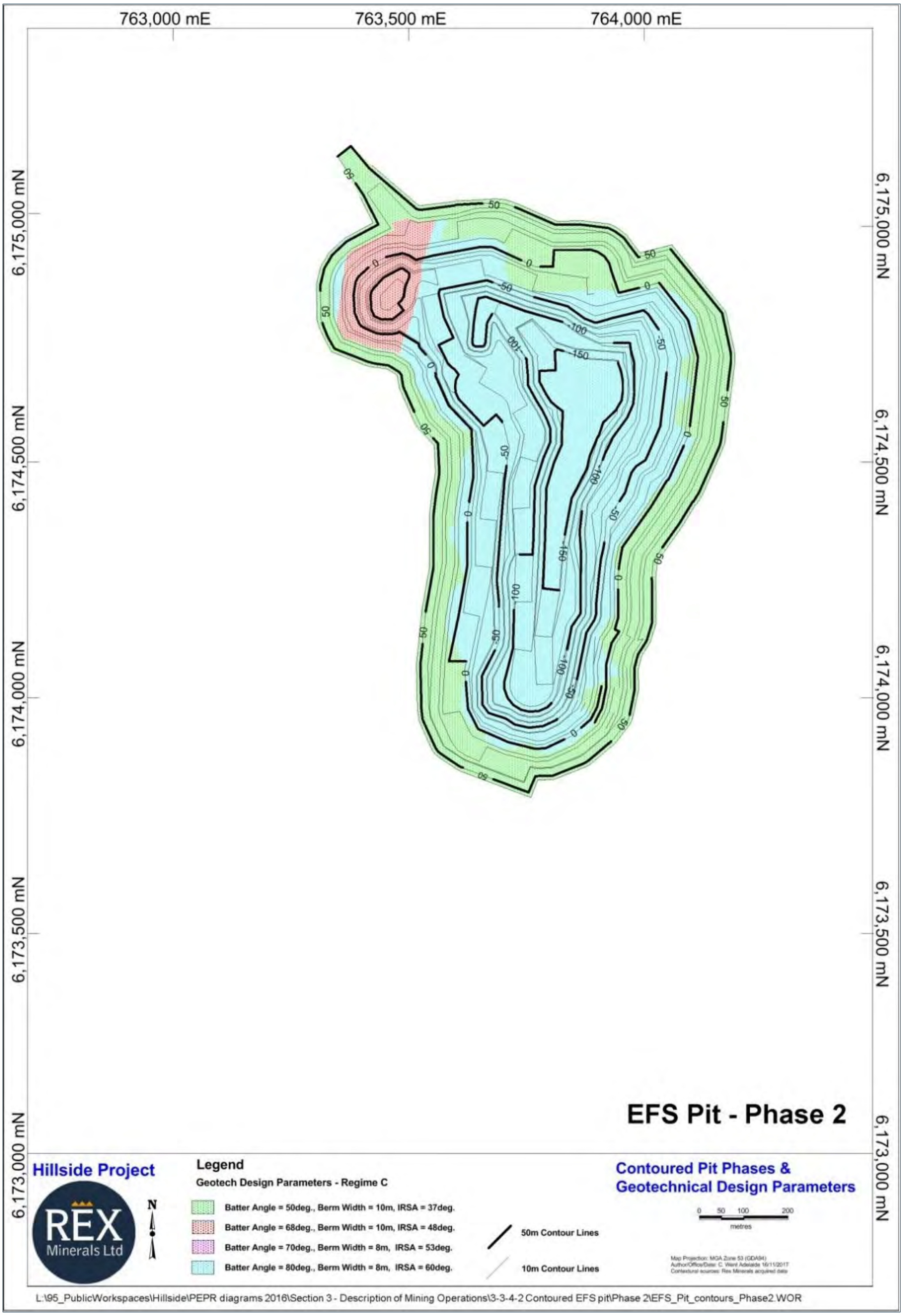


Figure 3-18: Pit Phase 2

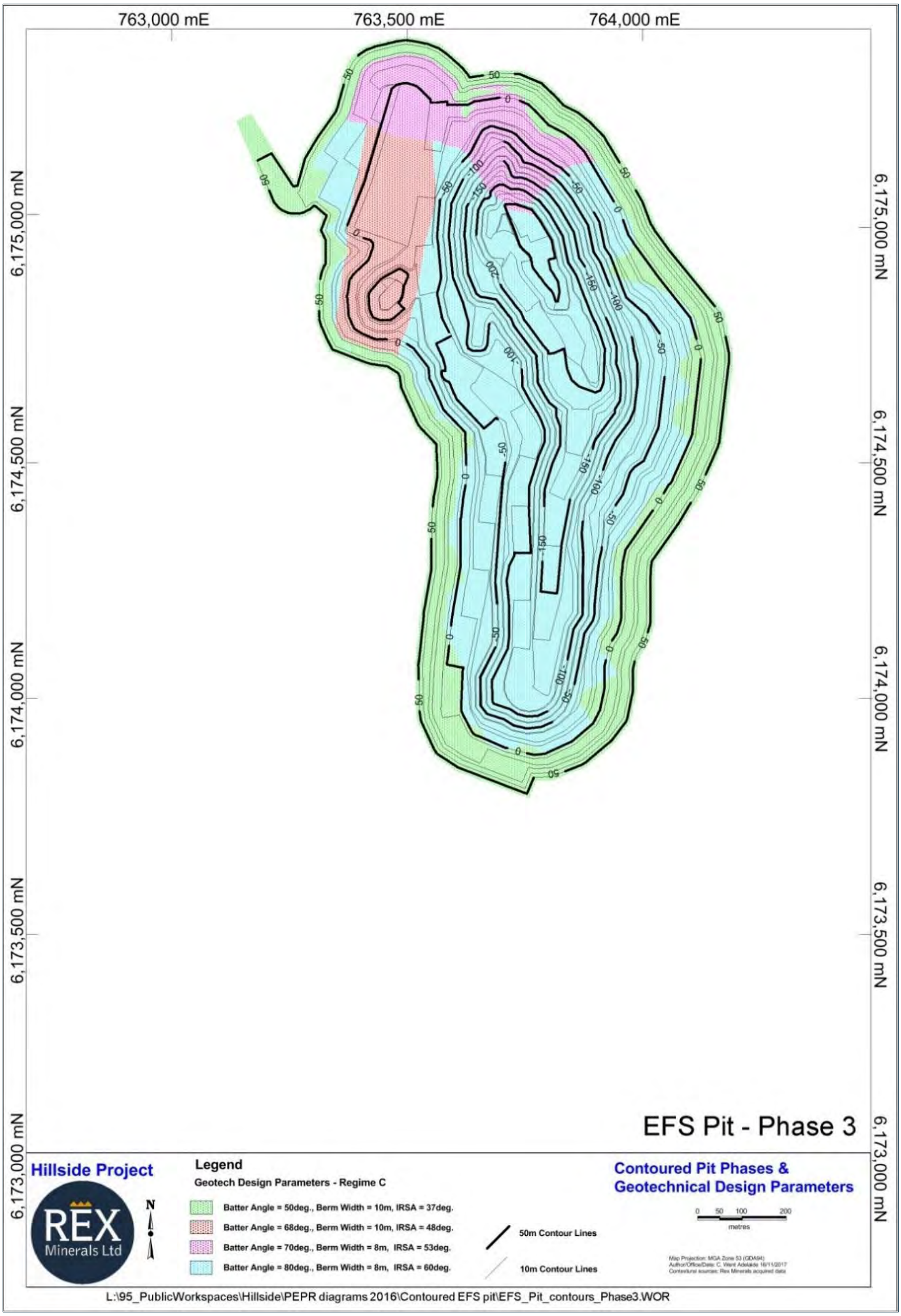


Figure 3-19: Pit Phase 3

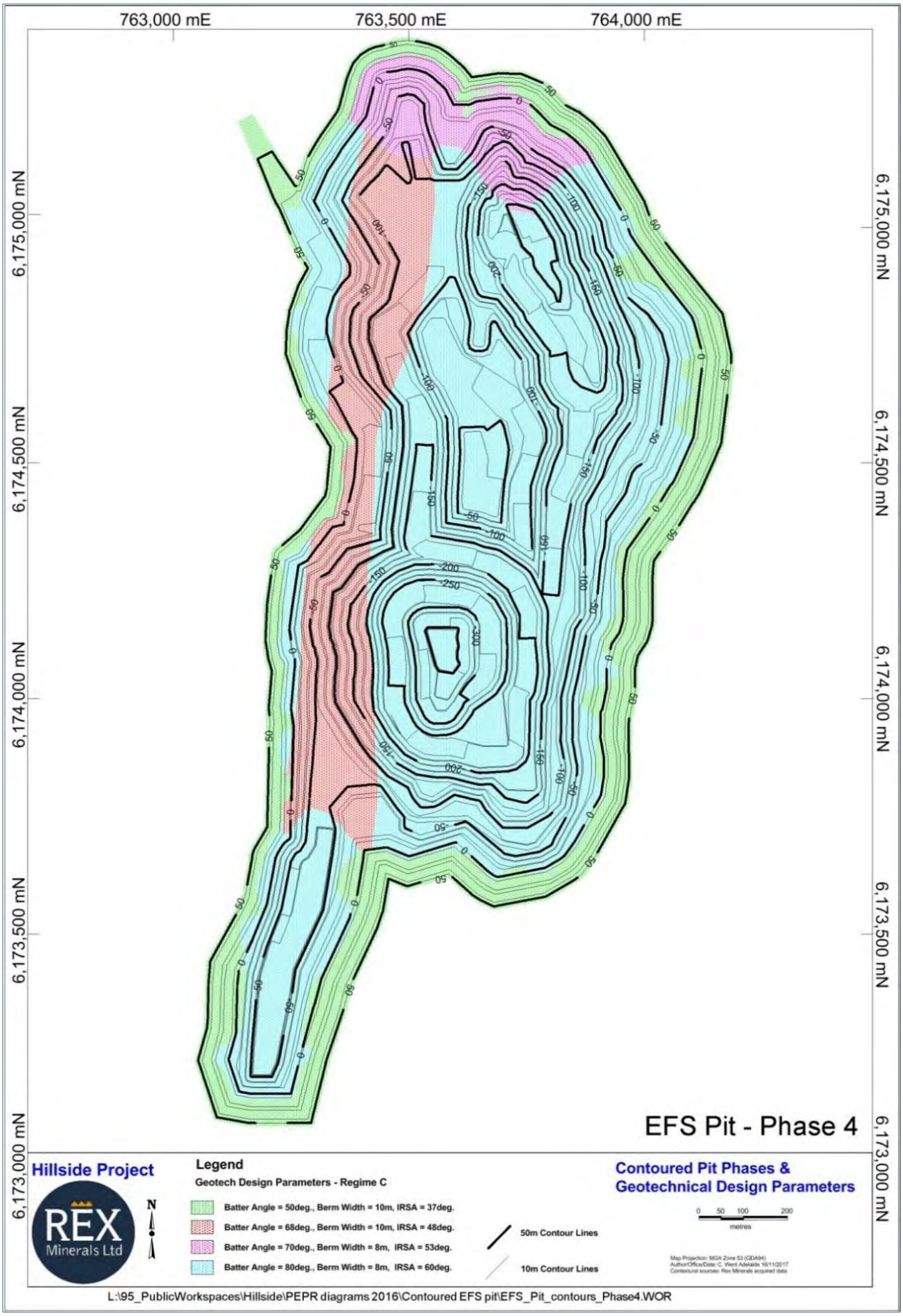


Figure 3-20: Pit Phase 4

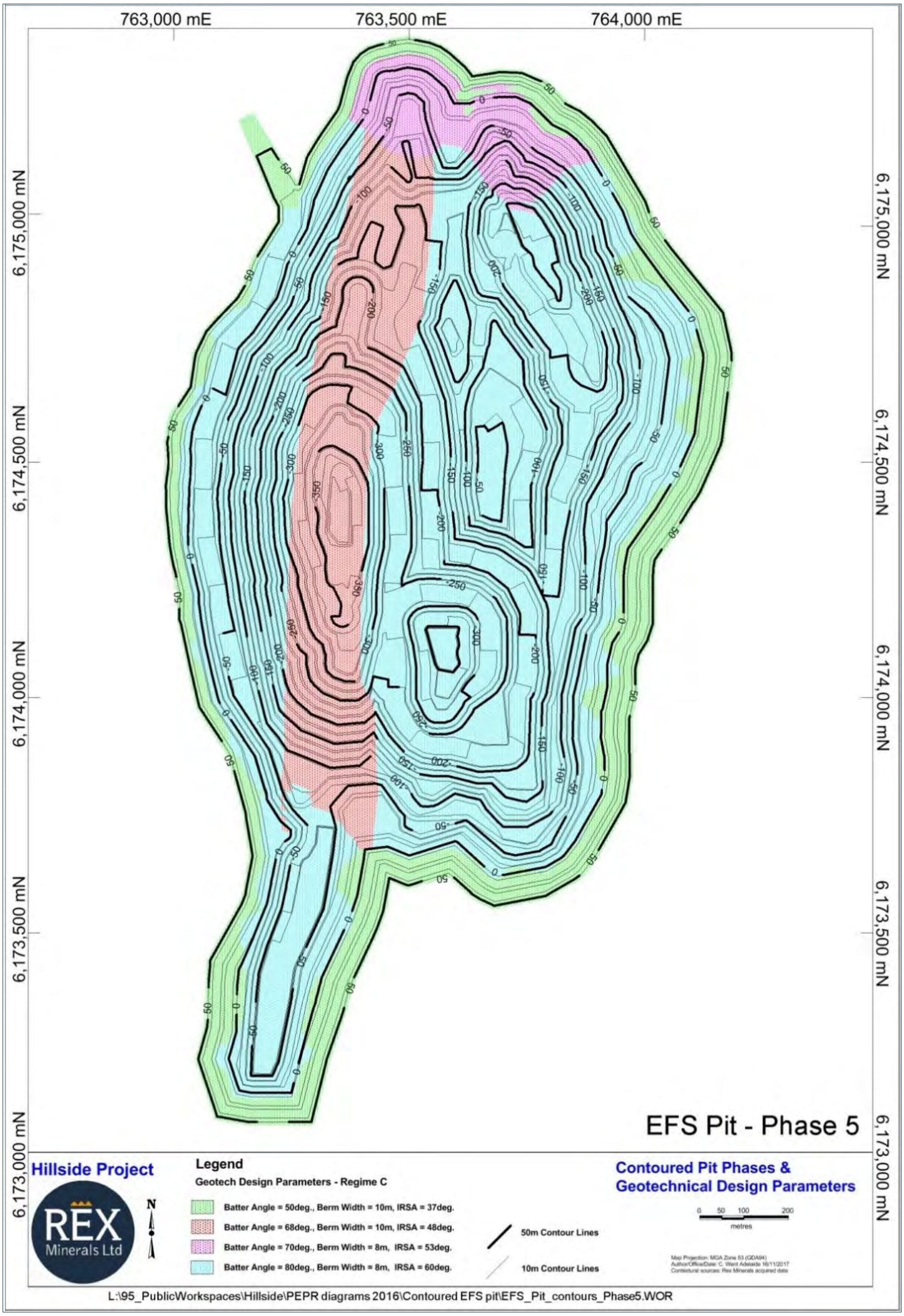


Figure 3-21: Pit Phase 5

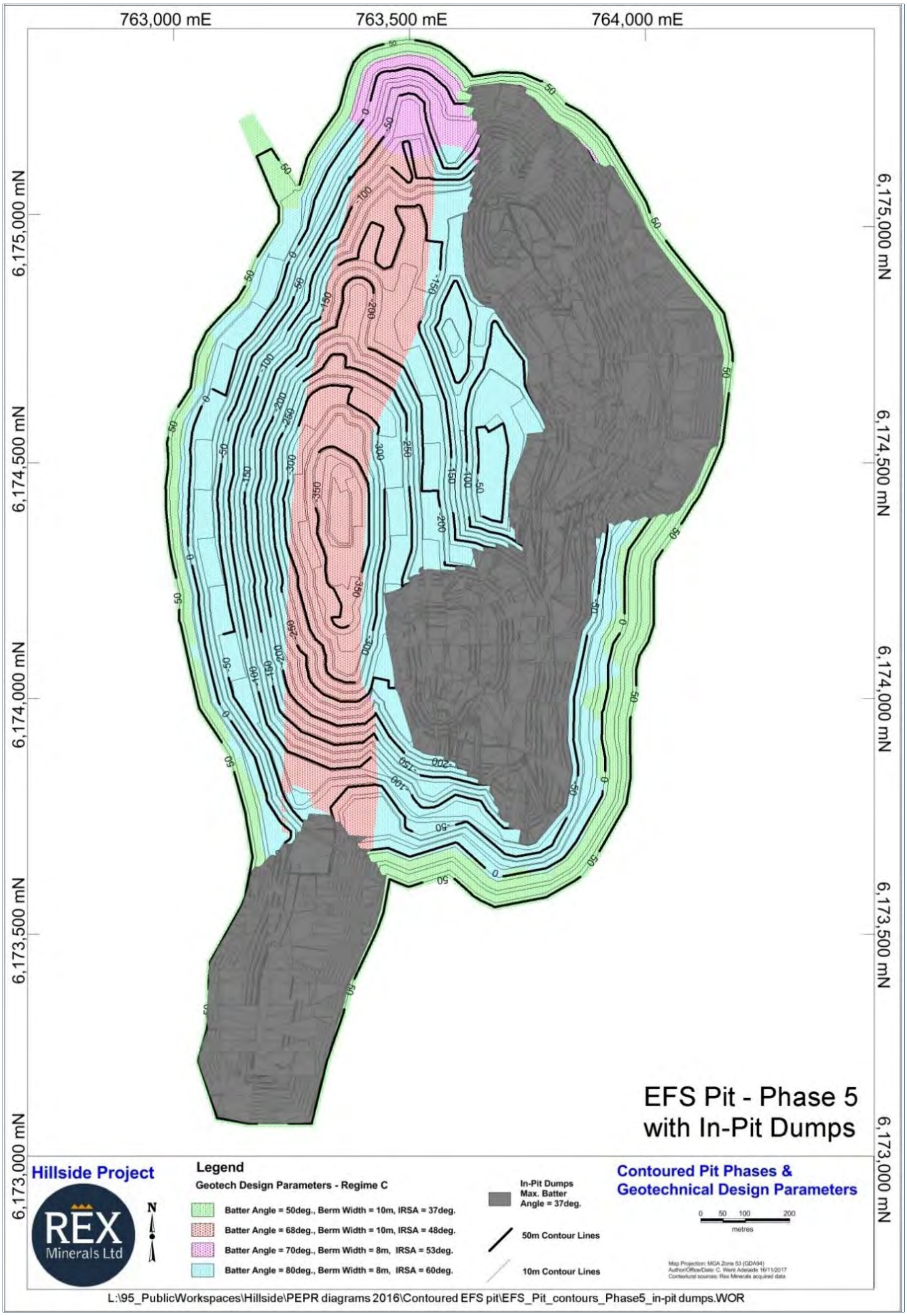


Figure 3-22: Pit Phase 5 with backfill

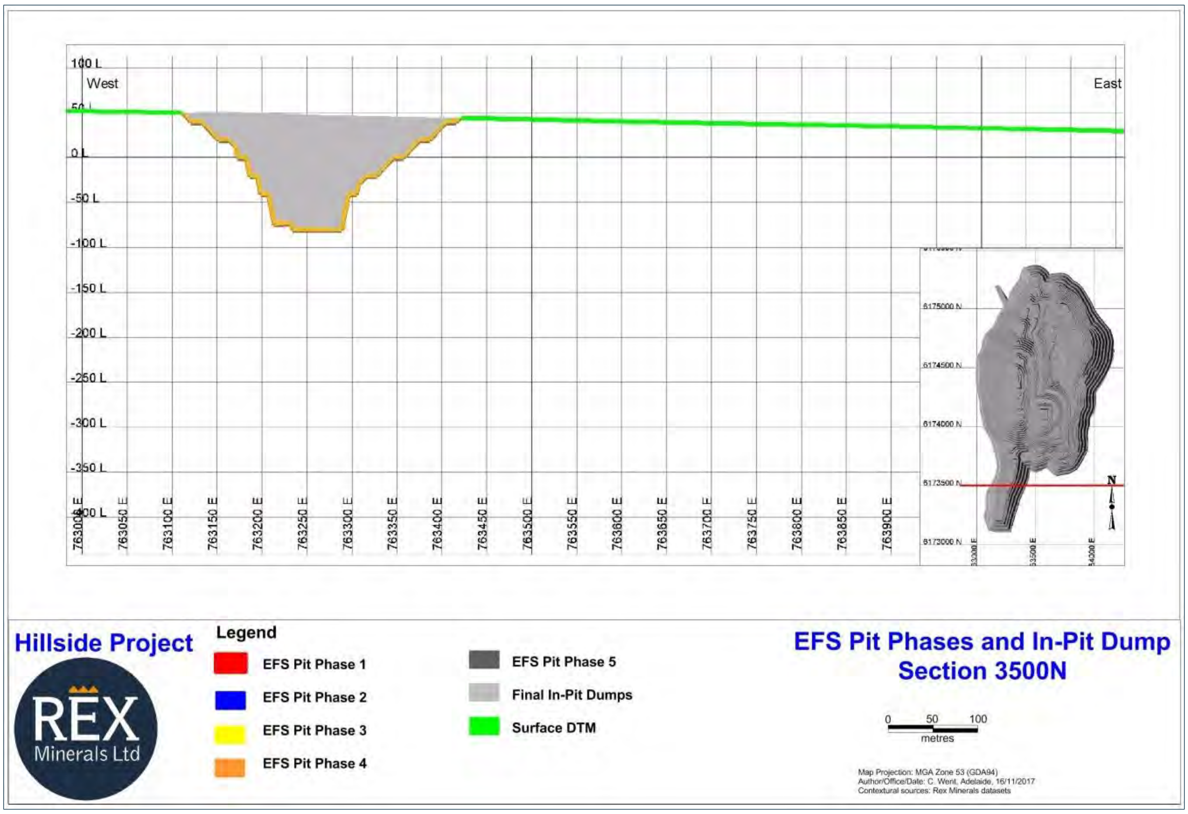


Figure 3-23: Pit cross-section 3500N

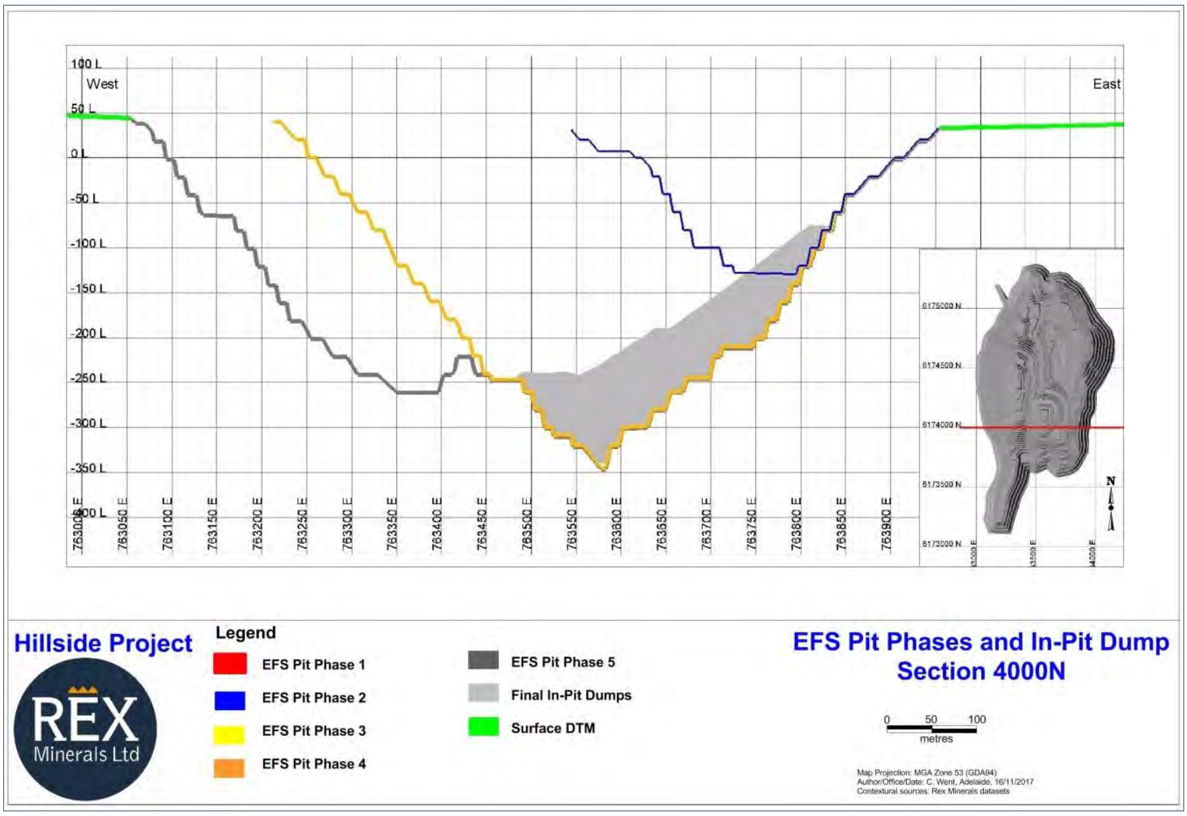


Figure 3-24: Pit cross-section 4000N

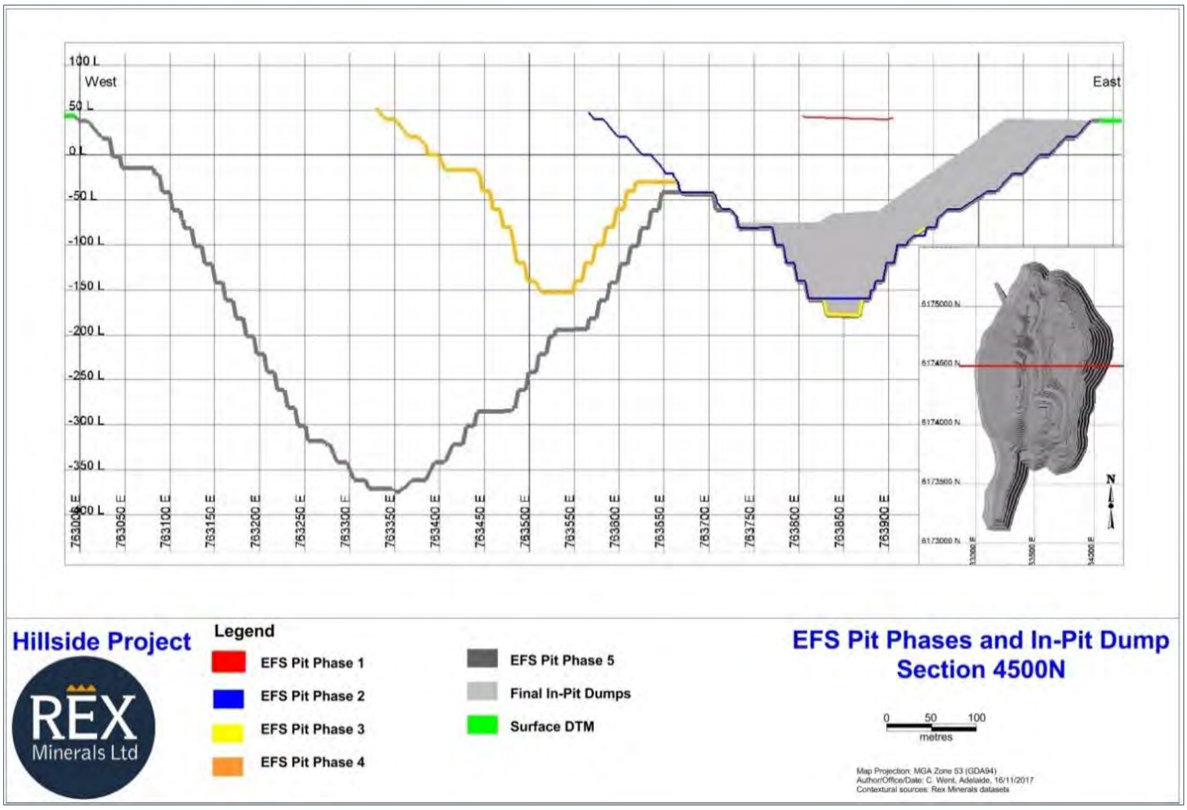


Figure 3-25: Pit cross-section 4500N

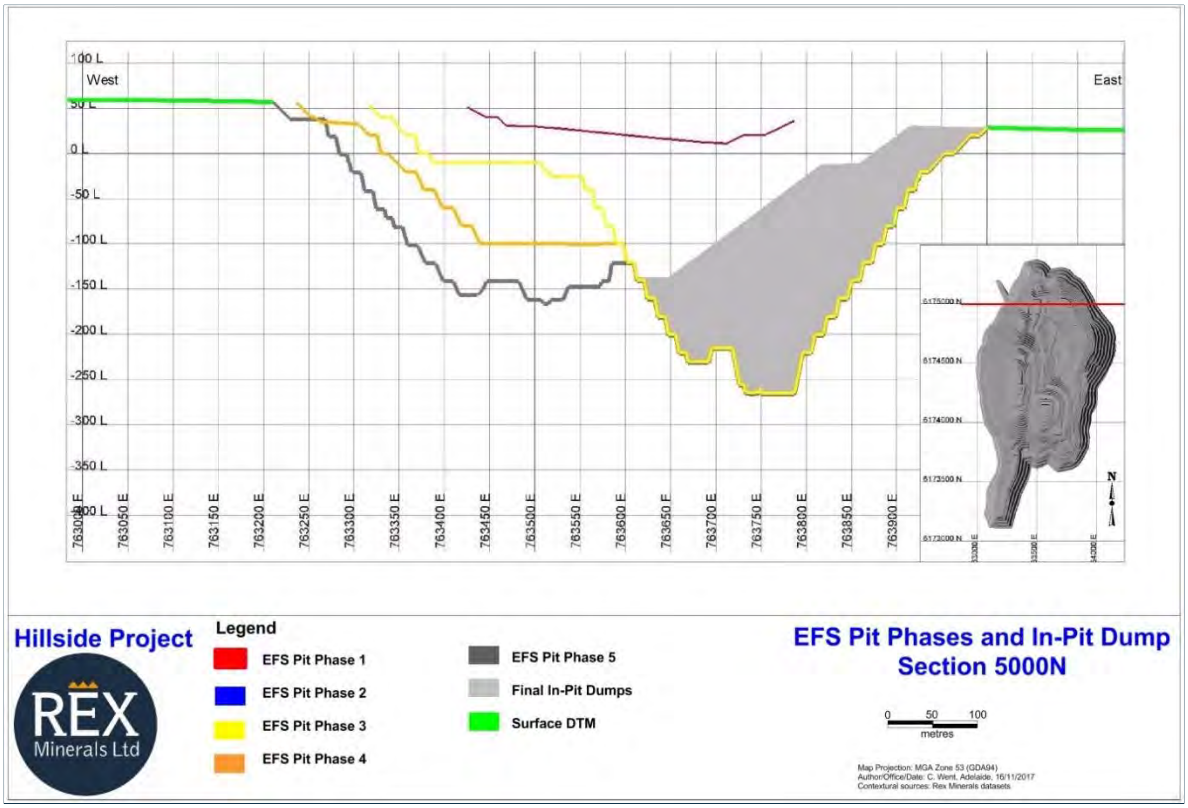


Figure 3-26: Pit cross-section 5000N

3.5.3 Underground Workings

Underground mining is not proposed under the Stage 1 Project hence it is not envisaged that underground operations will be carried out during the term of this PEPR.

3.5.4 Material Movements

Provide:

- *expected life of mine (including scope for extension);*
- *annual mine production rates and mine production schedule of ore and waste rock over the life of mine; and*
- *life of mine and annual strip ratios.*

3.5.4.1 Expected life of mine

The mine operations during Stage 1 are scheduled to operate from Years -1 to 13 for a total of 14 years. This includes one year of pre-strip of waste in Year -1 (i.e., during construction). The processing plant is scheduled to continue processing stockpiles one year after the mine operations cease. The scope of potential expansion is discussed in Section 3.5.12.

3.5.4.2 Annual mine production, waste rock, total rock, strip ratio, processing summary

The summary of material movements is given in Table 3-13 below.

Table 3-13: Hillside Project physical annual and life of mine summary

	Years															
	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total/*Average*
Total movement (Mt)	54	60	48.5	60	60	60	56.9	60	60	65	55	38.3	6.1	1.6	0.0	**685.4**
Ore movement (Mt)	0.9	7.2	5.7	4.5	6.7	9.3	8.3	7.3	3.3	6.9	7.8	9.5	3.3	1.2	0.0	**81.9**
Waste movement (Mt)	53.1	52.8	42.8	55.5	53.3	50.7	48.5	52.7	56.7	58.1	47.2	28.8	2.8	0.4	0.0	**603.5**
Strip ratio	61.7	7.3	7.5	12.3	7.9	5.5	5.8	7.2	17.1	8.5	6.1	3.0	0.8	0.3	0.0	***7.4***
Mine phase	1,2	1,2,3	2,3,4	2,3,4	3,4	3,4	4	4,5	4,5	4,5	4,5	5	5	5	0.0	**N/A**
Mill processing (Mt)	0.0	5.2	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.7	**81.9**
Mill processing copper (Cu%)	0.0	0.728	0.586	0.482	0.616	0.708	0.624	0.537	0.429	0.614	0.880	0.989	0.723	0.503	0.228	***0.623***
Mill processing gold (g/t)	0.0	0.267	0.157	0.151	0.152	0.170	0.199	0.189	0.134	0.152	0.184	0.186	0.138	0.117	0.100	***0.164***
Concentrate (kt)	0.0	109.8	108.1	87.6	120.7	139.3	129.0	110.6	86.4	127.0	183.7	206.8	150.3	102.5	34.6	**1696.5**
Concentrate assay copper (Cu %)	0	30.8	29.3	29.5	28.1	28.1	27.0	27.0	27.4	27.0	27.0	27.0	27.0	27.3	27.8	***27.7***
Concentrate assay gold (g/t)	0	10.8	7.1	8.4	6.0	5.9	7.2	7.9	6.8	5.2	4.6	4.1	4.0	4.9	9.7	***6.1***
Copper metal per year (kt)	0	33.8	31.7	25.9	33.9	39.1	34.9	29.9	23.6	34.3	49.6	55.8	40.6	28.0	9.6	**470.7**
Gold metal per year (koz)	0	38.1	24.6	23.7	23.5	26.2	30.0	27.9	19.0	21.3	27.4	26.9	19.2	16.0	10.8	**334.8**

3.5.5 Stockpiles

Describe:

- *location, size, shape and height of ore, product, subsoil and topsoil stockpiles;*
- *method of placement;*
- *method of stabilisation and erosion control of all stockpiles;*
- *water movement through stockpiles; and*

The location, maximum height and extent of all stockpiles must be shown on a map.

3.5.5.1 Stockpiles

The locations, maximum heights and extent of all stockpiles are shown in Figure 3-27.

Years 0, 4, 9 and 13 in Figure 3-28 - Figure 3-31 respectively. Descriptions of the stockpiles at their maximum capacity are provided below.

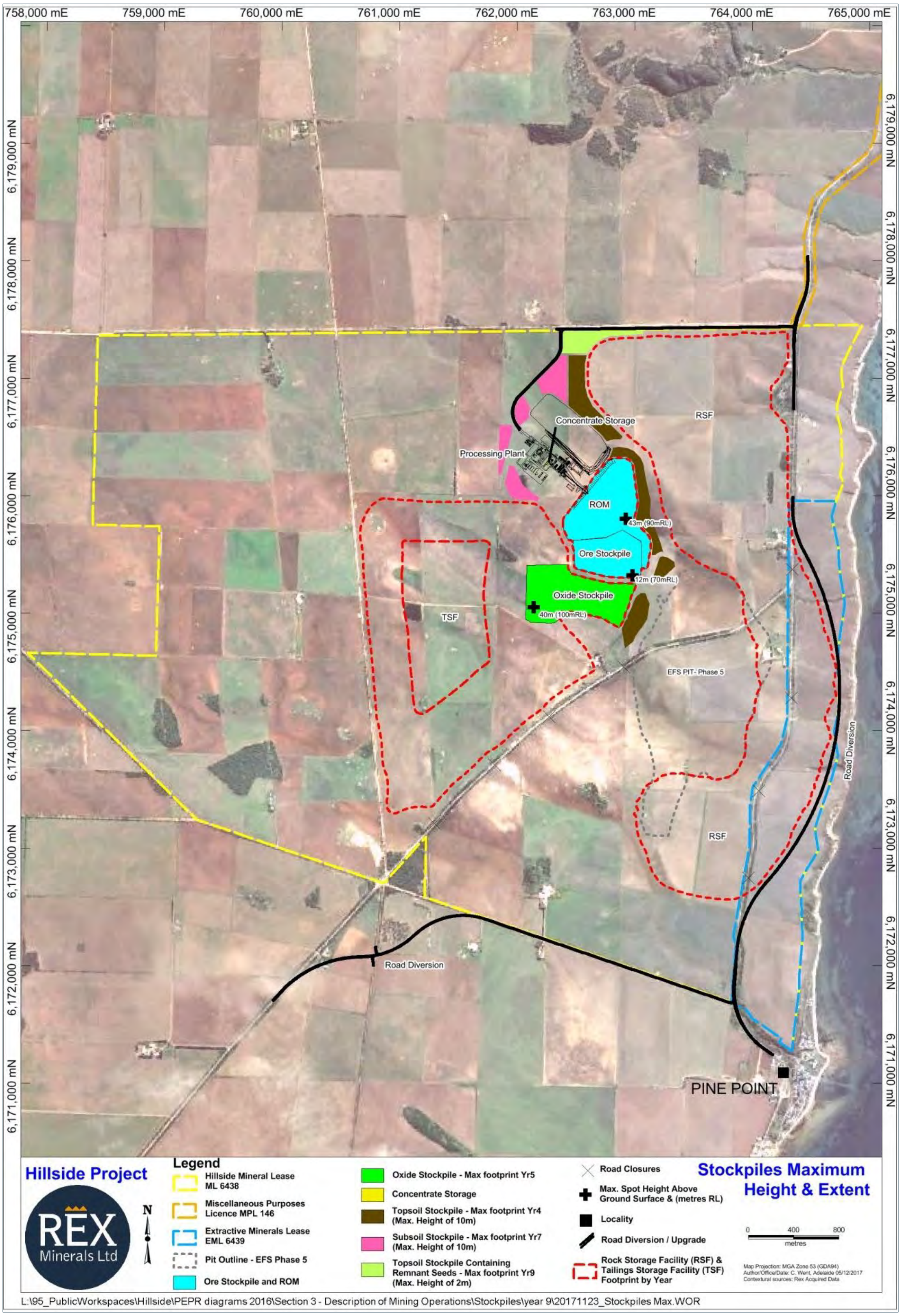


Figure 3-27: Locations, indicative maximum heights and extent of all stockpiles

3.5.5.2 Method of placement

Ore – Run of Mine

Run of mine (ROM) ore will be placed to an approximate height of 2m in paddock dumps or paddock dumped finger stockpiles by the mine trucks on the ROM pad. Finger stockpiles are longer narrow stockpiles containing one grade type (e.g., medium grade) to allow ease of blending into the crusher during reclaim. The ROM ore can be placed over approximately 22ha of the ROM pad which provides approximately 1Mt capacity.

The ROM pad itself is constructed of waste. ROM ore will be re-handled by dozers and loaders to feed the primary crusher. The ROM pad will be placed on a layer of impermeable clay. Depending on location, excess run off water will report either to the raw water pond, decant seepage and collection pond or into the pit where it will be pumped back to the decant seepage and collection pond. The stockpile is dynamic and low in height. There will be minimal stability or erosion issues.

Ore – Emergency stockpile

The emergency crushed ore production stockpile is 0.18ha in area to contain approximately 20kt of ore. Ore will be paddock dumped on the stockpile by mine trucks on a layer of impermeable clay. Excess water runoff will report to the process plant raw water pond. The stockpile is dynamic as it is used during crusher downtime and is low in height, resulting in minimal stability or erosion issues.

Ore – Low grade

The low grade (LG) stockpile will be created by mine trucks paddock dumping on the LG stockpile. Further expansions of LG stockpiles will expand the areal extent of the pad and will be reclaimed later in the mine’s life. The LG stockpile will reach an approximate maximum height of 12m and area of 22ha containing a maximum of approximately 4.7Mt of ore. The stockpile will be placed on a layer of impermeable clay. Excess run off water will report either to the decant seepage or collection pond or into the pit where it will be pumped back to the decant seepage and collection pond. There will minimal stability or erosion issues.

Ore – Oxide stockpile

The oxide stockpile will be created by mine trucks paddock dumping on the oxide stockpile. The oxide stockpile will reach an approximate maximum height of 40m and an area of 21ha containing approximately 19Mt of material. The stockpile will be placed on a layer of impermeable clay. There will minimal stability or erosion issues. Excess run off water will report either to the decant seepage or collection pond or into the pit where it will be pumped back to the decant seepage and collection pond.

Concentrate stockpile

The concentrate will be deposited in a large fully contained shed via filters in the roof. The maximum height of the stockpile will be approximately 4m and the area of the shed is 0.12ha. The shed has a capacity of 1500t of concentrate. The shed will have a concrete floor and the concentrate will contain less than 10% moisture. Rainfall run off water will be directed around the shed. There will be minimal stability or erosion issues.

Topsoil and subsoil stockpile

The topsoil and subsoil stockpiles will reach a maximum of 10m height respectively. The maximum height of topsoil containing remnant vegetation seeds is 2m. The maximum area they will occupy is approximately 36ha and 30ha respectively. This equates to approximately 6.7Mt combined maximum capacity. The topsoil and subsoil wiIl be placed by the mine trucks. The subsoil will require placement on several levels. The topsoil and subsoil stockpiles will be re-handled during progressive mine rehabilitation by dozers with the large loaders and the smaller mine excavator loading the mine trucks. The very low height of the stockpile will not cause any major stability or erosion issues, and in the case of the topsoil stockpile is designed to ensure longevity of soil condition and quality.

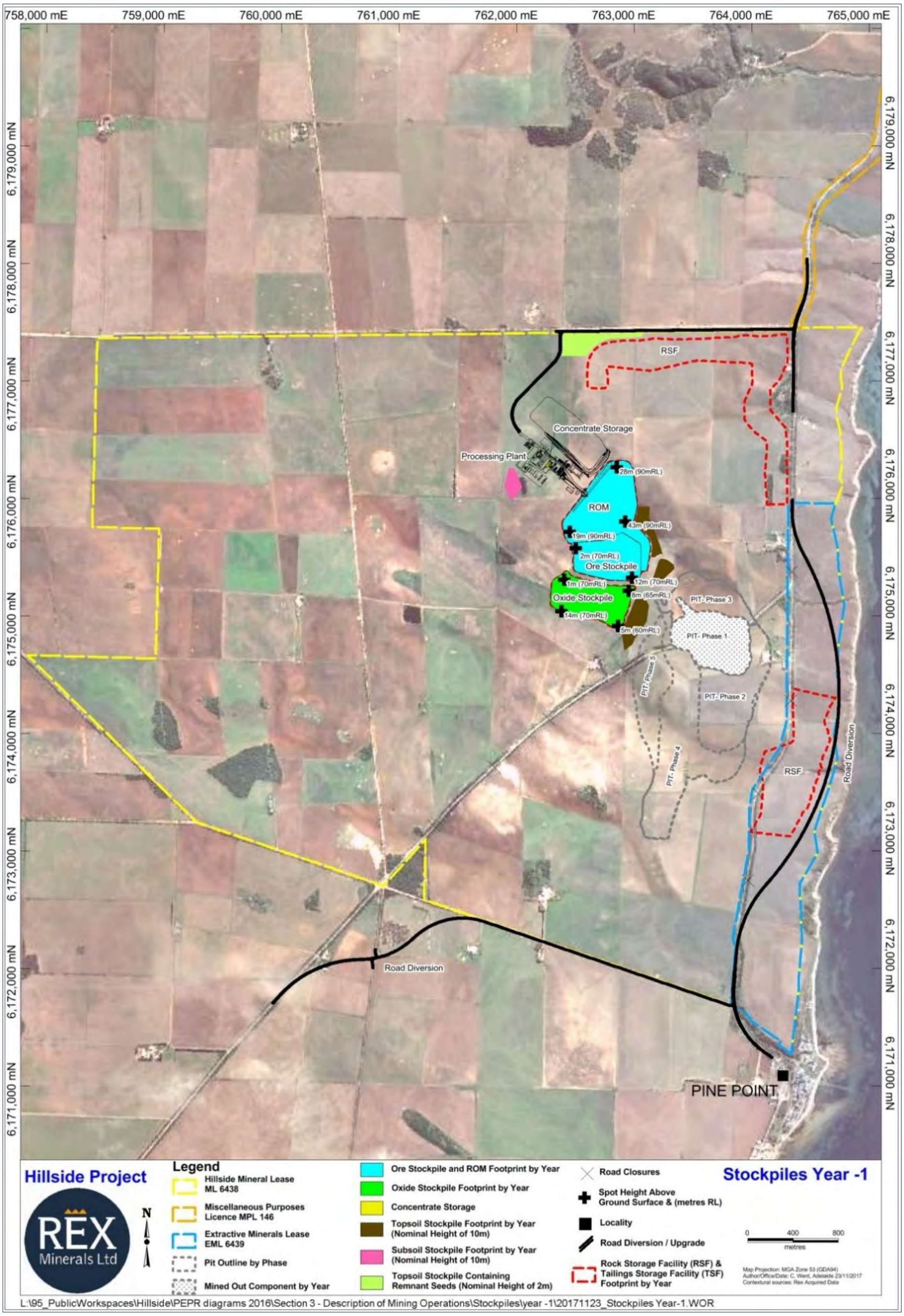


Figure 3-28: Year -1 stockpile locations

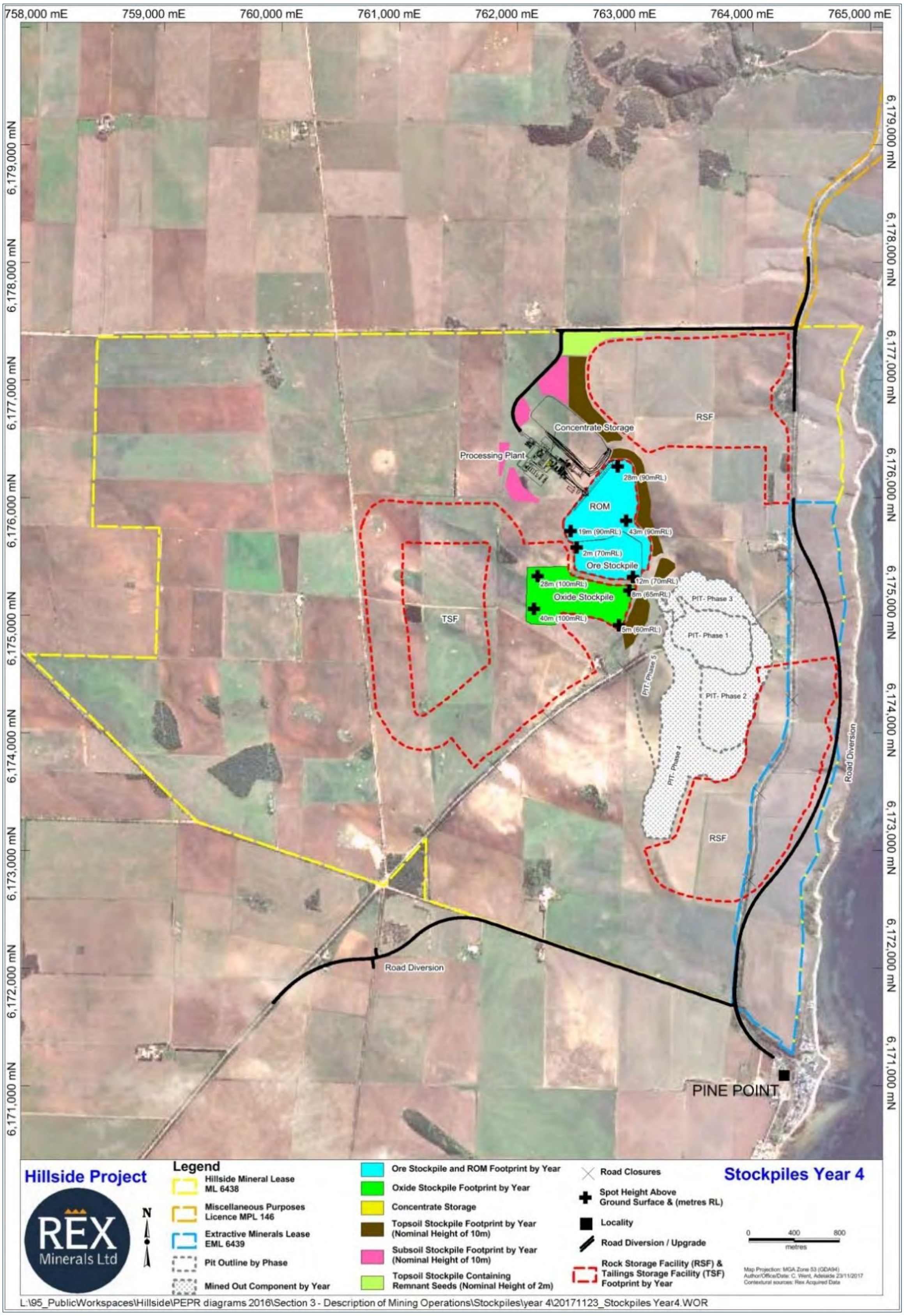


Figure 3-29: Year 4 stockpile locations

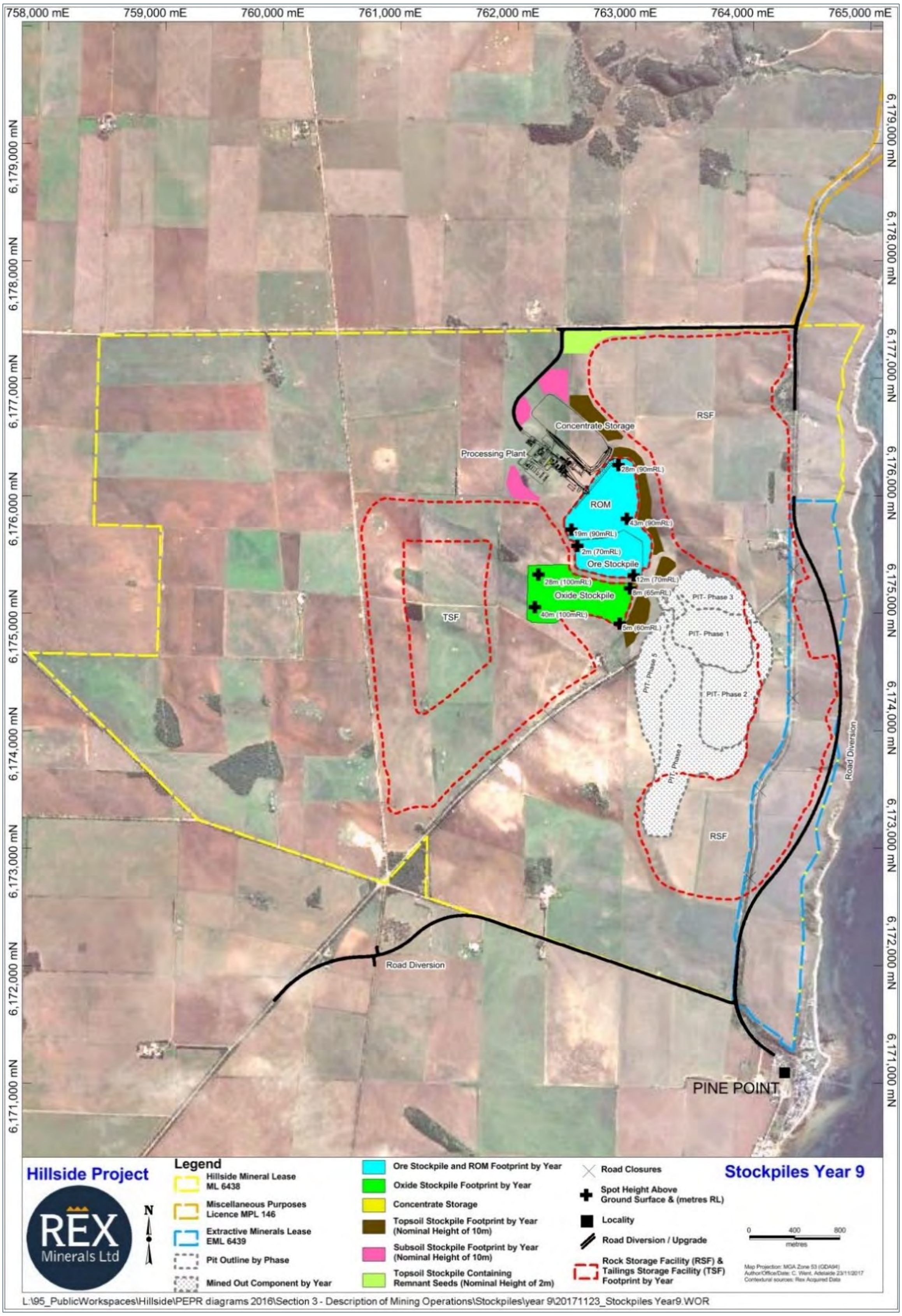


Figure 3-30: Year 9 stockpile locations

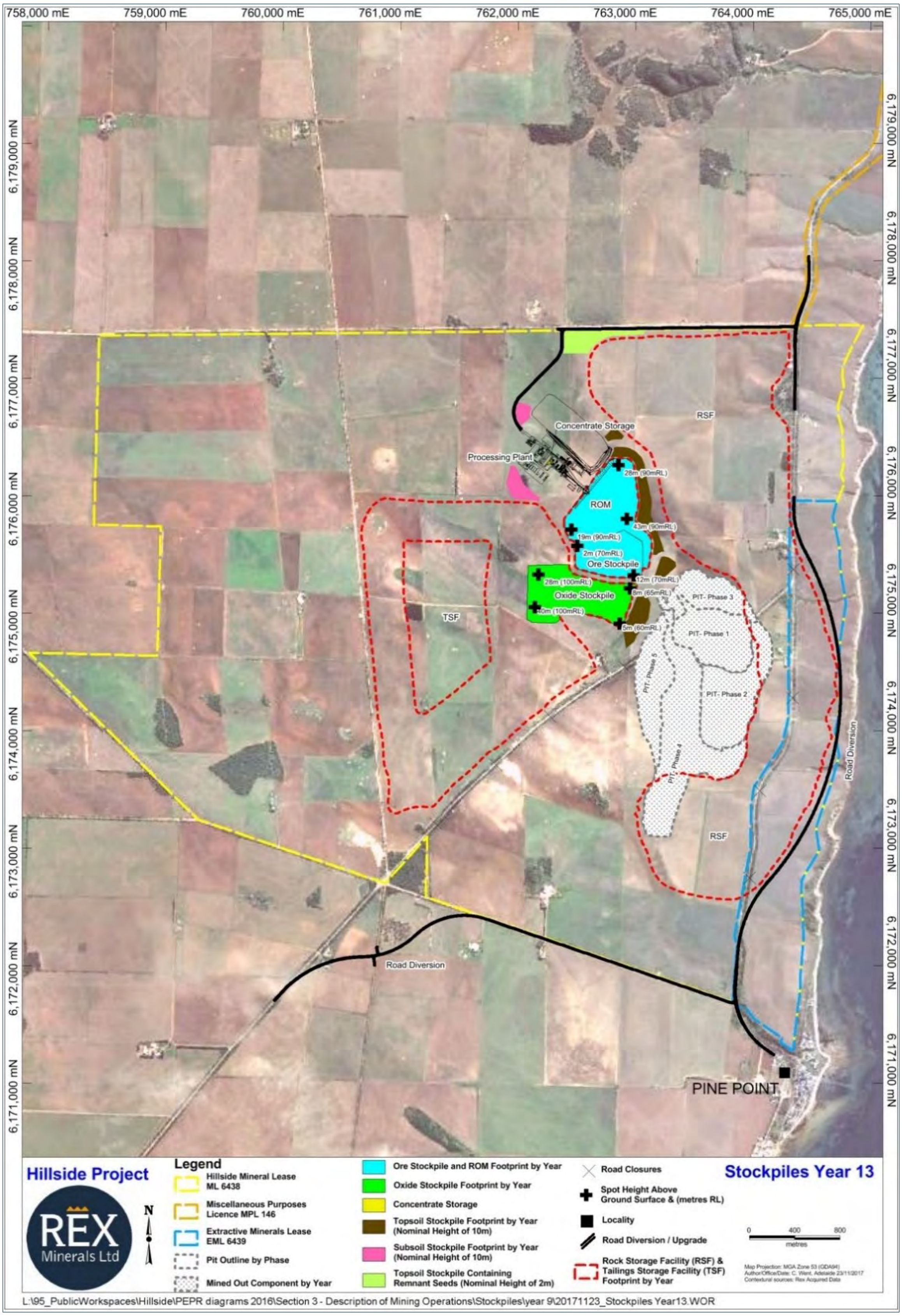


Figure 3-31: Year 13 stockpile locations

Table 3-14: Topsoil and subsoil stockpiles surface area disturbance

Description	Year															
	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Surface clearance (ha)*	363.3	236.7	187.6	112.2	74.8	30.0	9.1	39.5	7.1	137.6	0.0	0.0	0.0	0.0	20.1	**1218.1**
Progressive rehabilitation (ha)		54.6	44.7	14.2	30.5	84.8	82.5	62.7	36.9	94.1	58.7	84.5	27.7	0.0	371.5	**1047.6**
Topsoil – Stockpile required (Mt)**	1.799	2.727	3.456	3.956	4.181	3.902	3.528	3.409	3.258	3.479	3.180	2.749	2.608	2.608	0.816	
Subsoil – Stockpile required (Mt)***	0.346	0.232	0.062	2.230	2.056	1.632	1.223	2.257	2.064	1.659	1.440	1.009	0.851	0.851	0.000	

*An additional surface clearance of 35.5ha of topsoil stockpiles (maximum footprint in Year 4) and 16.6ha of subsoil stockpiles (maximum footprint in Year 4) equates to a maximum clearance area of 1270ha.

**Topsoil stockpiled at a nominal height of 10m with topsoil containing remnant native vegetation seeds stockpiled 2m high.

***Subsoil stockpiled at a nominal height of 10m.

3.5.5.3 Slope stability of stockpiles

Ground Control Engineering (GCE) completed a stability assessment for the RSFs. All static and seismic cases analysed indicate the waste rock storage facilities (oxide and ore stockpiles are considered to have geotechnically similar parameters) should remain stable (i.e., factor of safety (FoS) greater than minimum requirement). The slope stability details for the RSFs has been provided in Section 3.7.1.

3.5.6 Use of Explosives

If explosives are used, describe:

- *type of explosives used on the site;*
- *timing and frequency of blasting;*
- *size of blasts; and*
- *storage of explosives (amount, type, detailed location and method of storage).*

Rex will manage and perform the blasting activities in-house. The main type of explosives will be ammonium nitrate fuel oil (ANFO), heavy ANFO (HANFO) and a small quantity of emulsion. The emulsion will be used in wet holes. The use of boosters with non-electric detonators and detonating cord will be used to initiate the blasting. Over the life of the mine, approximately 108,000t of ANFO and 31,000t of HANFO will be used. Approximately 11,000t of ANFO and 3,000t of HANFO will be used per year when the mine reaches steady state production of 60Mt total rock blasted annually.

Rex Management at the Hillside Project will endeavour to limit production blasting to once a day at 1.00pm This will ensure minimal impact on the surrounding community and allow enough time for inspection of any misfires before nightshift commences.

The blast sizes will depend on operational planning but are expected to range from 150,000t to 500,000t of rock. On average, the operation will require 360,000t of rock to be blasted every two days to meet its production requirements for the life of mine.

The Hillside mining operations will have a high explosive magazine to store detonators and blasting boosters and a bulk storage facility to store ammonium nitrate (AN) and emulsion.

The high explosive magazine will have a capacity for 10t of detonators and boosters. Assuming 162 holes blasted per day, this gives approximately 150 days of capacity. The detonators and boosters would be delivered by road from Western Australia or New South Wales. The facilities will comply with the relevant Australian Standards and South Australian regulations.

The bulk storage facility will have a capacity of 300t of AN and 80t of emulsion. The AN will be stored in 1t bulka bags in a specially constructed shed. The emulsion will be co-located and stored in a specially constructed tank. The bulk storage facility will have a maximum capacity for 7.5 days of mine production using AN. If there is a shortage, a HANFO product could be used and the capacity would increase to approximately 9.5 days. The product will be delivered by road from Western Australia or New South Wales.

Australian Standard AS2187.1 Explosives – Storage, transport and use and the Safework SA safety distances from protected works or buildings are given below in Table 3-15 and Table 3-16. The proposed location of the high explosive magazine and bulk storage facility is given below in Figure 3-32 and complies with all regulatory requirements.

Table 3-15: Clearance distances for high explosive magazine

	Capacity	Public Roads/Pit	Houses/Offices	Town Sites
Australian Standard AS2187.1 Explosives – Storage, transport and use and the Safework SA safety distances	10t	240m	470m	853m
Actual distances	-	404m	1,197m	3,500m

Table 3-16: Clearance distances for blasting agent storage

	Capacity	Public Roads/Pit	Houses/Offices	Town Sites
Australian Standard AS2187.1 Explosives – Storage, transport and use and the Safework SA safety distances	300t AN and 80t emulsion	940m	1,400m	2,520m
Actual distances	-	970m	1,450m	3,475m

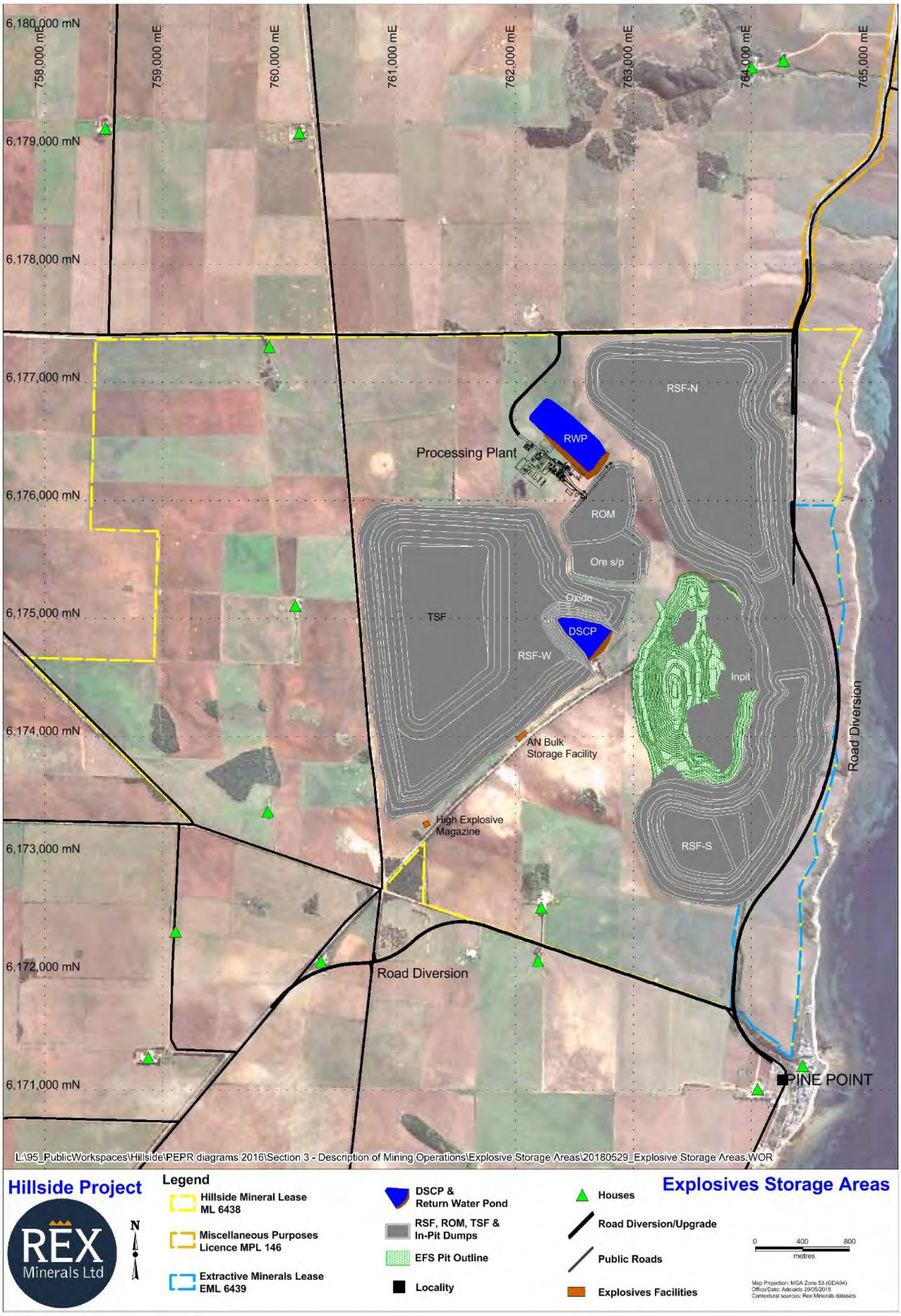


Figure 3-32: Location of explosive storage areas

3.5.7 Type of Mining Equipment

Provide a description of the equipment (fixed and mobile) to be used in the mining operation in terms of:

- *type, size and capacity of machines;*
- *approximate number of units;*
- *noise outputs;*
- *exhaust outputs; and*
- *fire ignition sources.*

The indicative mining fleet is listed below in Table 3-17 with the specifications for each model. The rated capacity unit of measure will depend on the type of equipment.

Table 3-17: Indicative mining fleet and specifications

Function	Indicative Manufacturer	Indicative Model	Weight (t)	Capacity Various	Size (L x W x H) (m x m x m)	Indicative Number
Heavy Mining						
Hydraulic excavator	Hitachi	EX2600-6	254	$10m^3$	13.6 x 8 x 7.3	2
Hydraulic excavator	Hitachi	EX8000-6	837	$38m^3$	20 x10.6 x 10	2
Large tracked dozer	Caterpillar	D10T	70	$18.5m^3$	9.1 x 3.7 x 4.8	5
Medium grader	John Deere	GP872GP	22	4.3m	10.6 x 2.1 x 3.4	3
Large grader	Caterpillar	24M	70	7.3m	14.2 x 4.3 x 4.3	1
Water truck	Hitachi	EH3500-3	141	181t	13.5 x 9.1 x 7.0	2
Primary haul truck	Hitachi	EH5000-3	200	296t	15.5 x 9.6 x 7.4	16
Large wheel dozer	Caterpillar	854K	100	$25.4m^3$	13.4 x 6.3 x 5.6	1
Large wheel loader	Caterpillar	992K	100	$12m^3$	15.7 x 5.9 x 5.7	2
Tyre handler	Hyster	H20XM-9	29	20t	8.2 x 2.9 x 4.2	1
Integrated tool carrier	John Deere	644	17	6t	8.6 x 2.9 x 3.4	1
Production drilling	Caterpillar	MDG6420C	95	229mm	19.9 x 5.6 x 19.4	3
Perimeter drilling	Atlas Copco	D65S	24	152mm	11.6 x 2.5 x 11.6	1
Blasting	IEE	Volvo FMX 11	10	17t	11.5 x 2.5 x 3.4	2
Compactor	Caterpillar	CS56B	11.5	N/A	5.9 x 2.3 x 3.1	2
Fuel/Service truck	Hitachi	EH1700-3	68	95t	10.5 x 6.3 x 5.2	2

Function	Indicative Manufacturer	Indicative Model	Weight (t)	Capacity Various	Size (L x W x H) (m x m x m)	Indicative Number
Maintenance truck	Hino	FC1022	10	6t	6.7 x 2.2 x 2.7	1
Stemming loader	John Deere	554	12.8	2m^3	7.4 x 2.5 x 3.2	1
Rock breaker	Hitachi	ZX470	47		11.9 x 3.8 x 3.5	1
Subtotal						**49**
Light Mining						
Pump	Pioneer	PP68C21				6
Bus						1
Lighting tower	All Light	LED				22
Communication trailer	Wenco					8
Light vehicles	Toyota	Hilux	1.8	1.2	5.3 x 1.8 x 1.8	34
Ambulance						1
Fire truck						1
Subtotal						**73**
Grand Total						**122**

Original Equipment Manufacturers (OEM) design mining equipment to meet required industry standards to reduce or eliminate noise, vibration and heat sources to protect the environment and operators as far as practicable. All equipment used on site is required to meet Australian mine industry standards.

The source of operational noise and vibration from the equipment used include:

- engine operation;
- operational alarms and warning systems including tramming or reversing alarms;
- loading noise in truck bodies;
- track noise from tramming tracked equipment; and
- hammer noise from drilling rigs.

The rated noise levels and exhaust outputs emission certification are listed in Table 3-18. The certification is either to US or EU standards. Mobile equipment will be fitted with 'white noise' style reversing alarms rather than the traditional loud beepers. The white noise alarms do not carry noise excessively beyond the immediate work area.

The diesel-powered equipment will not be operated in a potentially explosive atmosphere. Protection is such that all primary ignition sources will be contained, all diesel-powered equipment will have approved fire suppression systems installed and Rex will have an onsite fire truck.

Table 3-18: Indicative mining fleet and emissions

Function	Indicative Manufacturer	Indicative Model	Sound Power Level dB(A)	Exhaust Outputs Emission Certification	Fire Ignition Source	Indicative Number
Heavy Mining						
Hydraulic excavator	Hitachi	EX2600-6	118	US EPA Tier 2	N/A	2
Hydraulic excavator	Hitachi	EX8000-6	118	US EPA Tier 2	N/A	2
Large tracked dozer	Caterpillar	D10T	114	US EPA Tier 2	N/A	5
Medium grader	John Deere	GP872GP	113	US EPA Tier 3	N/A	3
Large grader	Caterpillar	24M	110	US EPA Tier 2	N/A	1
Water truck	Hitachi	EH3500-3	116	US EPA Tier 2	N/A	2
Primary haul truck	Hitachi	EH5000-3	116	US EPA Tier 2	N/A	16
Large wheel dozer	Caterpillar	854K	113	US EPA Tier 2	N/A	1
Large wheel loader	Caterpillar	992K	114	US EPA Tier 2	N/A	2
Tyre handler	Hyster	H20XM-9		US EPA Tier 3	N/A	1
Integrated tool carrier	John Deere	644	108	US EPA Tier 3	N/A	1
Production drilling	Caterpillar	MDG6420C	118	US EPA Tier 2	N/A	3
Perimeter drilling	Atlas Copco	D65S		US EPA Tier 3	N/A	1
Blasting	IEE	Volvo FMX 11	99	EU5 SCR Engine 410HP	N/A	2
Compactor	Caterpillar	CS56B	110	US EPA Tier 2	N/A	2
Fuel/service truck	Hitachi	EH1700-3	116	US EPA Tier 2	N/A	2
Maintenance truck	Hino	FC1022		EGR&DPR meeting ADR80/03 using EURO 5 Std	N/A	1
Stemming loader	John Deere	554	108	US EPA Tier 3	N/A	1
Rock breaker	Hitachi	ZX470	120	US EPA Tier 3	N/A	1
Subtotal						**49**

Function	Indicative Manufacturer	Indicative Model	Sound Power Level dB(A)	Exhaust Outputs Emission Certification	Fire Ignition Source	Indicative Number
Light Mining						
Pump	Pioneer	PP68C21	113		N/A	6
Bus					N/A	1
Lighting tower	All Light	LED			N/A	22
Communication trailer	Wenco				N/A	8
Light vehicles	Toyota	Hilux	100		N/A	34
Ambulance					N/A	1
Fire truck					N/A	1
Subtotal					**N/A**	**73**
Grand Total					**N/A**	**122**

The site will also have a mobile crushing and screening plant for road base and stemming for blasting. The plant will be in the 500kW prime mover range with US EPA Tier 3 Equivalent or EU Stage IIIA Equivalent exhaust outputs. The sound level is expected to be 118dB(A). This plant is expected to be operated during daytime operations only.

3.5.8 Mine Dewatering

Provide:

- *estimated inflows of groundwater and stormwater and water from any other mining activities into mine workings;*
- *details of mine dewatering infrastructure, and mine water management and disposal;*
- *contingency measures for greater than planned water inflows into mine workings; and*
- *a mine water balance of water inflows and water outflows during operations and at mine completion (if not included in the water balance in Section 3.5.4).*

Modelling of groundwater and stormwater inflows show that the mine workings will be relatively dry with an inflow starting at approximately 40L/s increasing steadily through mine life to a maximum inflow of approximately 100L/s in Year 12 (see Figure 3-33). The groundwater modelling for the revised pit configuration is provided in Appendix 3.4-B.

Uncertainties and sensitivity to change of groundwater model assumptions, i.e., the inflows cited throughout this section, is presented in Table 5-59 of Section 5.16.

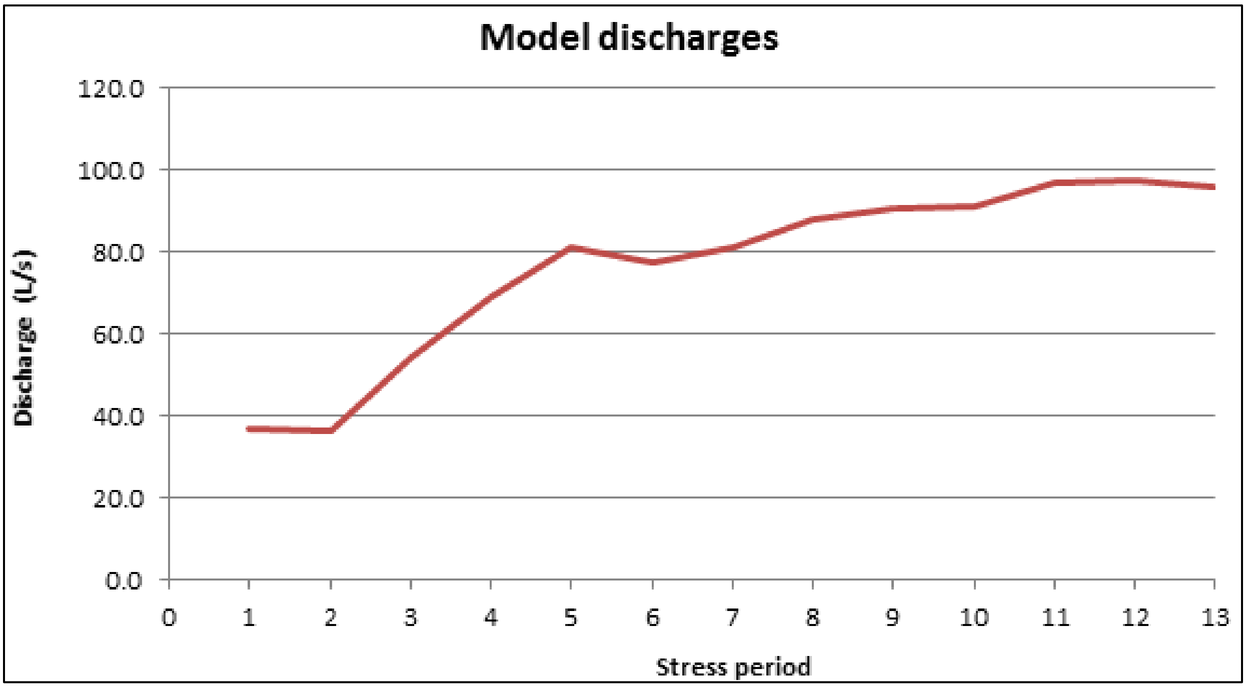


Figure 3-33: Modelled mine dewatering water

Average rainfall in the Project area is 350mm/a and the average evaporation rate is 1,300mm/a. Rainfall rarely exceeds 50mm/d. Assuming this falls within the Phase 5 pit void within one day it would contribute approximately 850L/s for a 24-hour period. Based on the existing mine dewatering system this would take approximately 20 days to dewater, including existing modelled water inflows.

The mine dewatering system will consist of transportable pump stations connected in series, to pump water from a number of pit drainage cells. These cells will be located at or near the bottom of each pit stage. The pumps will be added progressively as the mine advances. Water will be channelled from the road to the drainage cells via engineered drains. The water will be pumped to the decant seepage collection pond (DSCP), where it will be used for dust suppression, and/or pumped to the process water pond. The mine dewatering system has been designed to meet the expected water inflows over the life of mine.

There will be a maximum of four pump stations with two pumps on standby. Each station is modelled to deliver up to approximately 120L/s over 100m vertically. The water will be pumped to the DSCP.

The Hillside Project is in a semi-arid area, mining activities will generate dust during dry periods. The major dust generation will be from haul trucks and drilling operations (see Appendix 2.1-A). Assuming 12km of haul road is active at any one time and 4 active drills, it is estimated that Rex will require an average of 56L/s of water for good dust suppression (equivalent to 4.8ML/d or 1800ML/a). During the initial mining stages, the water produced by the mine (40L/s) will be in slight deficit for what is required in the mine. The deficit will be supplemented from the planned borefield (see Section 3.6.4). After production Year 2 (Year 3 on Figure 3-33), mine water will be in surplus for dust suppression. Excess mine water will be used in the plant. Dust suppression will be provided by three modified mine trucks fitted with 150kL tanks that are filled from the decant seepage collection pond. The trucks will also supply water to drills for their dust suppression. It is estimated that two water trucks delivering two loads per hour are required at the maximum production rate, with a backup water truck on standby. The mine water balance is explained in detail in Figure 3-59.

3.5.8.1 Contingency measures

In the case of unexpected water flows such as an extreme storm event of 1% AEP in 24 hours of 109mm/d, around 3,500L/s can be expected to fall within the maximum pit outline equating to approximately 300,000m^3. This amount of water cannot be diverted by the proposed pumping stations. In this case, personnel and equipment would be evacuated from the pit and emergency pumps would be brought in to pump the water from the pit floor to the TSF via the DSCP. Emergency pumps can be mobilised within 48 hours to enable water to be pumped to the TSF, ensuring that the TSF remains within the specified decant pond limits (Section 3.6.4, via the DSCP and operations to resume once the water has been removed from the pit.

3.5.9 Sequence of Mining and Rehabilitation Operations

Provide the following information on the sequence of operations in both text and map form:

- *description of the sequence of mining stages;*
- *sequencing of progressive and final rehabilitation, including demonstration that progressive rehabilitation has been integrated with the mining plan;*
- *an estimation of the quantities of sulphide minerals that have the potential to generate acid or mobilise metals, or other hazardous minerals to be mined at each mining stage; and*
- *any mineral resource that may be sterilised from future mining by the planned mining operations.*

3.5.9.1 Sequence of mining and rehabilitation

The following development stages are referred to throughout this PEPR document, particularly in Chapter 5:

- Construction (C): the period where the project is constructed. Pre-strip of the open pit will also commence during this period. This is anticipated to be 1 year (referred to as Year -1);
- Operations (O): the period of active mining and processing. This is planned as 14 years and ends with the processing of the last ore;
- Closure (Cl): this is the period of active closure implementation where demolition and rehabilitation of the site is conducted. At this stage, given the level of progressive rehabilitation to be implemented, active closure is planned to take one year; and
- Post-closure (PC): this is the period between active closure being completed and relinquishment of the mining lease. During this time monitoring and, where required, maintenance activities, will be conducted. The post-closure period is dependent on the achievement of all completion criteria, i.e., the achievement of all outcomes required prior to relinquishment. These outcomes and associated timeframes where applicable are detailed in Chapter 5 of this PEPR.

The Project will be mined in five phases with up to three phases operating concurrently. A high-level schedule of the Project construction to active closure completion is shown in Figure 3-34.

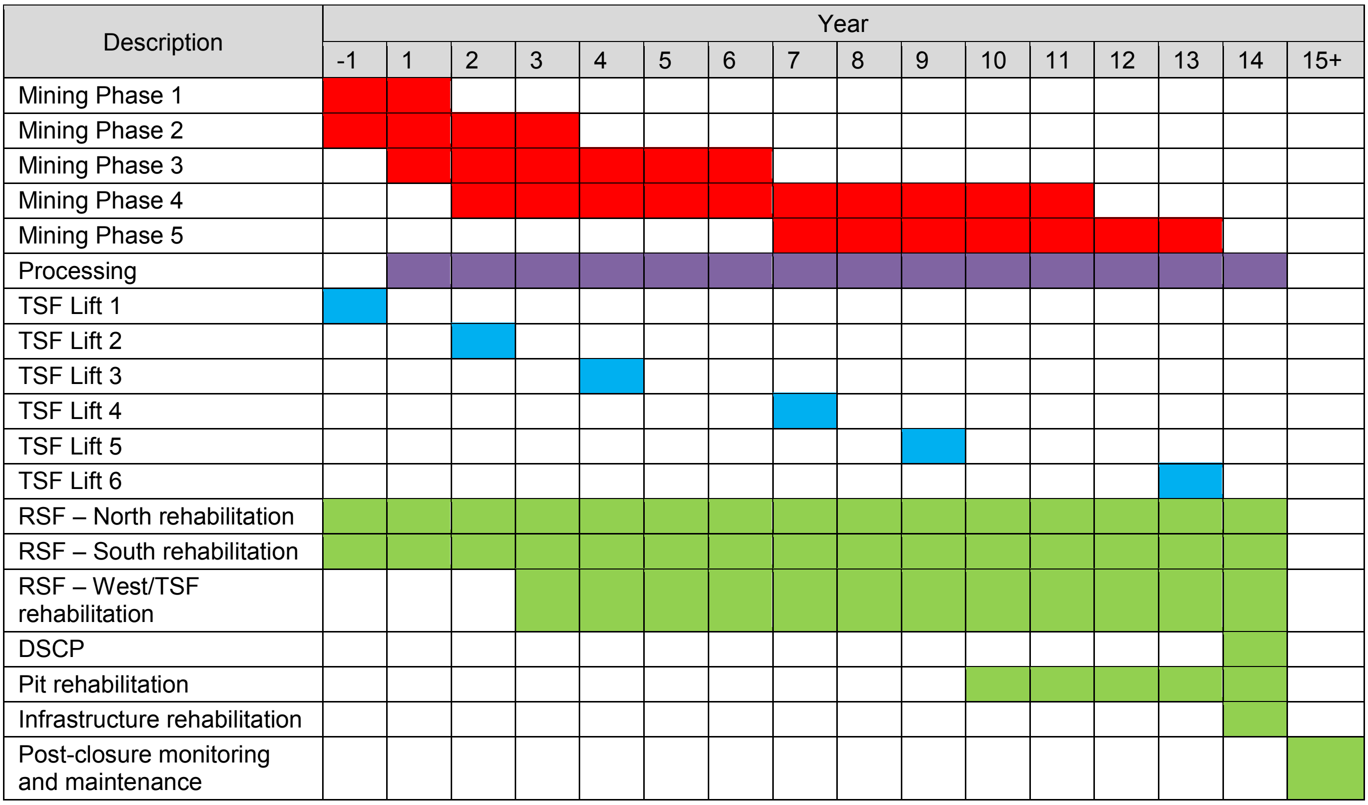


Figure 3-34: High-level project development and rehabilitation

Total ex-pit material movement throughout the schedule will be circa 60Mtpa. Natural surface is approximately 40mRL over the pit area.

In the first year of the schedule (Year -1) Phase 1 will commence and advance to RL -35m by the end of the year, putting some 840kt of ore on the stockpile prior to plant commissioning. Phase 2 commences in the second half of Year -1. Phase 2 will expose primary ore at RL 0m by the end of Year -1.

In the second year of the schedule (Year 1) Phase 1 will be completed, while Phase 2 will reach RL-90m with a turnover of 9x10m benches. The plant will be commissioned during the year reducing the stockpile to its lowest level of 440kt comprising mostly low grade (LG) material. The stockpile recovers to 2.9Mt by the year's end and will comprise around 40% each of mineral grade ore (>0.35% copper) and LG (>0.25% copper) with the remainder being VLG (<0.25% copper).

Phase 3 commences during Year 2 as Phase 2 advances to RL -140, and the bench turnover rate drops to around 5 x 10m benches per year. Stockpile balance drops slightly to 2.6Mt and the mix drops to about 20% mineral grade (>0.35% copper) and 60% LG (>0.25% copper) with the remainder being VLG (<0.25% copper).

In Year 3 the bottom two benches in Phase 2 are completed, Phase 3 becomes the sole source of ore as it is advanced to RL -150m, and the first bench of Phase 4 is opened. The stockpile level drops to 1.1Mt, 75% of which is VLG (<0.25% copper), and 8.5x10m benches are turned over for Phase 3.

Beyond year 3, Phases 3 and 4 are operated simultaneously out to Year 5, Phases 4 and 5 are operated simultaneously from Year 7 to 10 and Phase 5 is operated out to Year 13. The stockpile level increases to 1.8Mt by the end of Year 4, and increases rapidly thereafter as the waste to ore strip ratio falls. The ore stockpile maintains a level between 5Mt and 9Mt out to Year 10 before peaking at 12Mt in Year 11. It then declines as mining slows and stops in Year 13 and in the final year only ore off the stockpile is processed. Figure 3-35 to Figure 3-49 show annual positions for the pit and dumps. Figure 3-84 to Figure 3-87 in Section 3.7.5 show the progressive rehabilitation that is integrated with the mining sequence to final mine closure. Note that these figures only provide mining sequencing, not tailings placement.

There are currently no known mineral resources that would be sterilised by the current or future mining plan.

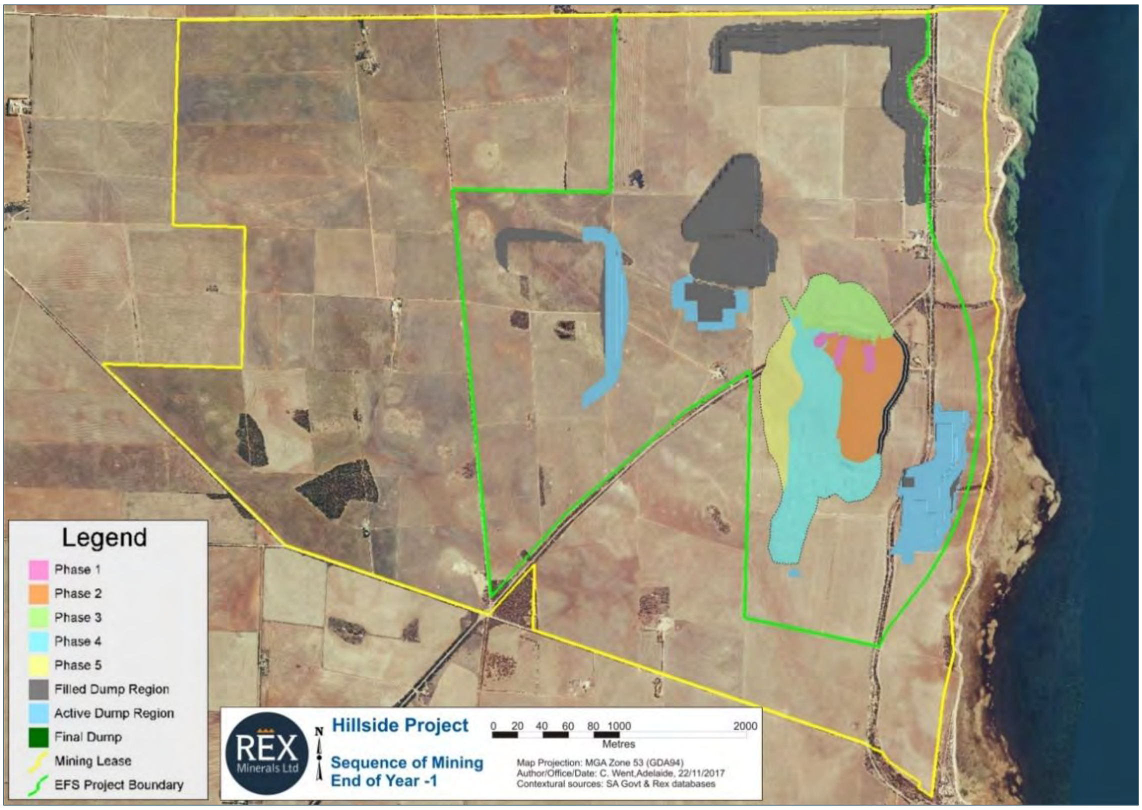


Figure 3-35: Sequence of mining – End of Year -1

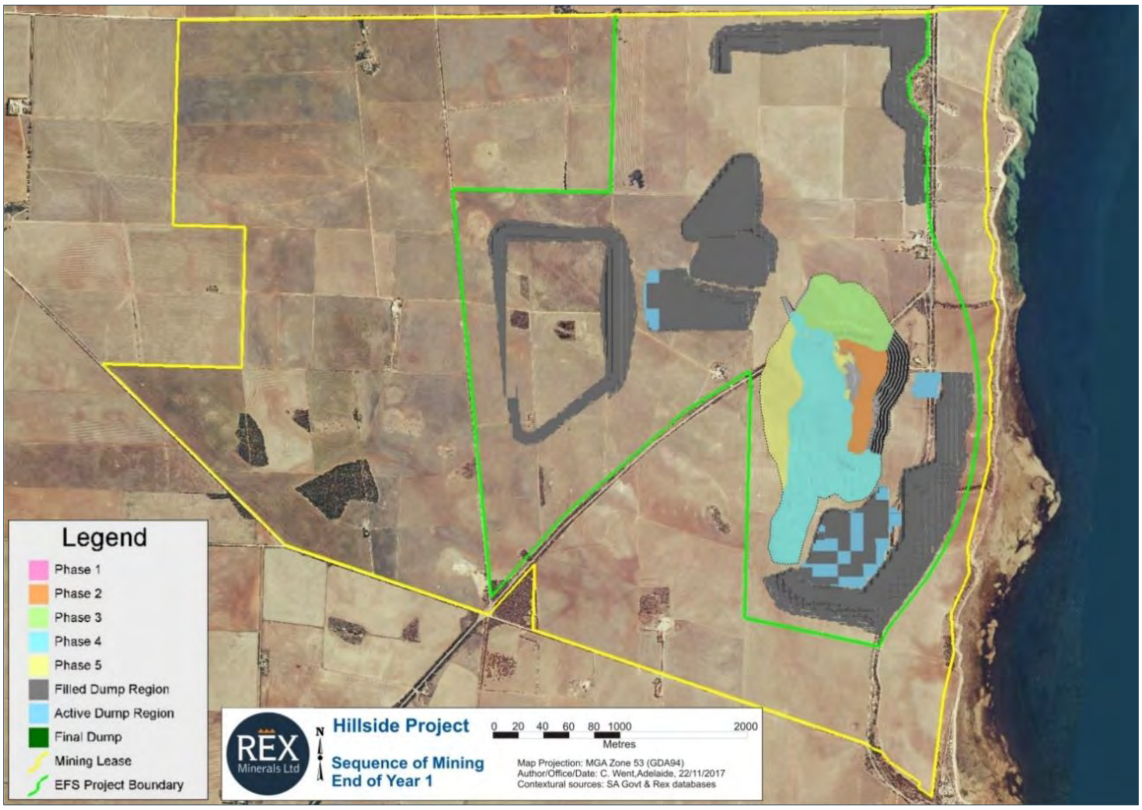


Figure 3-36: Sequence of mining – End of Year 1

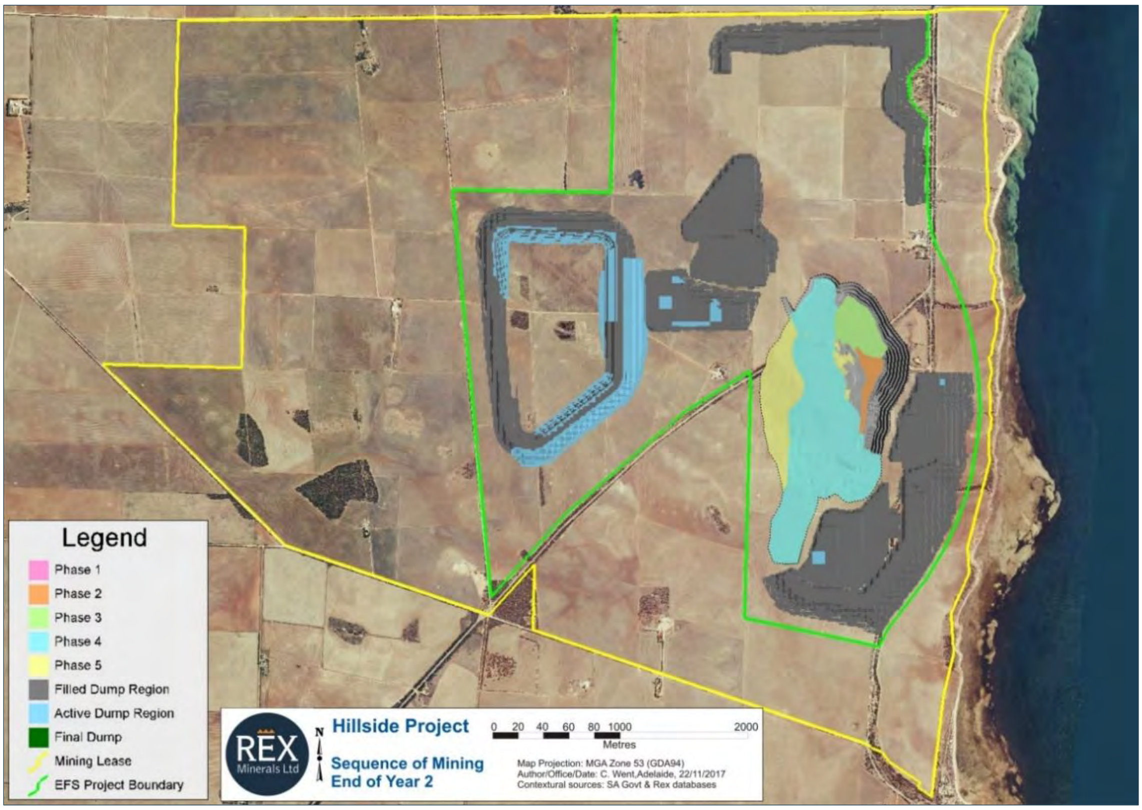


Figure 3-37: Sequence of mining – End of Year 2

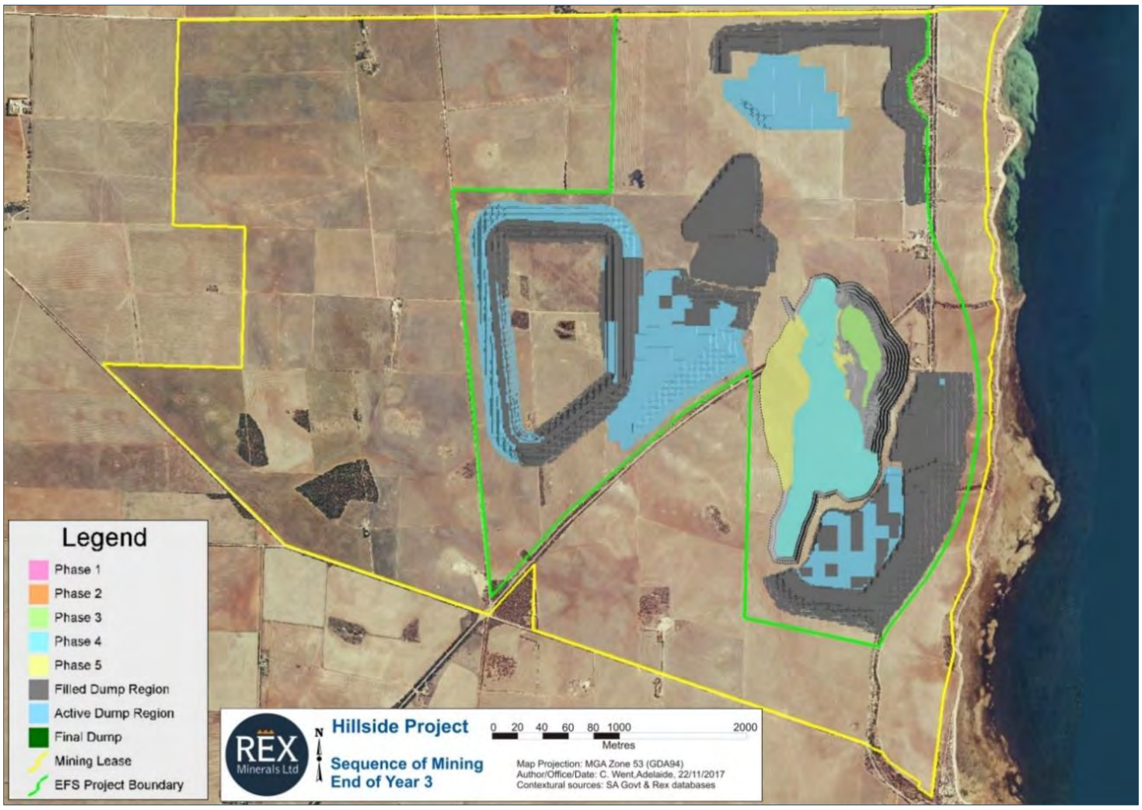


Figure 3-38: Sequence of mining – End of Year 3

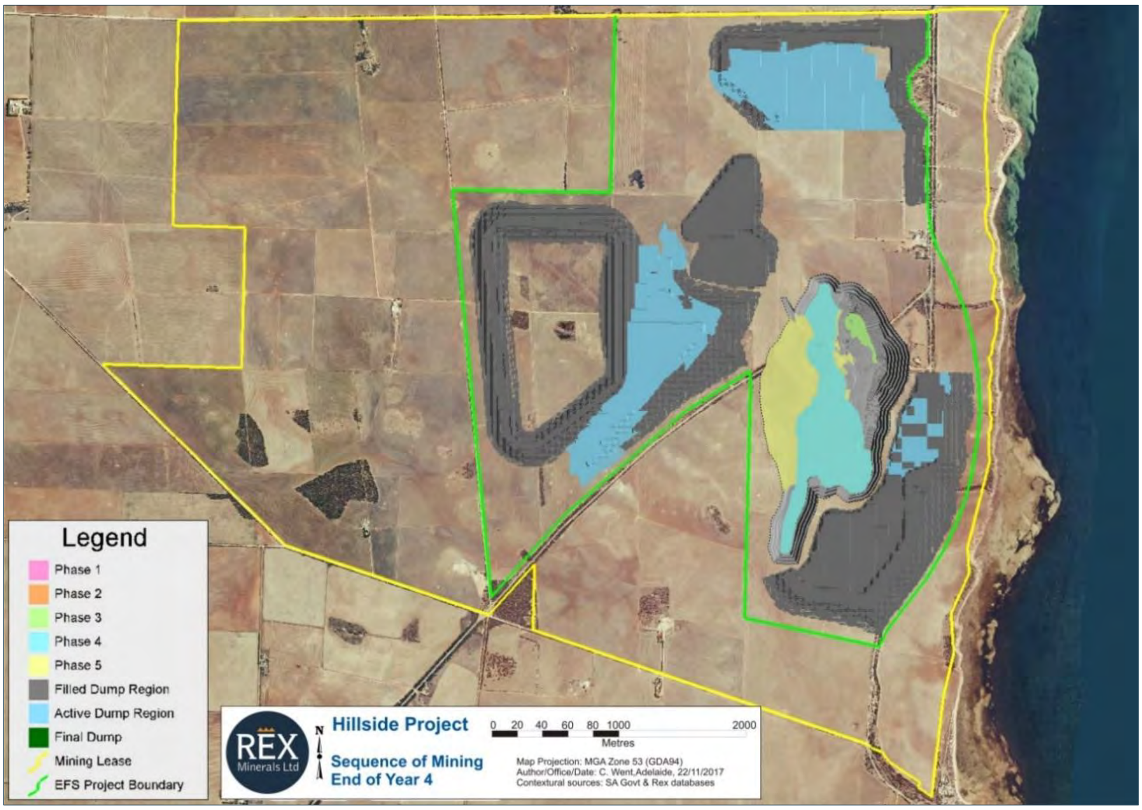


Figure 3-39: Sequence of mining – End of Year 4

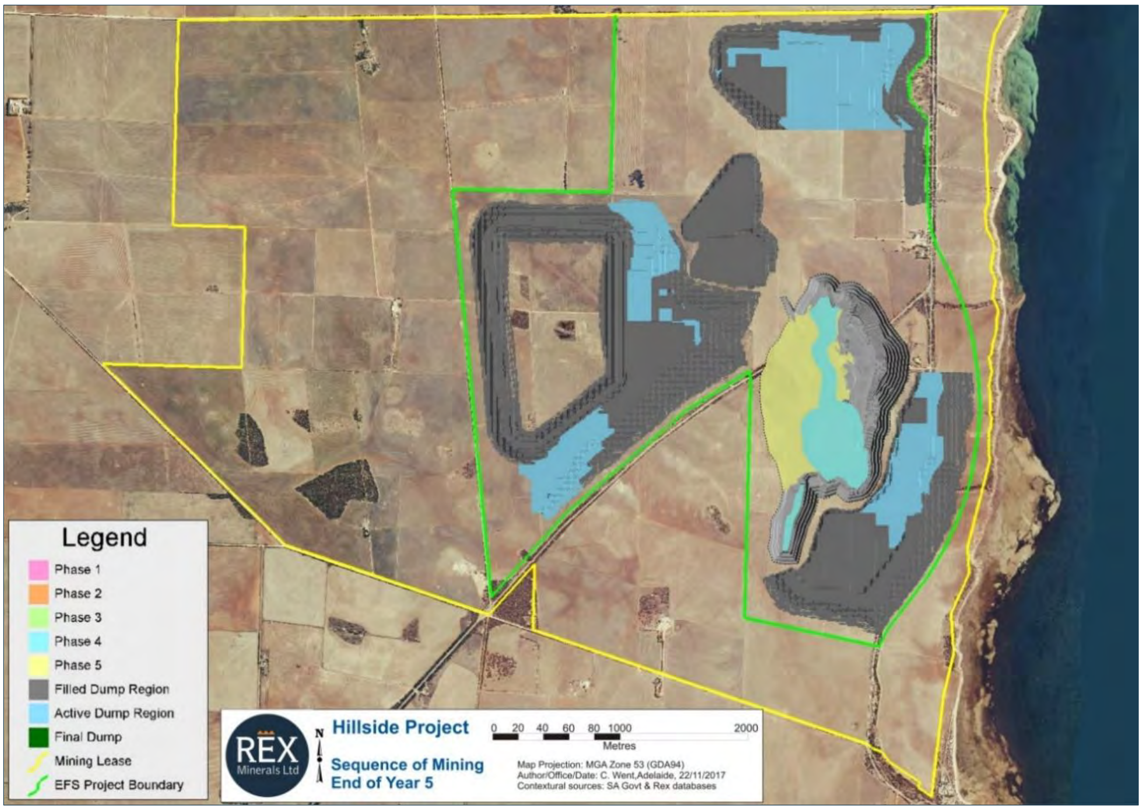


Figure 3-40: Sequence of mining – End of Year 5

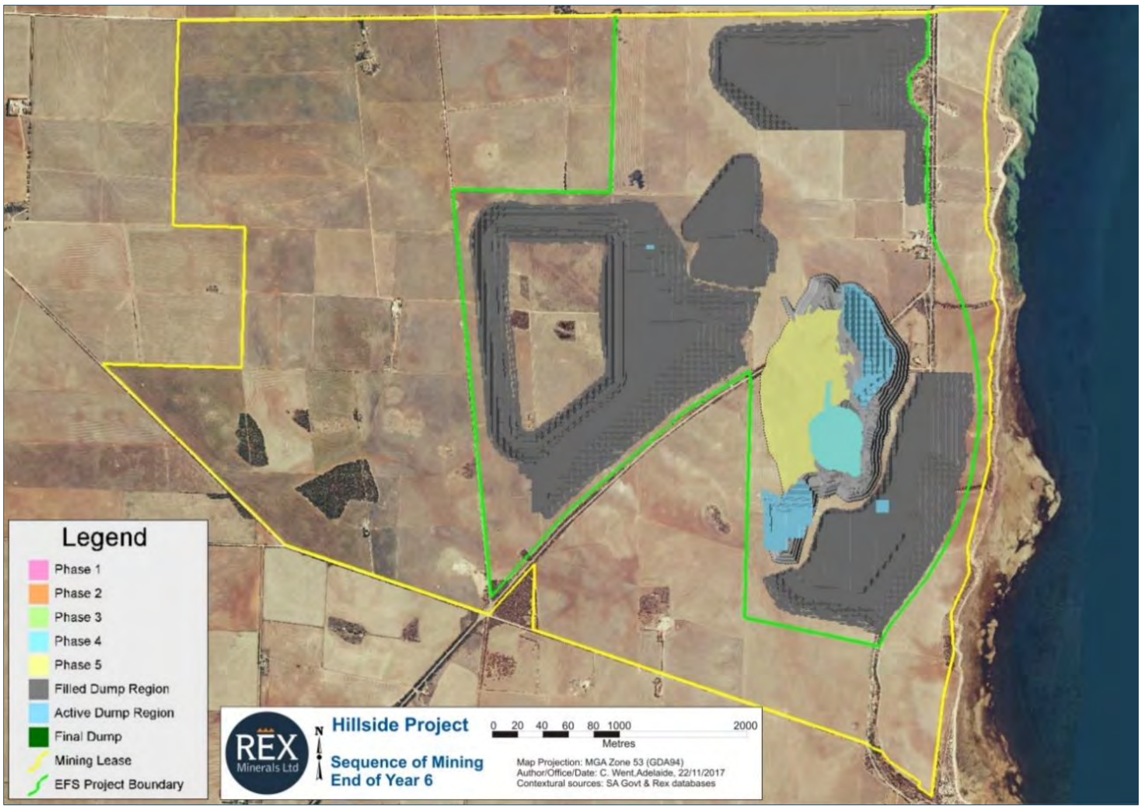


Figure 3-41: Sequence of mining – End of Year 6

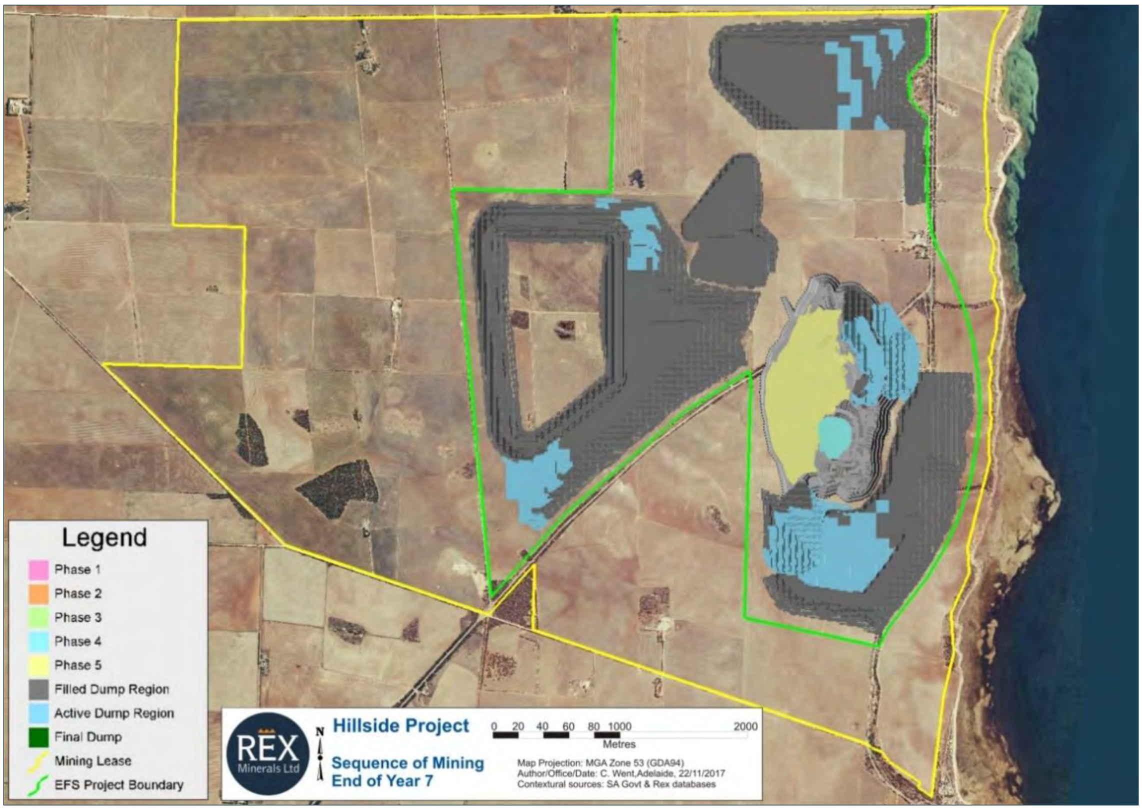


Figure 3-42: Sequence of mining – End of Year 7

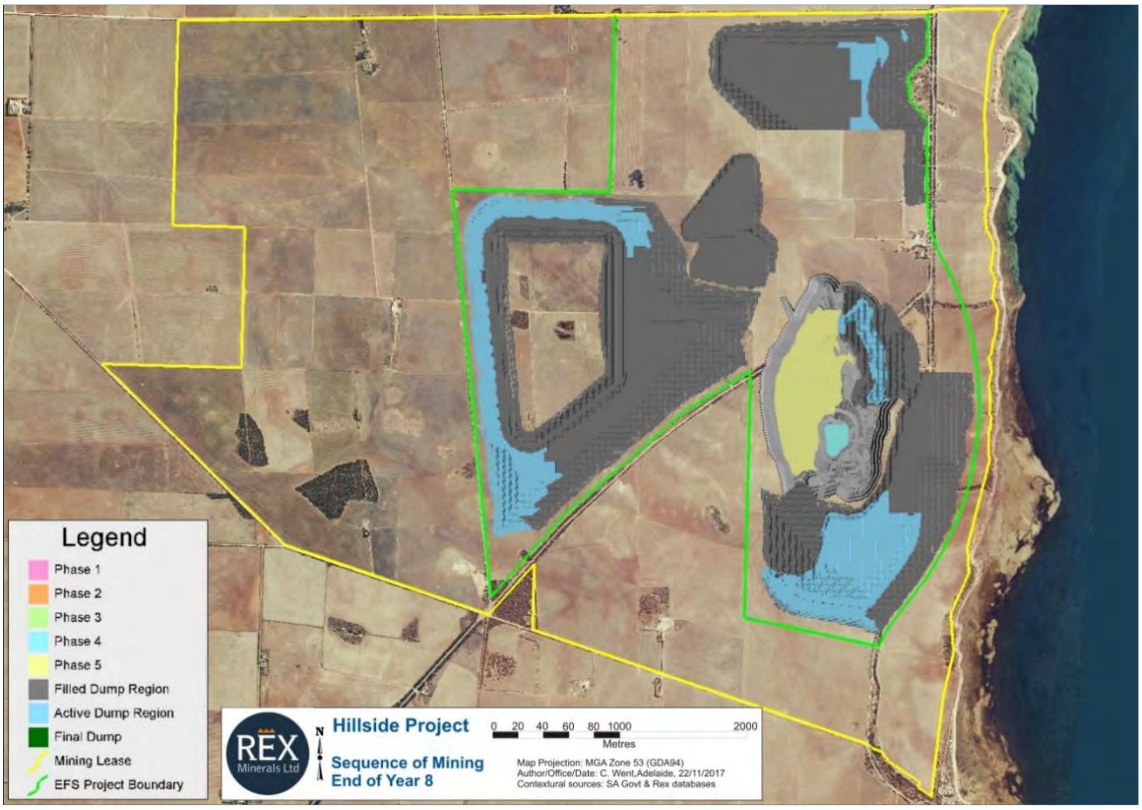


Figure 3-43: Sequence of mining – End of Year 8

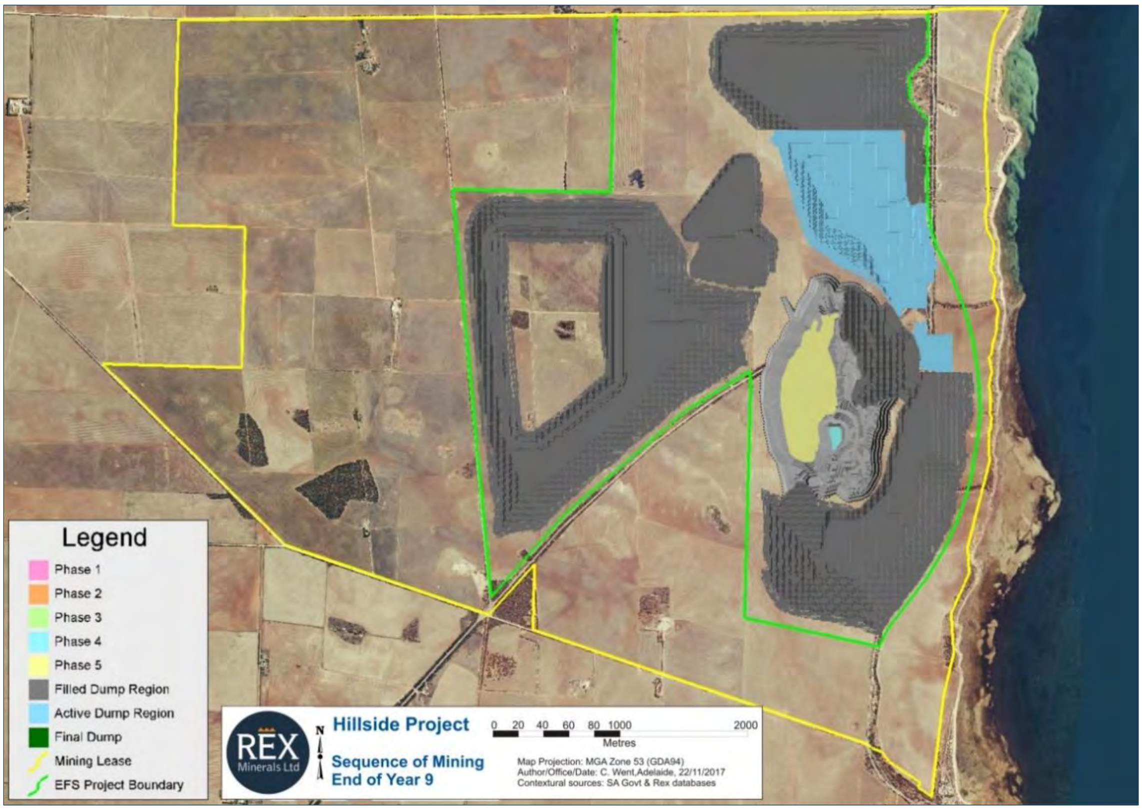


Figure 3-44: Sequence of mining – End of Year 9

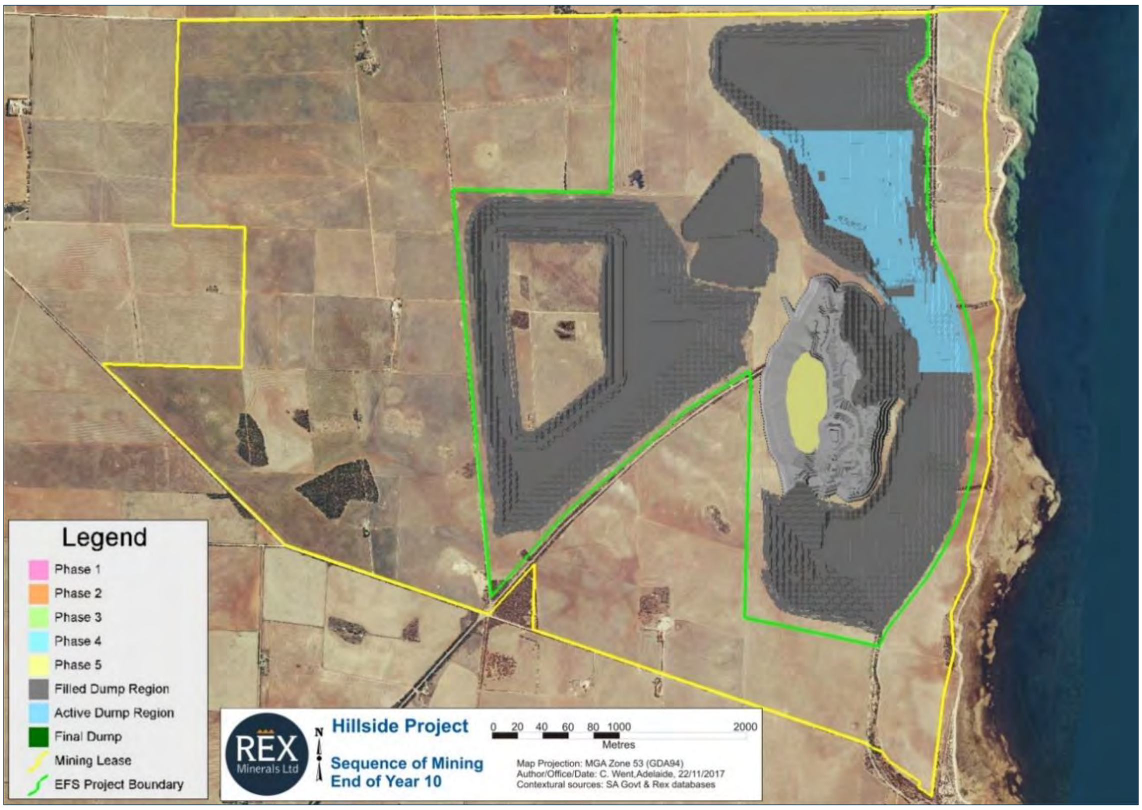


Figure 3-45: Sequence of mining – End of Year 10

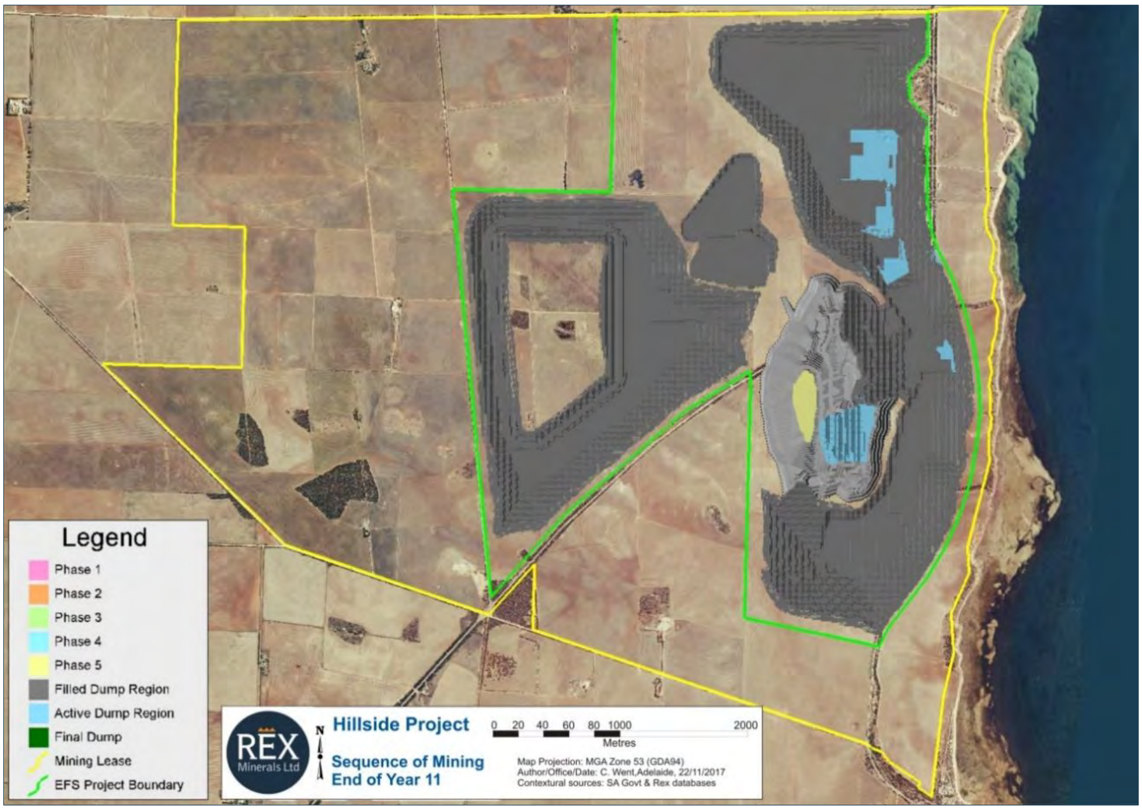


Figure 3-46: Sequence of mining – End of Year 11

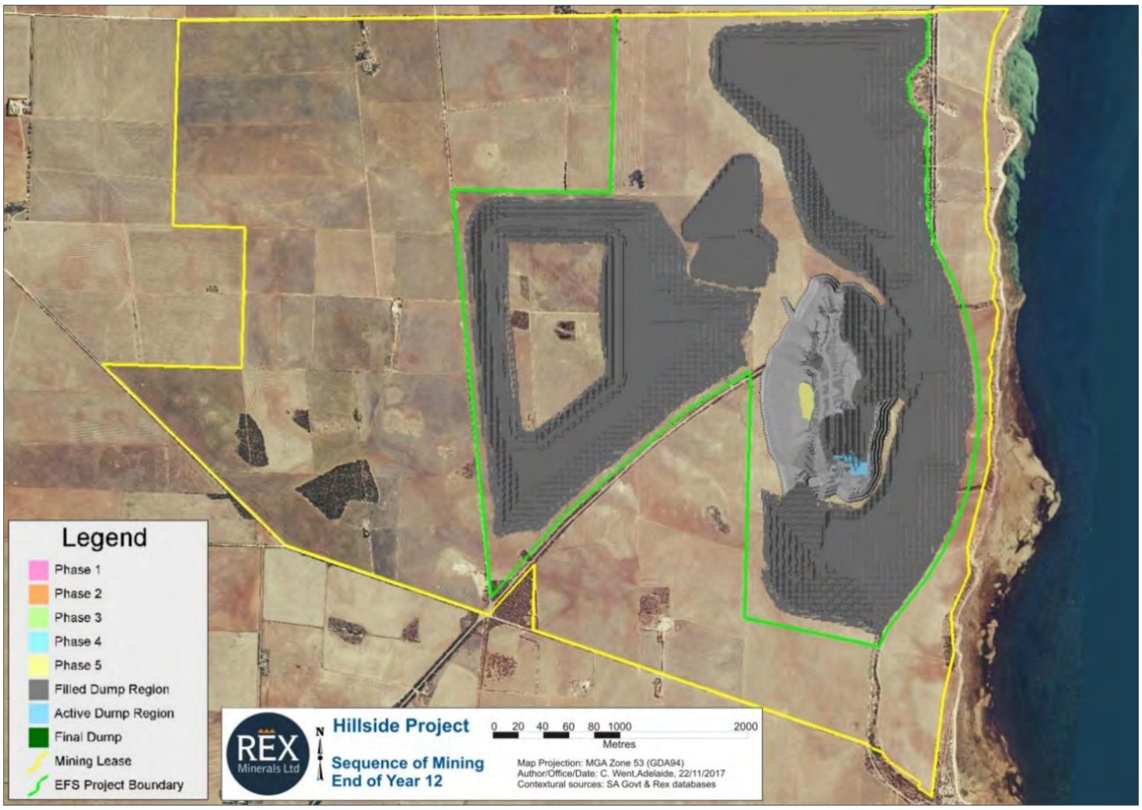


Figure 3-47: Sequence of mining – End of Year 12

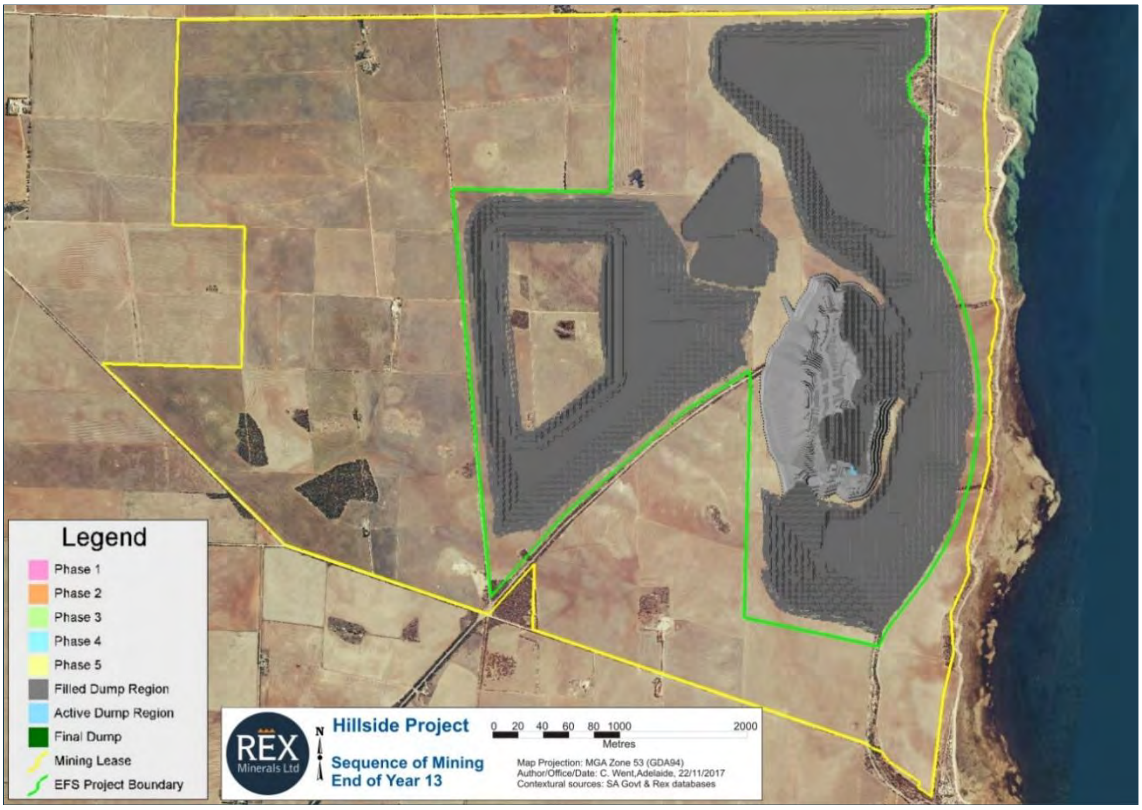


Figure 3-48: Sequence of mining – End of Year 13

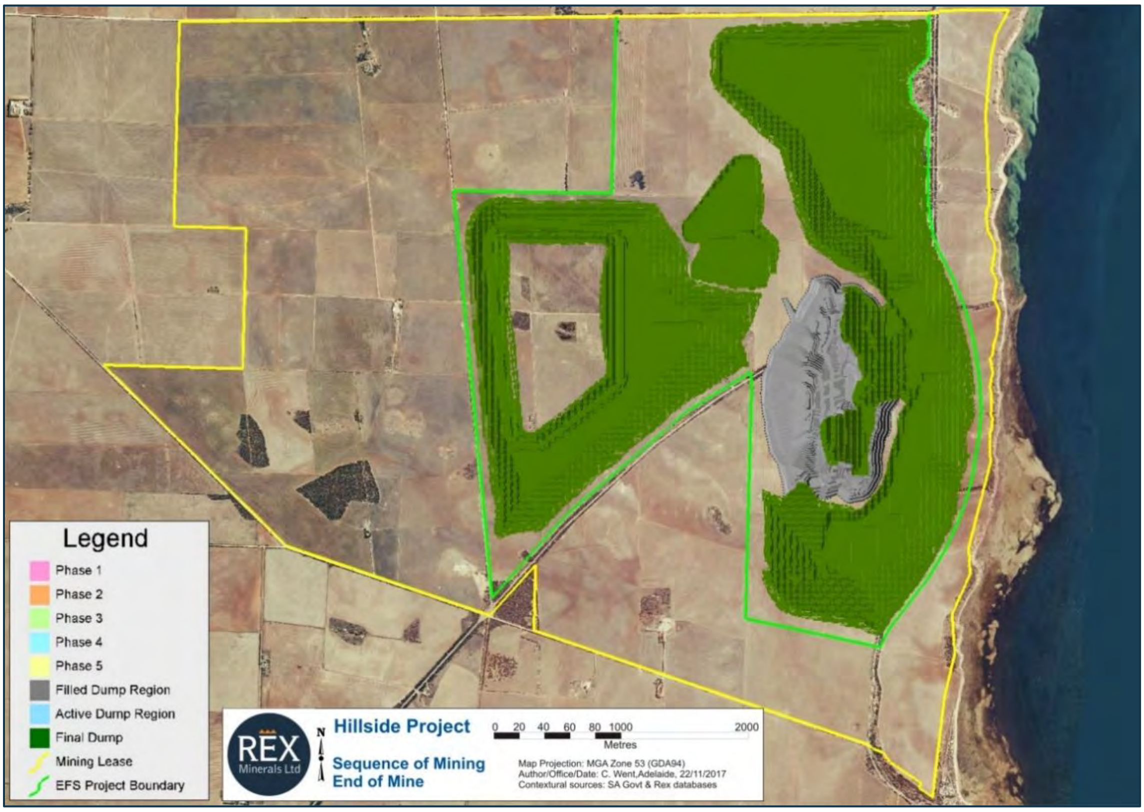


Figure 3-49: Sequence of mining – End of EFS mine

3.5.9.2 Quantities of PAF material by mining phase

The estimation of quantities of potentially acid forming (PAF) sulphides by mine phase and year is given in Table 3-19.

Table 3-19: PAF mineral quantities by mine phase

PAF (Mt) – Fresh and Transition Waste (Cu<0.17%)															
	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	TOTAL
Pit Phase 1	0.124	0.052	-	-	-	-	-	-	-	-	-	-	-	-	**0.176**
Pit Phase 2	0.006	0.449	0.120	0.005	-	-	-	-	-	-	-	-	-	-	**0.580**
Pit Phase 3	-	-	0.324	0.498	0.154	0.002	-	-	-	-	-	-	-	-	**0.978**
Pit Phase 4	-	-	-	0.019	1.029	2.896	2.217	0.538	0.114	0.010	0.002	-	-	-	**6.824**
Pit Phase 5	-	-	-	-	-	-	-	0.050	1.359	4.238	3.284	3.071	0.459	0.113	**12.572**
Total	**0.130**	**0.501**	**0.444**	**0.522**	**1.183**	**2.898**	**2.217**	**0.587**	**1.473**	**4.248**	**3.285**	**3.071**	**0.459**	**0.113**	**21.131**

3.5.10 Mode and Hours of Operations (Working Conditions)

The mine will operate 365 days per year, 24-hours-per-day, including all public holidays. The mine will run two 12-hour shifts, dayshift starting at 6am and finishing at 6pm, and nightshift starting at 6pm and finishing at 6am.

There will be a four-panel roster, with 12-hour shifts for supervisors, trade, operators and grade control technicians. Mine management and technical staff will normally work dayshift, on a 40-hour, five-day week excluding public holidays.

3.5.11 Care and Maintenance

In the event the mine is placed on care and maintenance due to an event such as low commodity prices, then the following major activities will be carried out:

- All the blasting agents in the bulk storage facilities will be used. The bulk storage facilities will be washed down and cleaned. Other explosives such as detonators and primer will be returned on consignment to the supplier. There will be no explosives stored at site during care and maintenance;
- The fuel farm will reduce from 600,000L to 100,000L of diesel and sufficient hydraulic oil will be stored to maintain the site equipment required for care and maintenance;
- Mine dewatering will continue as the water will be used for dust suppression of roads and the tailings dam. Water will be pumped to the DSCP and from there it will be used for dust suppression activities. The mine pumps will be withdrawn to a level that would ensure no flooding in a major storm event. Environmental monitoring of the dams will continue as per normal;
- Dust monitoring will continue with watering and suppression as required. If trigger dust levels are detected, response will be taken as detailed in Section 5.4;
- Pit wall monitoring will continue with regular surveying to detect any wall movement;
- Mine roads will be maintained by Rex personnel with existing mining equipment. Access to the pit will be maintained to ensure pump maintenance;
- The mine site will be completely enclosed with security fencing that restricts access with signage to deter unauthorised entry. There will be 24-hour security for the mine, plant, offices and infrastructure;
- Mining equipment will be parked at the go-bay at the mine and maintained by Rex. If the period of suspension is for an extended period, Rex may choose to remove some or all of the mobile equipment not associated with the ongoing care and maintenance of the mine;
- The mobile crushing and screen plant will be maintained to provide road base for road maintenance; and
- It is estimated that two to three people will be required in the mine for an extended care and maintenance to maintain equipment and monitoring regime.

3.5.12 Potential Transition to Large Pit Options

During the BFS, the Hillside Project had a planned LOM of more than 20 years. During the EFS, the operation was scaled back to approximately 50% of the BFS. The EFS is referred to as Stage 1, and is divided into five phases to minimise waste stripping whilst providing a reliable supply of ore to the processing plant. Stage 2 of the mine would see a sixth phase of mining pushing the pit to its ultimate limit as modelled in the BFS. Possible transition options, which would require additional approvals, are presented in Figure 3-50 and identified below.

- At approximately Year 5, depending on the economic forecast for copper, a decision will be made whether to continue with the EFS plan or to start Stage 2 and hence the Phase 6 pushback. The latter option will require expansion of the TSF and associated RSF, refer to Figure 3-2;
- At approximately Year 14, depending on the economic forecast for copper and iron ore, a decision will be made whether to start reprocessing the iron ore and disposing reprocessed tailings in the pit. This will add another 12 years to mine-life. At approximately Year 30, when Stage 1 is complete and the pit has been filled with reprocessed tailings, then final rehabilitation of the site would be completed; and
- Alternatively, at approximately Year 14, depending on the economic forecast for copper and iron ore, the Stage 2 and Phase 6 pushback (including removing part of the Phase 5 backfill), could begin. The decision to start Stage 2 in Year 14 will result in a hiatus of ore processing due to the amount and timing of waste material required to be removed before ore can be accessed. When Stage 2 – Phase 6 is finished, reprocessing of the iron ore could begin, adding another approximately 12 years to mine life. At around Year 40 when Stage 2 is complete, the final rehabilitation of the site could be completed.

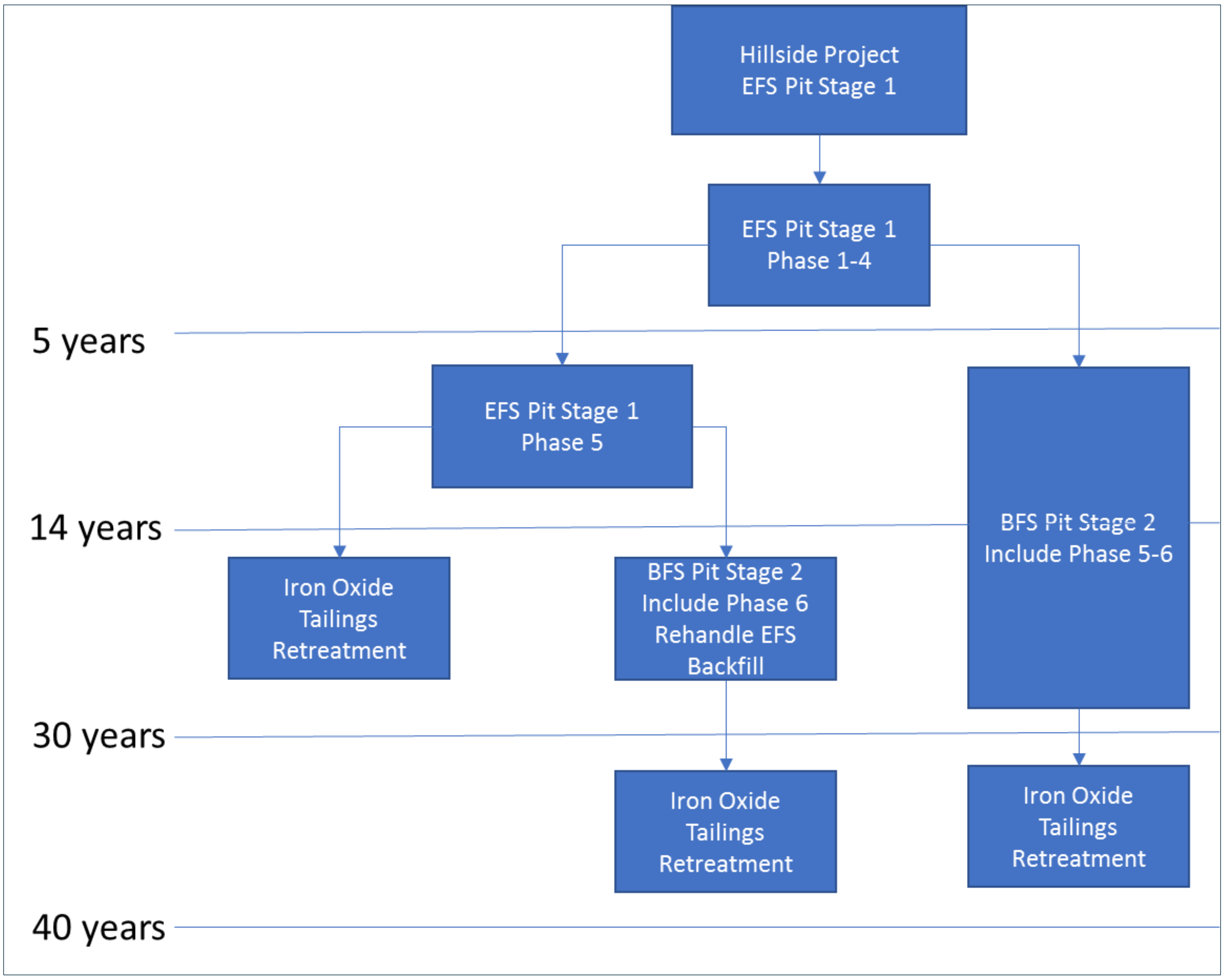


Figure 3-50: Flow chart detailing the options for transition to the large pit (Stage 2)

3.5.13 Summary of the Transition from the Stage 1 (EFS) Mine Pit to the Stage 2 Mine Pit

Table 3-20 provides a summary of the amount of fresh waste generated, waste that may be rehandled if Stage 2 starts in Year 14 and the amount of ore and grade for each mine stage.

Table 3-20: Sizes of Stage 1 and 2 LOM options summary

Stage	Phase	Fresh Waste (Mt)	Re-handle Waste (Mt)	Ore (Mt)	Copper (%)	Gold (g/t)
1 (EFS)	1 to 5	603		82	0.62	0.16
2 (BFS)	6	719	199	89	0.46	0.13
Total		**1,322**	**199**	**171**	**0.54**	**0.14**

Stage 1 (EFS) has a final pit shape of 2.3km long by 1.2km wide and 440m deep. The pit contains 82Mt of copper/gold ore from a total pit tonnage of 685Mt and has a mine life of 14 years. The Phase 5 pit shape is final shape for Stage 1. In the EFS, the pit design includes in-pit dumping of 106Mt of waste and with another 16Mt over the pit in the form of an integrated landform design. This design does not prevent future expansion of the pit nor does it sterilise the remaining resource.

In 2013, the ore reserves were quoted on the Stage 2 final pit and referred to as the Phase 6 design. The Phase 6 design had a pit that contained 180Mt of copper/gold/iron ore from a total pit tonnage of 1.484 billion tonne. The pit was 2.55km long by 1km wide and 0.5km deep. The major difference being the expansions to the north, south east and at depth (refer to Figure 3-1 for the Stage 1 Project and Figure 3-2 for the Stage 2 Project).

Using a similar selective mining method to the EFS pit, there would be approximately 171Mt in the old BFS Phase 6 but at a higher grade than the 2013 Ore Reserve statement. Once the EFS Phase 5 has been mined, there will remain 89Mt of sulphide ore within the BFS Phase 6. To access this ore via open pit mining methods if the Stage 1 was mined to completion but not backfilled with iron ore tailings would require the removal of approximately 918Mt of waste. This includes 106Mt of EFS Phase 5 in-pit dumps, 93Mt of EFS Phase 5 RSF and 719Mt of fresh waste from the BFS Phase 6.

Expansion of the Stage 1 (EFS) Project to the Stage 2 (BFS) project would require additional approvals and land access arrangements.

3.6 Crushing, grinding, processing and product transport

3.6.1 Crushing and Grinding Plant

Provide a description of the crushing / grinding plant including:

- *area, size, type of construction and location;*
- *throughput rate;*
- *a description of ore preparation for processing;*
- *grind size of the ore;*
- *noise sources;*
- *dust sources and composition;*
- *fire ignition sources; and*
- *maps and plans.*

The plant has been designed during the EFS task to process 750 dry tonnes per hour of unprocessed ore (equivalent to 6Mtpa) and has a design availability of 91.3%.

The plant location and general arrangement is shown in Figure 3-51 and Figure 3-52 below. The type of construction for the process plant and surface infrastructure will be a combination of build on site, and modular construction off site with transport of modules to site. The process flowsheet is outlined in Figure 3-53.

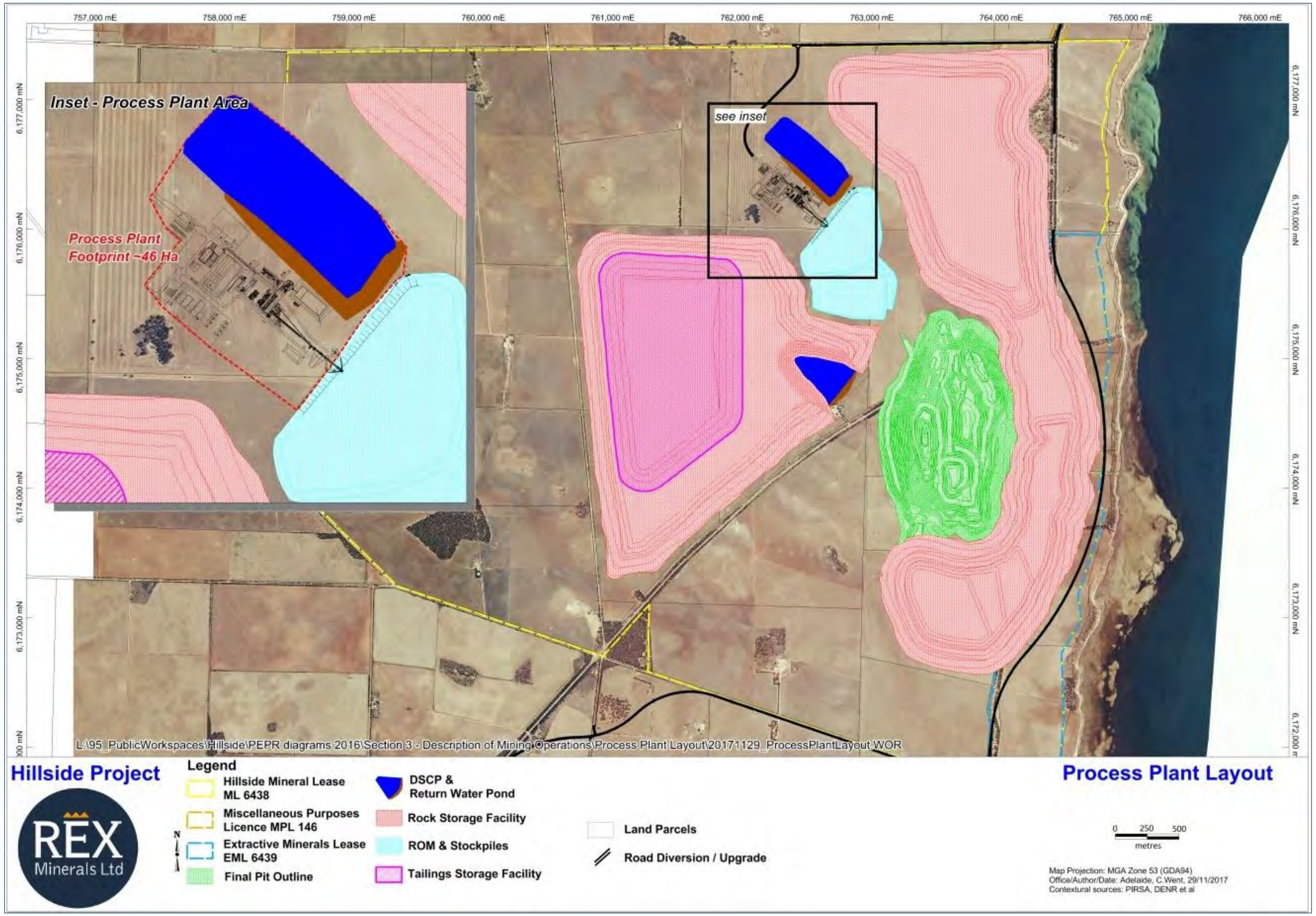


Figure 3-51: Process plant layout

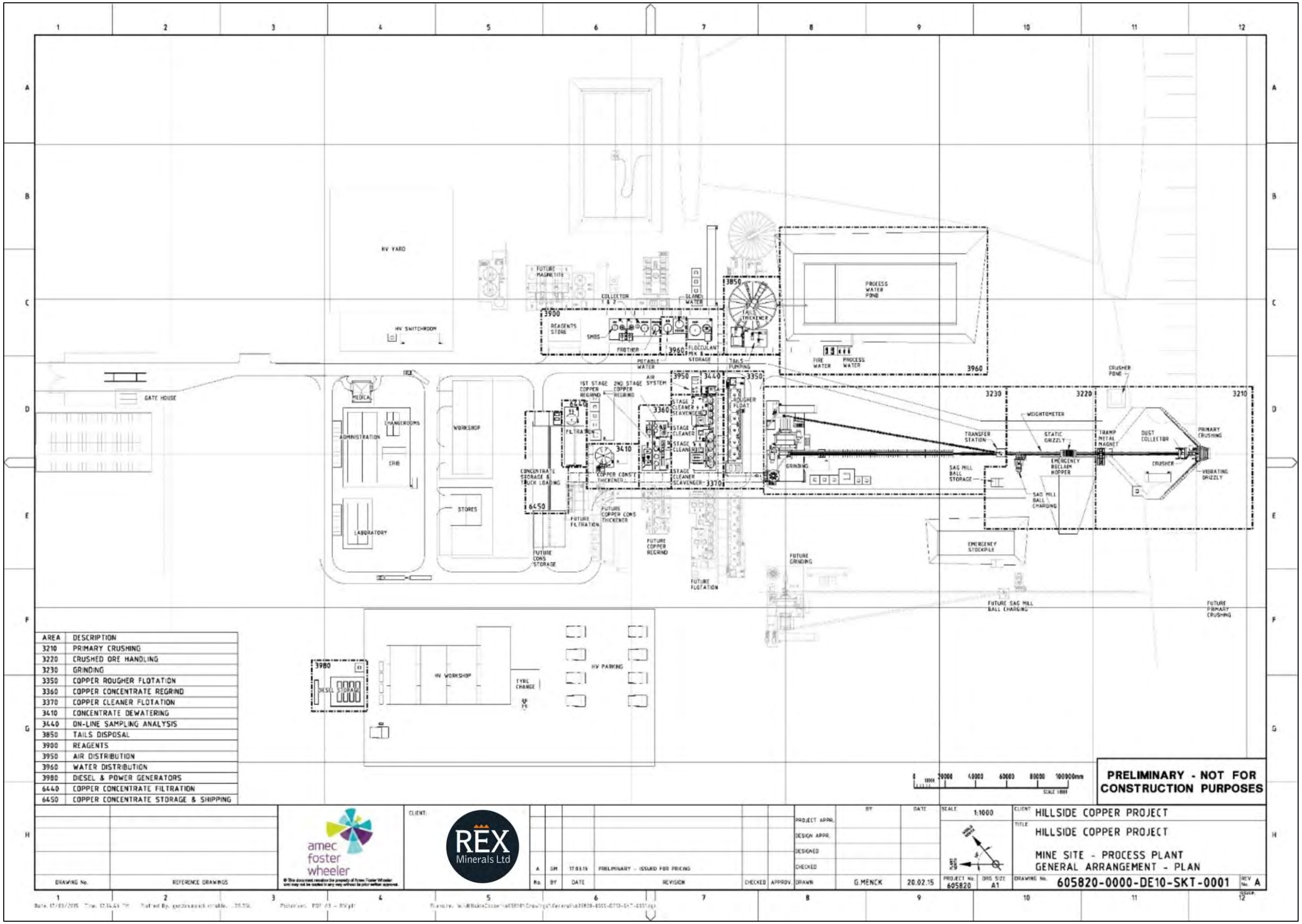


Figure 3-52: Process plant general arrangement plan

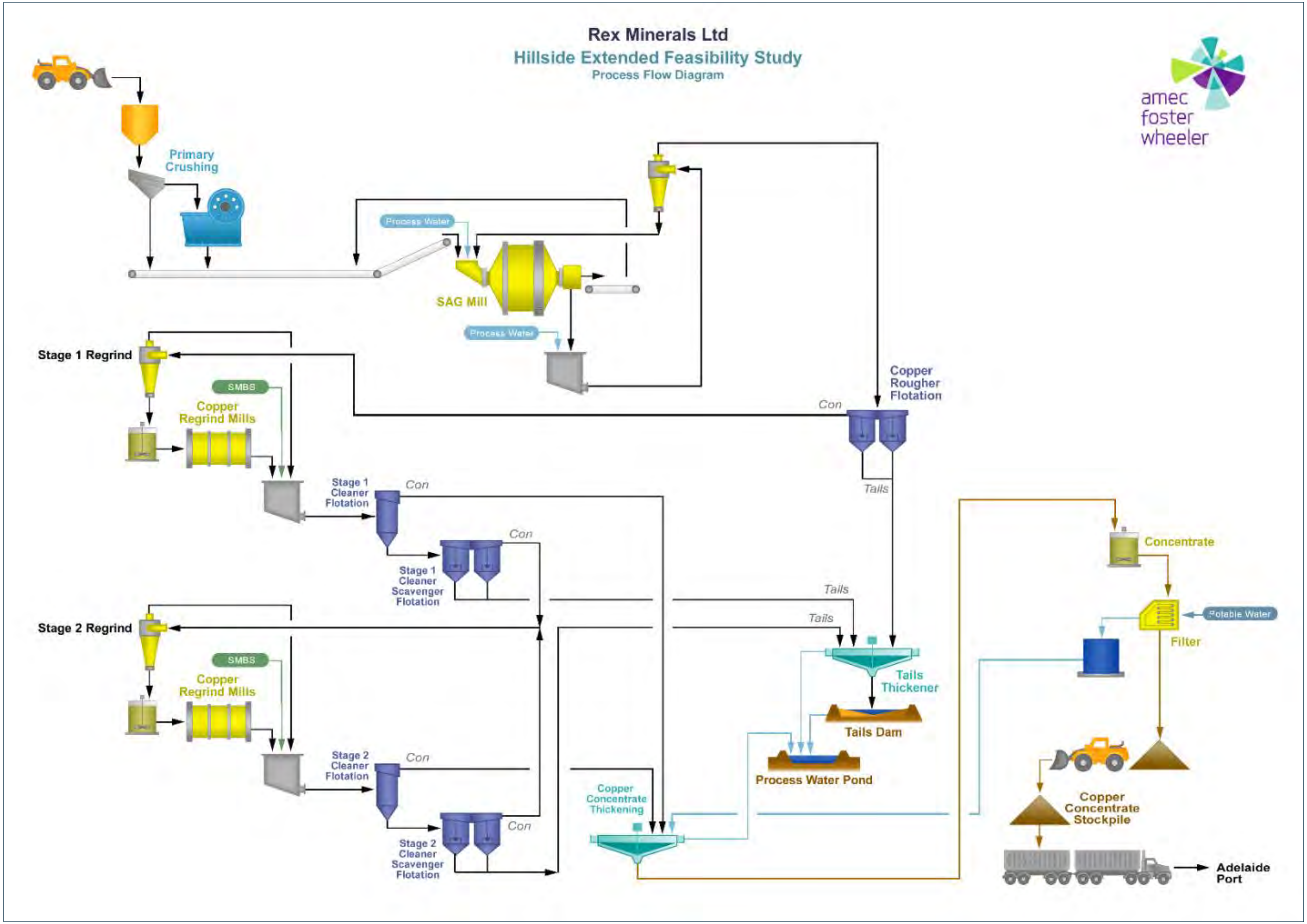


Figure 3-53: Process flowsheet

3.6.1.1 Crushing

Under the plant design, ore is delivered to the ROM stockpiles by trucks from the mine. Two front-end loaders reclaim the ore from the stockpiles and deliver it to the ROM bin. The ROM bin has a live capacity of 15 minutes of crushing and can be fed from two sides simultaneously. The top of the ROM bin is fitted with a static grizzly, to retain any oversized material from the mine, with the front-end loader required to remove the oversize material retained by the static grizzly. The ROM bin feeds directly into the vibrating grizzly feeder which discharges oversize material (over 150mm) into the primary crusher while the undersize material reports directly to the primary crusher discharge conveyor.

The primary crusher is a jaw crusher type and discharges the crushed ore onto the primary crusher discharge conveyor. Primary crushed ore passes under the primary crusher tramp magnet where tramp metal is removed and diverted via a chute and discarded.

3.6.1.2 Dust management

The dust management controls will be implemented to meet the Hillside Project ML conditions (see Section 5.4).

Dust suppression spray systems are installed at relevant transfer points, with water delivery added to the lump and fine product conveyors prior to transferring onto the stackers. Spray nozzles will match particle sizing and hopper hoods will be installed where necessary.

Wherever necessary, conditioning the ore with water will occur in the pit or on and around the ROM pad stockpiles and handling areas. Dust suppression spray systems will be in effect at key transfer points in the crushing and screening circuits.

There is also a dust extraction system to service the locations in the primary crushing area that generate dust. The collected dust from the dust extraction system is discharged intermittently onto the primary crusher discharge conveyor.

Spillage and wash down water are collected in the primary crusher sump and then pumped to the primary crusher area settling pond.

The primary crusher discharge conveyor, which is fitted with a weightometer to monitor the crushed ore feed rate to the process plant, discharges the ore into the semi-autogenous grinding (SAG) mill. Sprayers are employed to prevent dust generation.

Ongoing performance reviews of dust suppression controls, and vigilant in-house non-conformance reporting will ensure achievement of compliance outcomes during operation. Maintenance systems will be in place to ensure availability of plant dust suppression systems.

3.6.1.3 Crushed ore handling

At times of crusher maintenance, ore from the ROM will be crushed through the mobile crushing plant, and fed by front-end loader to the primary crusher discharge conveyor from the fine ore hopper. The hopper has a design residence time of 10 minutes and is fitted with a belt feeder to control the flow of material onto the conveyor. The hopper will be fed by a front-end loader, which will reclaim crusher material from an emergency stockpile located in proximity to the fine ore hopper.

Grinding media for the SAG mill is intermittently added onto the primary crusher discharge conveyor. This is achieved through a bin and feeder system located over the primary crusher discharge conveyor. Balls are loaded from a ball bunker to the SAG mill ball bin by front-end loader.

3.6.1.4 Grinding

The grinding circuit consists of a single stage 16 MW SAG mill capable of 750 dry tph feed rate in closed circuit with one cluster of hydrocyclones.

The SAG mill discharge passes through a trommel screen on the mill discharge trunnion. The oversize rocks or scats are conveyed back to the primary crusher discharge conveyor. The undersize from the trommel discharges gravitationally to the mill discharge hopper. The trommel screen is equipped with sprays to aid separation.

One duty cyclone feed pump draws from the mill discharge hopper and pumps to the cyclone cluster.

The nominal target P80 of the cyclone overflow is 125μm for the first two years of mine operation, increasing after that to 150μm. This is due to the amount of transition material in the ore fed to the plant in the initial years, which requires the finer grinding product of 125μm to achieve the target copper recovery.

Cyclone overflow gravitates through the rougher flotation feed box. The separate cyclone cluster underflow stream is returned to the SAG mill feed chute.

The larger maintenance tasks in the grinding area will require the use of a mobile crane. One relining machine and an access ramp to the mill platform are provided to allow for change-outs of liners and lifters of the mill.

The SAG mill has dedicated lubrication systems for the mill motors, pinion bearings and mill bearings. The lubrication system is located underneath the mill floor slab near the SAG mill.

3.6.1.5 Noise sources

The crushing and grinding noise sources are tabulated in Table 3-23. Mine site processing noise sources - point source.

3.6.1.6 Fire ignition sources

A conveyor is a potential ignition source. However, it is transporting damp (approximately 4% moisture) inert crushed ore. Water based fire suppression systems will be installed on conveyors. Additional fire precautions will be based on a job safety risk assessment undertaken at the time when maintenance is being conducted on a stationary conveyor.

3.6.2 Processing Plant

Provide a description of the processing plant including:

- *the methods and details of processing and value adding;*
- *number, location, area, size, type of construction (including lining and drainage systems, as appropriate) of processing plant;*
- *any ancillary plant and infrastructure to be used for processing the minerals on site; examples of associated structures are concrete batching plants, wheel wash facilities, silos, fuel tanks, water tanks, chemical storage/use, reverse osmosis plants and borefields;*
- *if chemicals are to be used in the beneficiation or processing of ore, describe the nature and quantities of the chemicals to be used, their reactions with ore and their ultimate fate;*
- *noise sources;*
- *dust sources and composition;*
- *fire ignition sources;*
- *other potential air emissions (including odour) and their composition; and*
- *maps and plans.*

3.6.2.1 Copper rougher flotation

Copper ore will be beneficiated using a conventional flotation processing method. This is the most technical and economically viable method for the separation of copper minerals from the Hillside ore.

Saline water will be used in the flotation process and will be sourced from groundwater available from dewatering the open pit and supplemented with saline water drawn from a coastal borefield (see Section 3.6.4).

Copper rougher flotation is nominally carried out at the cyclone overflow pulp density of 35% solids and at a grind size P80 of 125µm for the first two years of mine operation, increasing to 150µm after that. The rougher flotation circuit is an open circuit, with rougher flotation tailings reporting to the tailings dam.

The cyclone overflow from the grinding circuit gravitates to the rougher flotation cells. The rougher stage of flotation consists of six forced air tank cells in a 1-1-2-2 configuration. Figure 3-54 shows a cross-section detail of a typical flotation cell used in the circuit.

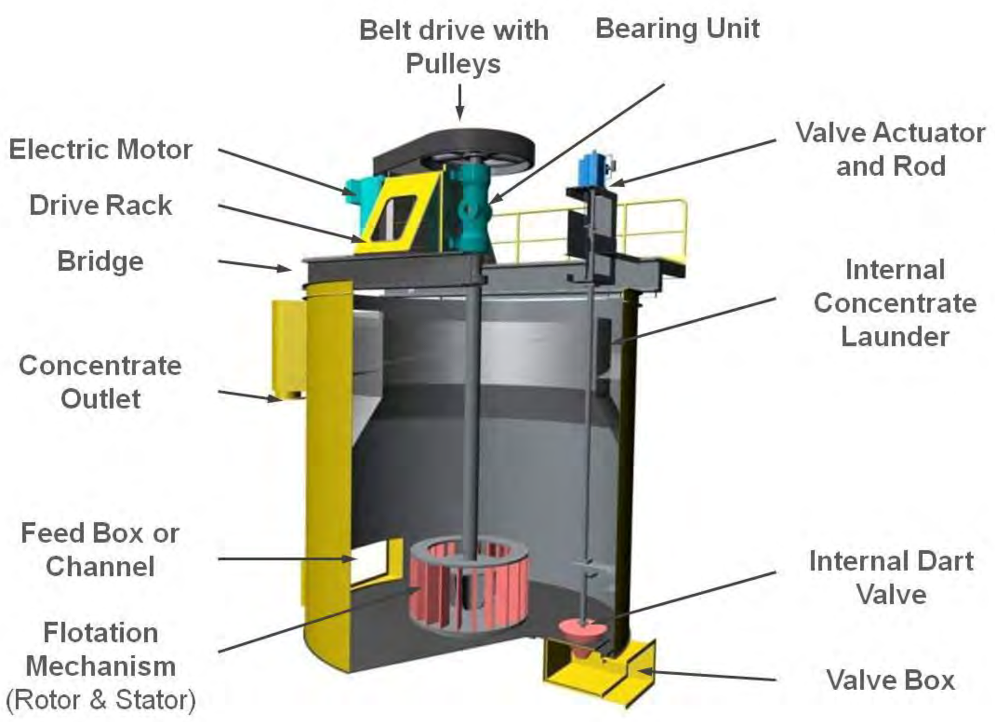


Figure 3-54: Flotation cell details

Flotation is undertaken at natural slurry pH. Potassium amyl xanthate (PAX) is added as the flotation collector and methyl isobutyl carbinol (MIBC) as the frother.

Rougher concentrates from each cell gravitate through launders to the concentrate hopper and one pump discharges the concentrate to the deslime cyclone cluster of the regrind circuit. Flotation tailings gravitate from the final cell to the rougher tails hopper. One operating pump transfers the flotation tails to the tailings thickener.

3.6.2.2 Copper concentrate regrind

Regrinding is done in horizontal stirred bead mills, with ceramic media. The mills selected as the base case, and referred to throughout this report are IsaMills™ (see Figure 3-55), however, other brands of a similar technology may be utilised.

Rougher flotation concentrate is pumped to a desliming cyclone cluster, discharging the underflow into the agitated copper concentrate regrind surge tank and the overflow into the agitated copper concentrate first stage regrind conditioning tank. The density in the regrind surge tank is controlled through the addition of process water and the contents of the regrind surge tank are then pumped to the regrind mill. The mill is supplied as a package, which includes a media hopper with feeder, a slurry feed hopper and media transport water hopper and a gland flushing water tank with pumps. The first stage regrind circuit is designed to produce a regrind target P_{80} of 26µm.

The regrind media feeder transports grinding media from the media hoppers to the mill feed hopper. The media combines with the mineral slurry and is transported via the mill feed pump into the grinding chamber of the mill. Media is slowly consumed during the milling process and fresh media is added to maintain the required charge.

The media is added in a controlled manner to maintain constant power draw for the mill at the specified set point. In this way, the size distribution of the product from the regrind circuit is also controlled.

The regrind rougher concentrate from the first stage regrind mill gravitates to the discharge hopper and from there is pumped to the agitated copper concentrate regrind first stage conditioning tank. The contents of the cleaner flotation area sump are also pumped into this conditioning tank. Sodium metabisulphite (SMBS) is dosed into this tank, and the contents are then pumped to first stage cleaner flotation. Frother (MIBC) and Collector 2 (PAX) are added into separate downcomers discharging into the tank close to the pump suction to prevent undesired reagent interaction.

The cleaner scavenger concentrates from both first stage and second stage cleaner flotation are pumped to the copper concentrate second stage regrind desliming cyclone cluster. The underflow discharges into the agitated copper concentrate Stage 2 regrind surge tank, and the overflow discharges into the agitated copper concentrate second stage regrind conditioning tank. The density of the conditioning tank contents is controlled through the addition of process water, and the contents of the regrind surge tank are then pumped to the second stage of copper regrinding in an IsaMill™. The second stage regrind circuit is designed to produce a regrind target P_{80} of 14µm.

In a manner analogous to that related to the first stage regrind mill, the regrind media feeder transports grinding media from the media hopper to the mill feed hopper. The media combines with the mineral slurry and is transported via the mill feed pump into the grinding chamber of the mill.

The regrind rougher concentrate from the second stage regrind mill gravitates to a discharge hopper and from there is pumped to the agitated copper concentrate regrind Stage 2 conditioning tank. SMBS is dosed into this tank, and the contents are then pumped to second stage cleaning flotation. Frother and Collector 2 (DSP-052) are added into separate downcomers discharging into the tank to close the pump suction to prevent undesired reagent interaction.

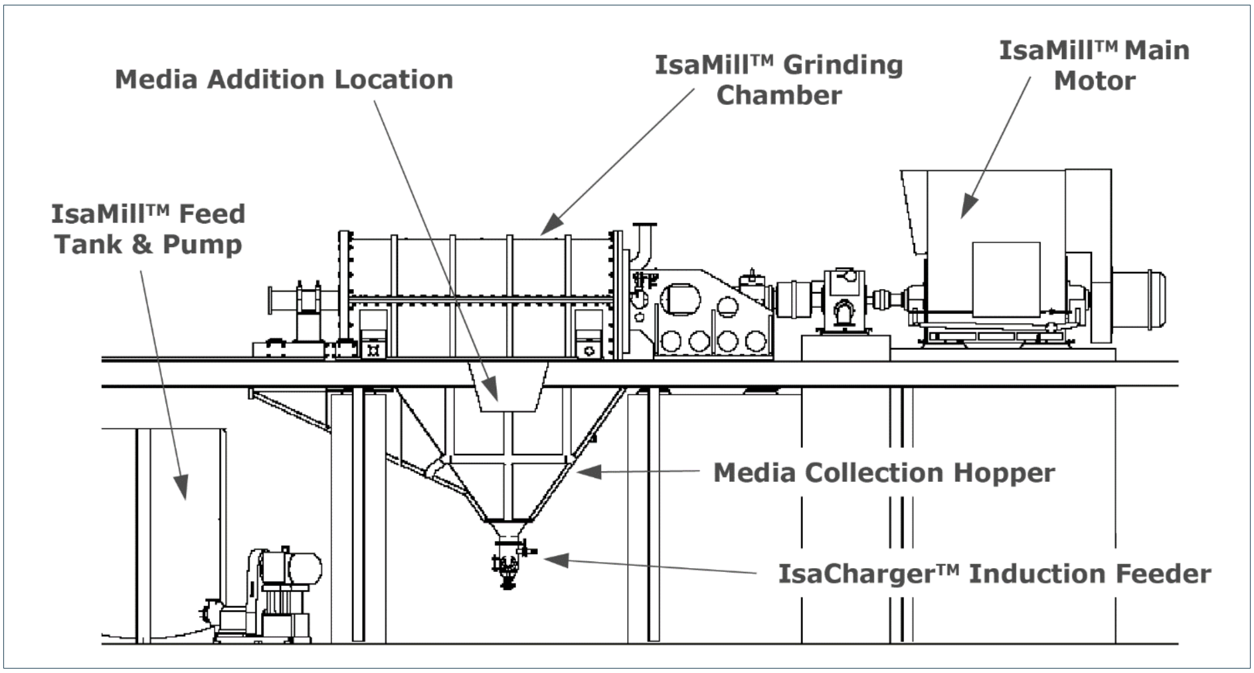


Figure 3-55: Schematic of an IsaMill™ installation

3.6.2.3 Copper cleaner flotation

The discharge slurry from the first stage regrind circuit is treated in a series of cleaner flotation Jameson cells and cleaner scavenger conventional mechanical cells.

Conditioned slurry from first stage regrind is pumped into the single cleaner flotation Jameson cells (see Figure 3-56). The froth generated in the cell is washed with process water, and the resulting concentrate is collected in the copper cleaner concentrate hopper and pumped to the copper concentrate thickener. The tails from the copper cleaner flotation cell are pumped to the first stage cleaner scavenger flotation.

First stage cleaner scavenger flotation is carried out in four tank cells in a 1-1-1-1 configuration. Additional frother and collector 2 are dosed into the feed box of the first cleaner scavenger cell. The concentrates from these four cells gravitate into a launder, and then into the first stage copper cleaner scavenger concentrate hopper, where it is joined with the second stage cleaner scavenger concentrate, before being pumped to second stage regrind. The tailings from the final cleaner scavenger cell discharge into the first stage copper cleaner scavenger tailings hopper and are pumped to the tailings thickener.

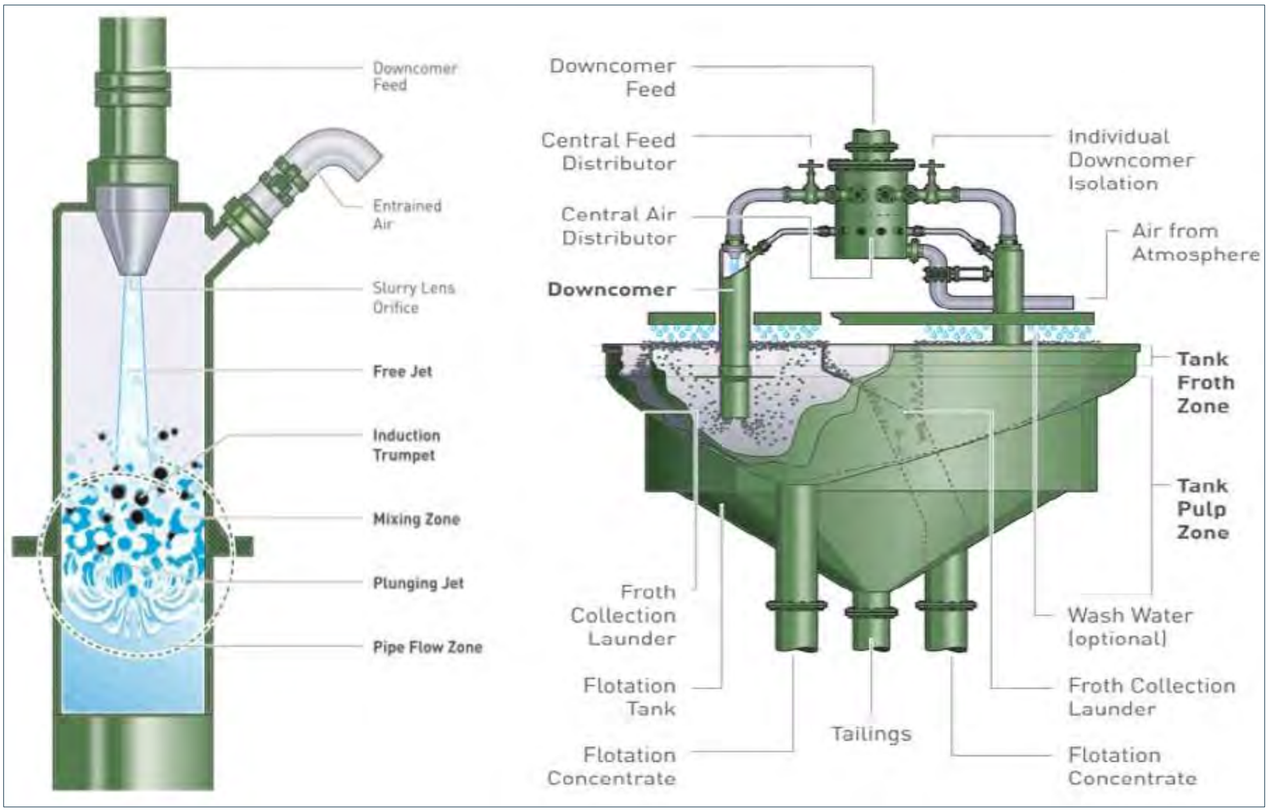


Figure 3-56: Jameson Cell downcomer detail and overall assembly

Conditioned slurry from second stage regrind is pumped into the single cleaner flotation Jameson cells. The froth generated in this column is washed with process water, and the resulting concentrate is collected in the copper second stage cleaner concentrate hopper and pumped to the copper concentrate thickener. The tailings from the copper second stage cleaner flotation column are pumped to the second stage cleaner scavenger flotation.

Second stage cleaner scavenger flotation is carried out in four tank cells in a 1-1-1-1 configuration. Additional frother and collector 2 are dosed into the feed box of the first cleaner scavenger cell. The concentrate from these four cells flow into a launder, and then into the copper second stage cleaner scavenger concentrate hopper where it is pumped to second stage regrind. The tailings from the final cleaner scavenger cell discharge into the copper second stage cleaner scavenger tailings hopper and are pumped to the tailings thickener.

3.6.2.4 Concentrate thickening

Final copper concentrate is pumped from the flotation area to the copper concentrate thickener.

The copper concentrate thickener is a high rate type. The thickener overflow flows gravitationally to the overflow tank and is then pumped to the process water pond. Thickener underflow is pumped to the copper concentrate filter feed tank. Thickener underflow can also be recycled back to the thickener so that underflow density can be maintained during times of low concentrate production.

The spillage and wash down water of the area are collected in the copper concentrate thickening area sump and then pumped back to the thickener feed box.

3.6.2.5 Copper concentrate filtration

The copper concentrate from the thickener discharges in the copper concentrate filter feed tank. The concentrate is then pumped from this tank to the filter, in batch campaigns, for concentrate filtration and washing. One filter press filter unit is used to dewater the concentrates, in batch campaigns.

Dedicated filter feed pumps (one duty/one standby), feed the concentrate filter. The filter operates in batch mode (cycles), with each cycle having the following stages: filtration, pressing, washing, pressing, drying, cake discharge and allowances for flushing, etc.

During the washing stage, the cake is washed with potable water to reduce the chloride content of the final concentrate. The water removed during the washing and pressing stages is collected in the filtrate tank and from there is pumped to the concentrate thickener feed box.

Dry cake is dumped from the bottom of the filter to the ground, at the completion of each filter cycle and transferred to the concentrate stockpile by means of a front-end loader.

Plant air is required for the concentrate filter operation. Drying air is supplied by a dedicated compressor and accumulator located in the filter area. These items of equipment are supplied with filters as a package.

A pressing water station is also required for the filter operation. Pressing water is supplied by a dedicated tank and pump located in the filter area. This equipment is supplied with filters as a package, as shown below in Figure 3-57.

Figure 3-57: Horizontal filter press

3.6.2.6 Concentrate storage and transport

The concentrate storage shed has been designed to provide an economical and environmentally sound storage for the concentrate with natural ventilation, using ridge ventilators and fixed louvres. The total storage capacity allowed for within the shed is around 1.5kt of concentrate (four days planned concentrate production). A front-end loader will operate inside the shed to reclaim the concentrate dumps from the filter and to load the concentrate trucks on a dedicated truck weighbridge. The concentrate shed includes one sump and an associated pump provided to reclaim wash down water.

The copper concentrate will be transported form the mine site to the port of Adelaide, by road train trucks of 55.7t payload. Each truck will carry two containers, specially designed to transport concentrate and to be emptied by rotating the containers into a carrier vessel. Product transport will be operated by a subcontractor. An average of seven trucks per day will be required to transport the concentrate to the port.

3.6.2.7 Online analyser

Twelve sample streams are collected for online control of the copper circuit. Various in-stream samplers will collect online control samples and direct the streams to a multiple stream analyser.

The samples pass through a 12-stream multiplexer that sequences the samples for analysis of copper and percent solids. In addition, rougher flotation feed, cleaner Stage 1 flotation feed, and cleaner Stage 2 flotation feed have their particle size determined for grinding control in two particle size analysers. The rejects from the three systems gravitate to either the tailings samples return hopper or the concentrate samples return hopper from where they are pumped to either final tails via the tails thickener feed box or the copper cleaner flotation circuit.

The following samples are collected by dedicated metallurgically accurate samplers for metallurgical accounting:

- rougher flotation feed;
- final copper concentrate; and
- final tailings.

Samples are collected on a shift basis and transferred to the laboratory for analysis. Typically, the samples are prepared and then analysed for copper, iron, gold, silver, sulphur, silica, chloride and fluorine.

3.6.2.8 Tailings

The cleaner scavenger flotation tails are pumped to the tailings thickener. The tailings thickener is a high-rate type. Thickener overflow gravitates directly to the process water pond, while thickener underflow is pumped to the tailings dam. Thickener underflow is pumped by three (two on duty, one on standby) underflow pumps. Thickener underflow can also be recycled back to the thickener so that underflow density can be maintained during times of low tailings generation.

The spillage and wash down water of the area are collected in the tails disposal sump and then pumped back to the thickener feed box.

3.6.2.9 Reagents

There are six major reagents used in the mine site process plant. All fuels, oils and other chemicals will be stored in accordance with AS 1940 and EPA bunding guidelines. Generally, less than two months inventory for any reagent will be held on site. The reagents will be stored at the reagents store. The indicative annual reagent consumption is tabulated in Table 3-21 and details of the individual reagents described in the sections below.

Table 3-21: Indicative annual reagent consumption

Reagent	Indicative Annual Consumption (tpa)	Indicative Annual Consumption (kg/t)
SMBS	1,578	0.263
Collector – PAX	180	0.03
Collector – DSP 052	73	0.012
Frother – MIBC	156	0.026
Tails and concentrate flocc – Magnafloc 800HP	178	0.030
Antiscalant (Nalco Scaleguard 84614)	6	0.001

Sodium metabisulphite

Sodium metabisulphite (SMBS) is used in the copper flotation circuit to suppress pyrite. SMBS solution is made by dissolving solid SMBS in potable water.

SMBS is delivered to site in bulka bags. SMBS dissolution and preparation is performed in the SMBS mixing package, which comprises a bag splitter, feed bin, screw feeder, agitated mixing tank, ventilation fan and transfer pump.

SMBS fate: SMBS is a nonhazardous solid used as a wastewater de-chlorination agent. High concentrations will contribute to elevated chemical oxygen demand in aquatic environments. It is soluble in water and rapidly undergoes biological decomposition. This product is also known as E223 in the food industry and is used as a food preservative and antioxidant.

SMBS will be delivered to site in bulk bags, which are stored in the reagent store area.

Flotation collectors

Flotation collectors are reagents that are used to selectively adsorb onto the surfaces of particles. They form a monolayer on the particle surface making the particle surface hydrophobic (or water-repelling). This water-repellent film facilitates the contact and attachment of the mineral particle to the air bubbles, generating the flotation of the valuable material particle to the top of the flotation cell for is collection. The plant uses two collector types, potassium amyl xanthate PAX and Orica specialty collector DSP-052, on the rougher and cleaning stages respectively.

Collector 1 – Potassium amyl xanthate (PAX)

A flotation collector is required in the copper rougher flotation process for the recovery of copper and gold bearing minerals. PAX is an anionic collector used in the flotation of metal sulphides and metallic minerals where a strong but a non-selective collector is desired. PAX is delivered to site in bulka bags, which are stored in the reagent store area. The tank is fitted with a ventilation fan to remove combustible gases and discharge them via a stack.

Collector 2 – Orica DSP-052

A specialty flotation collector is required in the copper cleaner flotation process for improved selectivity of copper sulphide minerals over predominantly iron sulphide gangue minerals. The DSP 052 specialty collector by Orica is a proprietary blend formulation of dithiophosphate and isopropyl ethyl thiocarbamate.

It is delivered as a neat solution by isotank truck (27t per delivery) and is unloaded into the Collector 2 storage tank.

PAX fate: Xanthates readily decompose to carbon disulphide with a half-life of approximately 90 days. Xanthates may persist for several days in water, hydrolysing slowly in the neutral environment. Bioaccumulation is unlikely to occur.

The reagents used in the floatation of the concentrate (PAX) are not acutely toxic and are not considered to be hazardous at the concentrations likely to occur with the tailings, provided that the water remains contained within the TSF system. The addition of PAX is expected to be 0.02kg/t and at these rates, concentrations of <0.5mg/L are expected in the TSF. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2000) quote levels of 0.2 – 1.2mg/L. From this it is expected that at the levels of PAX projected for the TSF water, the likelihood of birds consuming sufficient PAX to result in fatalities or disruption to their life cycle, should they land in the TSF, is unlikely.

Isopropyl Ethyl Thiocarbamate fate: Thiocarbamates (TCs), a group of small organic molecules with a strong chelating ability toward inorganic species have been used extensively in the agricultural industry for more than 80 years. TCs are also of biological importance due to their antibacterial, anti-tuberculosis and antifungal properties. Because of their insecticidal, herbicidal, and fungicidal properties, thiocarbamates have a wide range of uses and applications throughout the world and, thus, are produced in great quantities.

Thiocarbamates are volatile and will therefore evaporate from soil. Leaching and lateral movement in soil may take place because of their water solubility. Some photodegradation occurs.

Factors that influence the biodegradation of thiocarbamates in soil include volatility, soil type, soil moisture, adsorption, pH, temperature, and photodegradation, all of which make it unlikely that long-term contamination of the soil will occur.

Soil microorganisms contribute significantly to the disappearance of thiocarbamates from the soil. In micro-organisms and plants, thiocarbamates undergo hydrolysis followed by transthiolation and sulfoxidation to form carbon dioxide (CO_2) and compounds that enter the metabolic pool.

Flotation frother (methyl isobutyl carbinol)

Flotation frother is a reagent that is used to stabilise air bubbles in the froth phase so that they will remain well-dispersed in the slurry, and assist in forming a stable froth layer that can be removed before the bubbles burst. Methyl isobutyl carbinol (MIBC) frother, a pure alcohol frother, is used in both the rougher and cleaner flotation circuits.

MIBC is delivered in neat solution form by isotank truck (38t per delivery). The tank is fitted with a vapour seal tank, to remove any MIBC vapour form the air. The vapour while filling the tank is to run an overflow line from the top of the tank into a water bath. As the tank is filled, it would force any vapour through water removing vapours from the air.

MIBC fate: MIBC is a clear, colourless liquid. MIBC does not cause adverse health or environmental effects at levels typically found in the workplace or in the environment. MIBC can enter the environment as emissions from its manufacture and use as a frother. Ninety-four percent of MIBC is biodegraded within 20 days.

Flocculant (magnafloc 800HP)

Magnafloc 800HP flocculant is used in the copper concentrate thickener and tailings thickener to assist solids settling. The flocculant preparation is carried out in the flocculant mixing package. Magnafloc 800HP is a non-ionic polyacrylamide, which promotes fine particles clumping together, and aids in the settling characteristics of the solids in pulp.

Flocculant is delivered to site in bulka bags, which are stored in the reagent store area.

Magnafloc fate: Use caution after contact of product with water, as extremely slippery conditions will result. Residuals maybe flushed with water into the drain for normal wastewater treatment. This is a non-hazardous waste suitable for disposal in an approved solid waste landfill. Polyacrylamide flocculants can be also subject of biodegradation, photodegradation and mechanical degradation but most of the studies report slow degradation rates.

Antiscalant (nalco scale guardian 84614)

Antiscalants are reagents used as scale inhibitors. Scale is a dense coating of predominantly inorganic material formed from the precipitation of water-soluble constituents. Common scales are compounds consisting mainly of calcium or magnesium carbonates or calcium sulphate, which may deposit inside pipelines leading to fluid transport and instrumentation problems.

Nalco Scale Guardian 84614 is supplied as a stable polymeric solution containing sodium bisulphite. It functions by limiting scale formation and aids in dispersing particulate matter in industrial applications.

Antiscalant, storage and dosing is performed by equipment supplied by the vendor of the reagent in a vendor package, and is added directly to the raw water pond.

Nalco Scale Guard fate: Nalco Scale Guard is classified as a non-hazardous waste.

3.6.2.10 Dust, noise and other emissions to air

Dust sources

Table 3-22 below identifies key areas of process operations for dust generation and the mitigation strategies allocated to lessen the probability.

Dust suppression sprays are used on conveyors to inhibit dust generation during conveyance of the crushed ore. The SAG mill conveyor also includes a dust extraction system, complete with a fan and scrubber to service the tunnel under the stockpile in which apron feeders are located.

Dust composition

Dust will be derived predominantly from two sources, the crusher and hauling activities. Dust generated and captured by the crusher will have similar composition to the ores, and the hauling generated dust will be composed predominantly of the benign overburden materials.

Table 3-22: Processing plant dust suppression

Equipment Title	Dust Suppression/ Extraction
Primary crusher	Sprays
SAG mill feed conveyor	Sprays
SAG mill	Wet process
SAG mill trommel screen	Sprays and wet process
Concentrate storage shed	Enclosed loading within shed

3.6.2.11 Dust management

Dust is a key environmental risk at mine sites that requires vigilant management and review. Controls are applied to point sources (e.g., fixed plant) and fugitive sources such as roads. Water spray ‘cannons’ can also be used during some conditions.

Haul roads and hardstand areas

All road surfaces will be treated with saline groundwater only. Trialling of a magnesium chloride palliative mixed with water and spread on haul roads and hardstand areas to further control dust generation will be undertaken if required.

Recovered water from mine dewatering operations will be used for road dust suppression and is distributed by standpipes and water trucks.

Processing plant

All fixed and auxiliary crushing equipment will be fitted with dust suppression equipment, and will be the subject of continuous review, maintenance and optimisation to minimise dust generation and conform to dust criteria. Plant feed stockpiles and work pads will be regularly conditioned by water truck sprays as required.

Noise Sources

Independent consultant AECOM conducted an Operation Noise Assessment of the proposed Hillside Project (see Appendix 3.5-A) and all components of the processing plant that are considered to be significant sources of noise have been included in the noise assessment. The items of the processing plant that are considered point (see Table 3-23) and line (see Table 3-24) noise sources, and provides details on their numbers, locations, capacity and the sound power levels L_wdB(A). The most significant noise sources at the mine processing plant are anticipated to be crushing and grinding plant and conveyors.

Table 3-23: Mine site processing noise sources – Point source

Source	# Sources	Indicative Location	Indicative feed rate (tph)	Indicative L_w(dB(A))
Primary crusher hopper	1	On top of ROM pad	N/A	107
Primary crusher	1	10m above ground	774	119
SAG Mill	1	21m above ground	774	121
Regrind mills – Copper	2	5m above ground	96	109
Conveyor drive motors	1	At ends of conveyors	N/A	94
Tailings pumps	1	Processing plant	1284	111

Table 3-24: Mine site processing noise sources – Line sources

Item/Location	Indicative Feed Rate (tph)	Indicative L_w/meter (dB(A)/m)
Conveyor – Primary crusher to transfer	774	75
Conveyor – Transfer to stockpile	774	75
Conveyor – Stockpile to SAG mill	774	75
Conveyor – SAG mill trammel to SAG mill feed conveyor	47	75

The saline water intake pumps located at the coastal borefield are also a noise source with sound power levels given in Table 3-25 below.

Table 3-25: Coastal borefield intake pump details

Pump type	Rating	Indicative Source Height	Indicative L_w(dB(A))
Centrifugal, horizontal orientation	110kWh	30m above sea-level	101

Ignition sources

The potential main ignition source located within process operations is the reagent PAX. The Material Safety Data Sheet (MSDS) from the supplier 'Orica' indicates *'Xanthate needs to be isolated from acids and other incompatible substances/materials, heat sources, ignition sources etc. refer to MSDS. Xanthate solutions will also decompose to liberate toxic and flammable carbon disulphide gas (CS_2)'*. To mitigate the risk, a ventilation fan on the mixing tank is installed to eliminate pressure build-up inside the tank that could lead to those gases combusting.

Odour

Dust and odour impact assessments were undertaken by Pacific Environment Limited, (see Appendix 2.1-A and Appendix 3.5-B respectively). The reports stated that odours are generally associated with the reagents used in the flotation circuit to separate metals from the crushed ore. While the reagents are present in the highest concentrations in the flotation circuit, odour emissions from the processing plant are minor due to the relatively small total surface areas of the flotation circuit vessels and mixing tanks. In contrast, the larger surface area of the TSF leads to a greater total emission rate, despite the relatively low concentrations of the reagents in the tailings.

3.6.3 Heap Leach

Provide a description of the Heap Leach Pad and process including:

- *type, size and location of the Heap Leach Pad;*
- *construction and operating specifications for the Heap Leach Pad and process, including solution containment measures;*
- *geochemical and geotechnical assessment of the material placed on the Heap Leach Pad before and after leaching;*
- *method and rate of ore deposition and removal;*
- *chemical characteristics of the leach solution, pregnant liquor and raffinate solutions;*
- *solution application rates, and method of application;*
- *removal (where proposed) of the Heap Leach Pad at cessation of production and the method/location of disposal of leached material;*
- *method of stabilisation and erosion control of Heap Leach Pad;*
- *an assessment of the long term chemical and physical stability of the Heap Leach Pad post-mine completion;*
- *the source, pathway and ultimate fate of any potential mobile contaminants; and*
- *maps and plans.*

Rex does not intend to have any heap leach pads and therefore, heap leaching is not applicable for this PEPR.

3.6.4 Process Water Management

If processing water is to be used, provide a water balance including:

- *approximate water volumes required;*
- *a summary of the inputs and outputs (with consideration of any purge requirements);*
- *determination of net surplus or deficit; and*
- *process flowsheet showing all streams including stormwater management and mine dewatering where these are connected to the processing circuit.*

Provide a description of all process water ponds, including:

- *size, capacity, layout and location of ponds;*
- *design and construction methods;*
- *chemical composition of the solution to be stored in each pond; and*
- *minimum freeboard to be maintained.*

The following sources of water will be used during Stage 1 of the Hillside Project:

- open pit groundwater inflow – also called pit groundwater, process mine water, mine dewatering water, mine water;
- saline water from a coastal borefield within the ML – also referred to in various reports as seawater, borefield water, saline water wells, and sea water wells; and
- potable fresh water supplied through the SA Water pipeline – also known as scheme water, SA Water.

The Stage 1 mass and water balance for the process plant was compiled by Amec Foster Wheeler consulting with input from other consultants. The Project water balance will be in deficit as groundwater intersected during the mining phase will not accommodate process plant water requirements. Consequently, saline water from a borefield adjacent to the sea on the ML will be utilised (in conjunction with a relatively minor contribution from potable water) to balance the site water requirements. Table 3-26 defines the Project water demand from additional water sources other than water recycled through the process which is governed by the overall mass balance for ore processing. It also has inclusions for additional mine and potable water make-up for the process water pond and potable water for ablutions, safety showers and other small uses.

Table 3-26: Indicative make-up water requirements – Average (first six years)

Flow Description	Flow (tph)	Flow (gL/a)
Process saline water wells	**310.7**	**2.42**
Process mine water	**28.7**	**0.22**
Scheme (potable) water		
Scheme water for process use	19.9	0.16
Scheme water for ablutions	5.5	0.04
Scheme water allowance	2.5	0.02
Total scheme water	**27.9**	**0.22**

The design basis for available mine water for plant use is summarised in Figure 3-33 and detailed in Appendix 3.4-B.

It has been considered that there will be four distinctive water availability periods, as per Table 3-27. At this point, a 63.7L/s rate (Years 3 to 6) is used for the indicative overall mass and water balance.

Table 3-27: Open pit dewatering water

Description	Unit	Value
Mine dewatering water flow		
Up to year 2	L/s	36.7
Years 3, 4 ,5 and 6	L/s	63.7
Year 7 and 8	L/s	82.0
Years beyond Year 8	L/s	93.4
Chloride	mg/L	29 300
Total dissolved solids	mg/L	55 700
pH		6.8

3.6.4.1 Project water balance

Two criteria were considered when developing the Project water balance. Firstly, the water losses anticipated within the production process and, secondly, the chloride content in the concentrate slurry going to the filters. The chloride content of the final concentrate that is allowable is capped at 200ppm. Smelter penalties will apply if this level is exceeded in the concentrate. Accordingly, once the total water requirement is established in the mass balance, the proportion of potable water added to other sources such as saline borefield water, mine water and tailings return water is defined based on the overall chloride level in the process water.

Table 3-28 describes the EFS water balance at 91.3% overall plant availability unless otherwise noted and Figure 3-58 shows a schematic of the process water flow. A description of all process water ponds is presented in Figure 3-59.

Table 3-28: Water balance

Flows Description	Water Flow (tph)	Cl, Flow (tph)
Water Losses		
Copper concentrate cake	1.6	0.00
Tailings dam evaporation	21.4	0.00
Consolidated in solids in tailings	359.6	7.45
Total Losses	**382.6**	**7.46**
Water in ore and reagents	24.2	0.00
Water to replace (make-up)	**358.4**	**7.46**
Water make-up		
Saline borefield wells	310.7	6.64
Mine water	28.7	0.81
Scheme water	18.9	0.00
Total Make-Up	**358.4**	**7.46**

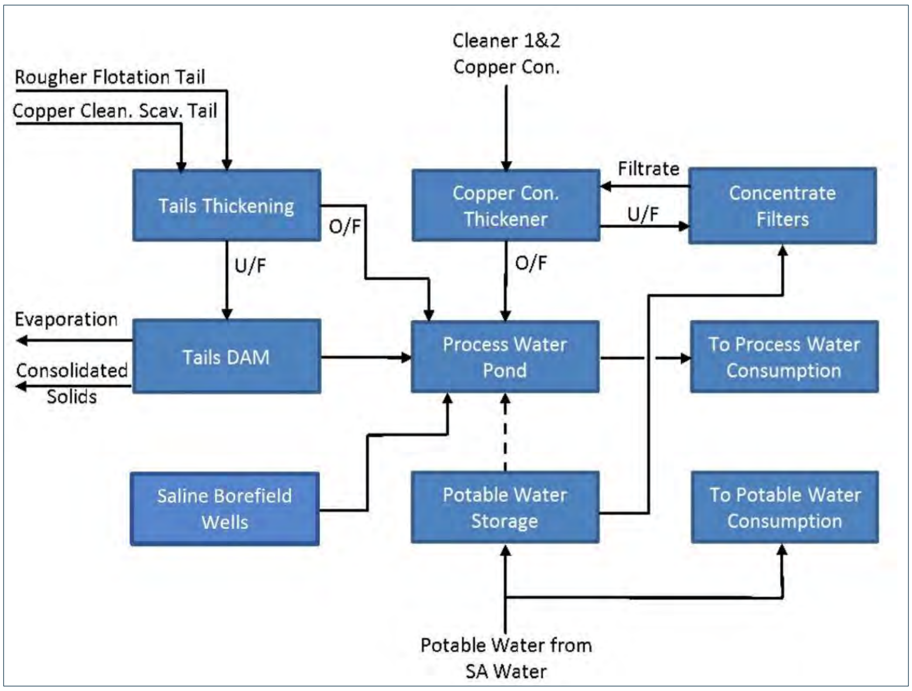


Figure 3-58: Simplified process water flow diagram

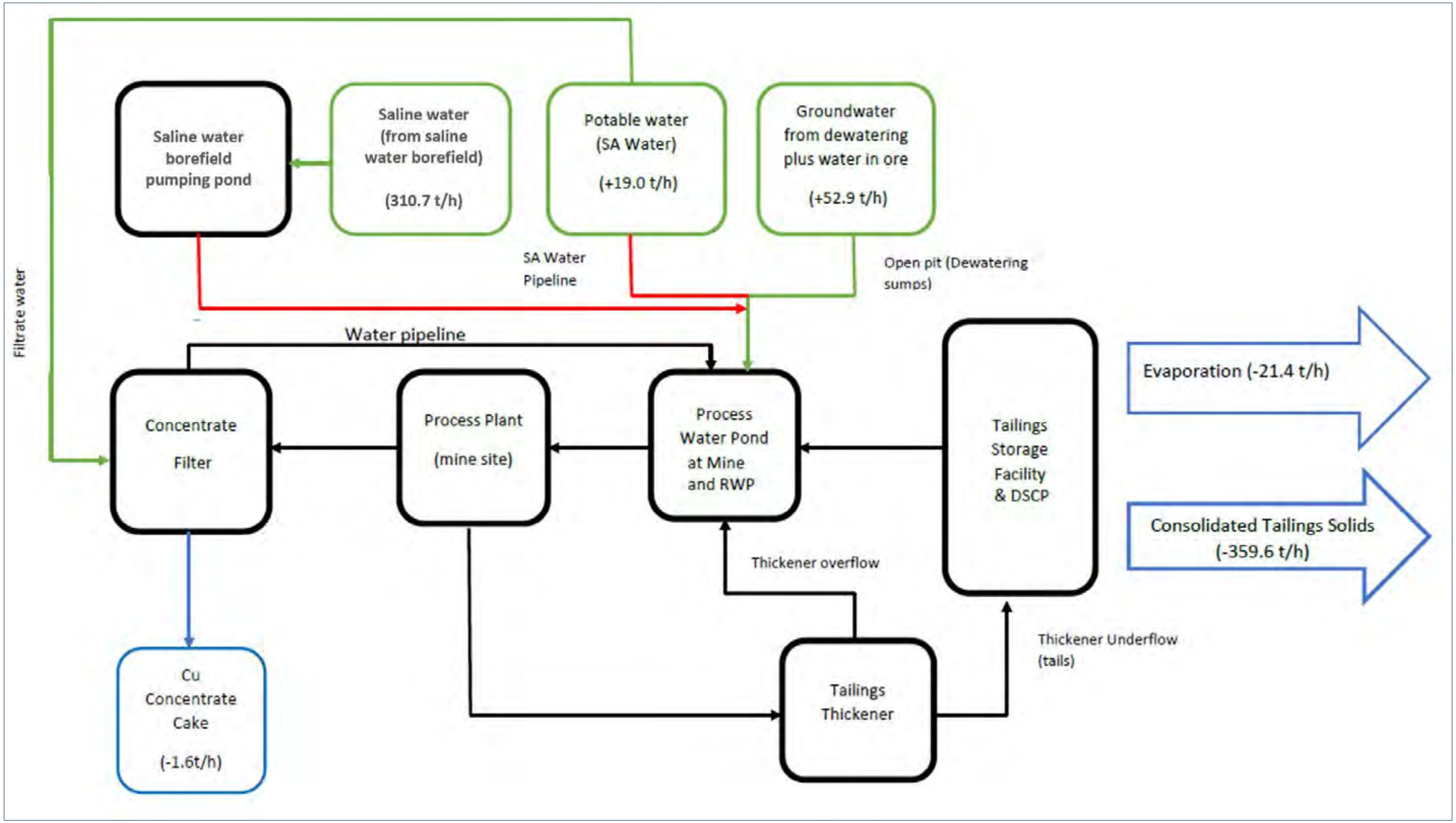


Figure 3-59: Description of all process water ponds

Water management and disposal

Due to water loses experienced mainly through consolidated tailings solids, the process plant requires replacement water of approximately 3.6gL/a (see Table 3-29). Mine water (not used in open pit mining dust suppression) will be used for process water make-up along-side borefield saline well water and scheme water.

The quantity range of potable water used to make up the required total water volumes and to dilute and control chloride content in concentrates will vary from 0.22gL/a to 0.6gL/a over the life of Stage 1.

Table 3-29: Water balance (pit dewatering included)

Water Make-Up	Year 2	Year 2–6	Year 6–8	Year >8
Water flow	gL/a	gL/a	gL/a	gL/a
Mine water (groundwater from dewatering)	1.19	2.06	2.65	3.02
Mine water (required for dust suppression)	1.81	1.81	1.81	1.81
Mine water (available for process plant = dewatering – dust suppression)	-0.62*	0.25	0.84	1.21
Saline water (from borefield well)	3.37	2.45	1.67	1.21
Potable water (SA Water)	0.20	0.23	0.44	0.55
Total Make-Up	**2.94**	**2.93**	**2.96**	**2.97**

* negative value indicates the mine water does not supply enough water and is made up by additional saline water.

Borefield saline water pond

Saline groundwater is to be sourced from a set of wells installed in the vicinity of test well 13 (WBTH-013) adjacent the coastal area within the ML. The pumps selected are multiple-stage vertical centrifugal pumps constructed from super duplex stainless steel. These pumps are considered the most economical and well suited for the required duty. The pumps will be supplied as a package, including flexible rising main, bore headworks supports, isolation and check valves and skid mounted pump starters/control panel.

The saline water is to be pumped from each well to the high density polyethylene (HDPE) lined saline water pond (with a four-hour storage capacity of approximately 2850m^3) and from there pumped to the process water pond.

The borefield accesses tidally influenced saline water in the fractured coastal basement aquifer. Given the dewater available from the pit increases over the life of mine as the pit gets deeper and accesses the fractured rock aquifer, the water demand from the coastal borefield will reduce over the life of mine (refer to Table 3-29). Should process water demand exceed the capacity of the currently designed borefield, additional bores would be installed in accordance with the appropriate approvals and the groundwater model updated accordingly (see Section 5.16).

Decant seepage collection pond

A decant seepage collection pond (DSCP) will be constructed downstream of the TSF to hold seepage and decant water from the TSF. The sizing of the DSCP has been determined from the water balance. The pond is designed to contain approximately 100 000m^3 (100ML) of water (allowing for Average Recurrence Interval (ARI) 1-in-100 and freeboard allowance). This design requires an embankment crest at elevation RL 54.3m, resulting in the maximum embankment height of 6.3m above ground surface.

The embankment geometry adopted for the DSCP is summarised as follows:

- crest width (m) 15;
- downstream slope 1 in 3; and
- upstream slope 1 in 2.

The DSCP embankment design will be constructed predominantly of clay and waste rock material with a two-stage selective filter between these two materials to effectively remove potential seepage through the embankment and to control pore pressures.

The upstream face of the embankment will consist of a 10m wide, low permeability clay (Zone 1) obtained from the open pit excavation (suitable overburden). An end tipped, non-compacted layer (approximately 1m thick) will be placed over the low permeability facing as protection from the elements during operation.

The majority of the downstream portion of the embankment will consist of bulk waste rock material (Zone 3A and 3B). Zone 3A will consist of selective waste rock material to act as a transition between the bulk waste rock and the two-stage filter zone.

The filter material (Zone 2A) will consist of a 2m wide selective sand filter material placed immediately against the low permeability zone. Next to this selective gravelly sand will be placed as a transition zone for the waste rock material (for details see Figure 11.8 of Appendix 3.4-A).

The DSCP return water pump has been sized to meet the process plant return water requirements and will be a variable speed drive (VSD) floating pontoon pump arrangement, sized to pump at a rate of up to 458m^3/h. The return water will be pumped directly to the RWP.

Should the TSF spillway overflow, the floodwater will quickly report to the nearby Throoka Creek diversion drain. To minimise the risk of embankment failure, the spillway design for the DSCP is similar to that for the TSF, by installing the similar size spillway excess water will be promptly removed, protecting the embankment.

DSCP embankment and foundation

Two seepage analyses were completed for the DSCP, namely:

- Pond at normal operating level; and
- Pond at maximum level (i.e., invert of spillway).

It should be noted that a two-stage filter has been included in the embankment geometry to assist with removal of potential seepage, thereby reducing the potential of pore pressure build-up within the embankment.

The analyses showed that any seepage will migrate along the interface of the clay foundation and the rockfill due to the embankment configuration utilising waste rock material. The results of the analyses indicated that an estimated seepage amount of between $4.0x10^{-4}$L/s/m length of embankment to $1.2x10^{-4}$L/s/m length of embankment could occur if the pond remains at the maximum levels for an extended period (i.e., foundation and embankment materials are fully saturated). In these conditions, the total flow is estimated to be in the range of 0.03L/s to 0.11L/s. As the site is predominantly in water deficit, it is unlikely that the foundations and embankment will be in a state of full saturation for extended periods. Furthermore, given the open pit will act as a sink in perpetuity, all groundwater will always flow towards the open pit as discussed in Section 3.10.2.4.

Return Water Pond

In order to remove water from the TSF and maintain a minimal decant pond on the tailings, a Return Water Pond (RWP) has been located at the process pond area. The sizing of the pond has been determined from the results of the water balance to contain a 72-hour 1:100 AEP event and to maximise return water from the TSF and DSCP, hence has been designed to contain approximately 160ML of water. The western and southern embankments have been designed to an elevation of RL64m and are the smaller of the three embankments, being approximately 9.3m in height. The northern dividing embankment will be constructed to RL65.3m with a resultant embankment height of 10.6m.

The RWP base will consist of compacted low permeability material and will be constructed in a similar manner to that of the TSF, resulting in the entire RWP having a low permeability liner. The base of the RWP will be covered with a 300mm layer of waste rock to protect the low permeability base material from drying out and cracking. The embankment will have a crest width of 5m with a 3:1 upstream and downstream slope.

Throoka Creek Diversion Pond

In the unlikely event that Throoka Creek flows during the LOM, the creek diversion is directed to the Throoka Creek Diversion Pond (TCDP), constructed adjacent to and sharing and embankment with the RWP. The sizing of the pond has been determined from the results of the water balance. The TCDP is assumed to be dry the majority of the time and is sized to retain a 1:100 AEP storm event, i.e., 1,000ML of water, with a spillway to account for a 1:1,000 critical storm event. The embankments have been designed as for the RWP with a crest width of 5m with a 3:1 upstream and downstream slope and will be constructed in the same manner. The TCDP adjoins the RWP and they share the middle embankment.

Note that originally the RWP and TCDP were combined into one pond. Review of this system with the updated TSF water balance conducted in February 2018 resulted in an optimisation to separate recycled water contained in the RWP from the ‘clean’ water entering the pond from Throoka Creek and to maintain the RWP as full as practicable. This resulted in the separation of the RWP and TCDP, with a shared dividing embankment. The TCDP was then increased in size to retain the critical storm event as identified above. In a number of the figures presented throughout this PEPR, the TCDP and RWP are depicted as a single pond, labelled RWP, with the dividing embankment not clearly shown due to scale. The dividing embankment is clearly identified on Figure 3-71.

ANCOLD Recommended Design Criteria

To provide an acceptable level of risk, the ANCOLD guidelines provide design criteria that should be incorporated into the design as summarised in Table 3-30. This table uses the consequences of an adverse event identified in the preceding sections for the TSF, RWP and DSCP to determine the design criteria. The TCDP is assumed to be dry the majority of the time.

Table 3-31 details the TSF Spillway probable maximum precipitation (PMP) storm event design values.

Table 3-30: Design criteria summary

Design Criteria		TSF ('High C')	RWP ('Very Low')	TCDP ('Very Low')	DSCP ('Significant')
Minimum wet season storage		1:10 notional AEP wet season runoff	1:5 notional AEP wet season runoff	Nil*	1:10 notional AEP wet season runoff
Minimum extreme storm storage		1:100, 72-hour flood	1:100, 72-hour flood	Nil*	1:100, 72-hour flood
Facility freeboard allowance		1:10 AEP wind + 0.3m	Nil	Nil	1:10 AEP wind + 0.3m
Emergency spillway		1:100,000 AEP storm or PMP storm	1:100 AEP storm	1:100 AEP storm	1:1,000 AEP storm
Emergency spillway freeboard		1:10 AEP wind or none	1:10 AEP wind	Nil	1:10 AEP wind
Seismicity	OBE	1:1,000	1:50	1:50	1:100
	MDE	1:10,000	1:100	1:100	1:1,000

(*) The TCDP is assumed to be dry the majority of the time and is capable of storing a 1:100 AEP storm event.

Table 3-31: TSF spillway design values for PMP storm

TSF Stage*	Critical PMP Duration	PMP Total Design Rainfall	Annual Exceedance Probability
Lift (TSF Stage) 1	4 hour	480mm	0.0001 (1:1,000,000)
Lift (TSF Stage) 2	6 hour	500mm	
Lift (TSF Stage) 3	9 hour	520mm	
Lift (TSF Stage) 4	9 hour	520mm	
Lift (TSF Stage) 5	9 hour	520mm	
Lift (TSF Stage) 6	9 hour	520mm	
Post-closure	3 hour	460mm	

* Note: The term TSF stage refers to the TSF lift ('stage' is the terminology used by ATC Williams) and is not linked to the EFS Stage 1 or BFS Stage 2 Project terminology. All six lifts/TSF stages are for the EFS (Stage 1) Project.

Legislative requirements

To provide a temporary water storage (i.e., TSF, RWP, TCDP and/or DSCP), the requirements of the South Australia Environment Protection (Water Quality) Policy 2003 should be met[2].

The design has been completed considering these policy requirements and commentary on the considered items of the Environment Protection (Water Quality) Policy 2003 is provided in Table 3-32.

Table 3-32: Legislative requirements summary – Environment Protection (Water Quality) Policy 2003

Section No. Reference (*)	Commentary
18 (1) (a)	TSF, DSCP, TCDP and RWP do not fall within the flood plain known as the '1956 River Murray Flood Plain.
18 (1) (b)	TSF, DSCP, TCDP and RWP do not fall within a water protection area.
18 (1) (c)	TSF, DSCP, TCDP and RWP do not fall within 20m of a public road or road reserve.
18 (1) (d)	TSF, DSCP, TCDP and RWP do not fall within 50m of a bank or a watercourse.
18 (1) (e)	TSF, DSCP, TCDP and RWP do not fall within 200m of a residence built on land that is owned by some other person.
18 (1) (f)	TSF, DSCP, TCDP and RWP do not fall within 500m of the high water mark.
18 (1) (g)	TSF, DSCP, TCDP and RWP will not be constructed within an area where the base of the lagoon would be below any seasonal water table.
18 (2) (a)	See 18 (1) (a).
18 (2) (b)	See 18 (1) (b).
18 (3) (a)	TSF, DSCP, TCDP and RWP designs includes infrastructure to minimise seepage into underlying seasonal water tables although no such water table exist on site.
18 (3) (b) (i)	The TSF, DSCP and RWP will be lined with in-situ clay materials of suitably low permeability to minimise seepage into surrounding environment.
18 (3) (b) (ii)	Downstream seepage collection has been included in the TSF design.
18 (3) (c)	See 18 (3) (b) (i).
18 (3) (d)	Monitoring bores are included in the design located at key locations around the TSF, DSCP, TCDP and RWP and the mine site in general.
18 (3) (e)	Emergency spillways have been included and flow will be captured within the open pit and removed via the dewatering system.
18 (3) (f)	The water within the TSF, DSCP and RWP is likely to have an elevated salinity level however will be within the current groundwater salinity levels as fresh water is added to the system during ore processing. A fence around the entire mine facility will limit movement of animals onto the mine lease.

[2] The mineral lease was granted in September 2014 and is based on the EPA 2003 document. The current version is South Australia Environment Protection (Water Quality) Policy 2015.

Section No. Reference (*)	Commentary
18 (4)	Operating manuals will identify routine inspection and monitoring requirements.
18 (5)	Designs of the TSF, DSCP, TCDP and RWP have been carried out in accordance with the SA and ANCOLD guidelines.
17 (1) (a)	Designated low permeability lined areas (TSF, DSCP and RWP) have been designed in order to temporarily store water for re-use in the process plant.
17 (1) (b)	See 17 (1) (a).
17 (2)	N/A
17 (3)	No pollutants listed in Part 2 of Schedule 4 are anticipated to be discharged into any waters.

(*) South Australia, Environment Protection (Water Quality) Policy 2003.

3.6.4.2 Chemical composition of the solution to be stored in each pond

The projected dissolved metal chemical compositions of the water stored in the RWP, DSCP and Saline Water Borefield Storage Pond are tabulated Table 3-33 and Table 3-34 below. The water stored in the TCDP will reflect the water quality of the upstream Throoka Creek water: this creek has not flowed and hence no baseline water quality is available at this stage.

Table 3-33: Projected geochemical water analysis of the RWP and DSCP (mg/L, except for pH in SI, all metals dissolved)

Cations	RWP and DSCP	Anions	RWP and DSCP
Na^+	8,080	Bicarbonate (HCO_3^-)	40
K^+	146	Carbonate ($CO^3{}_2$)	210
Ca^{2+}	547	Cl^-	16,200
Mg^{2+}	1,120	Sulphate (SO_4^{2-})	880
Fe^{2+}	0.004	Hydrogen phosphate (HPO_4^{2-})	0.08
Mn^{2+}	0.001	Arsenic hydroxide ($As(OH)_4^-$)	0.008
Cu^{2+}	0.032	B	3.62
Zn^{2+}	0.100	Total dissolved solids (TDS-calc)	27,223
Ni^{2+}	0.015	pH	7.84
Ba^{2+}	0.039		

Cations	RWP and DSCP	Anions	RWP and DSCP
Cd^{2+}	0.0013		
Co^{2+}	0.011		
Pb^{2+}	0.038		
Be^{2+}	0.0018		
U	0.095		

Table 3-34: Borefield saline water storage pond (mg/L, except for pH in Si, all metals dissolved)

Cations	Saline Water	Anions	Saline Water
Na^{+}	11,000	Bicarbonate (HCO_3^-)	120
K^{+}	560	Chloride (Cl^-)	22,000
Ca^{2+}	600	Sulphate (SO_4^{2-})	1,100
Mg^{2+}	1,300	Hydrogen phosphate (HPO_4^{2-})	<0.05
Fe^{2+}	1.4	Arsenic hydroxide ($As(OH)_4^-$)	0.021
Mn^{2+}	<0.025	Total dissolved solids (TDS-calc)	40,000
Cu^{2+}	<0.005	pH	8.3
Zn^{2+}	0.018		
Ni^{2+}	<0.005		
Ba^{2+}	<0.1		
Cd^{2+}	<0.001		
Co^{2+}	<0.005		
Pb^{2+}	<0.005		
Be^{2+}	<0.005		
U	<0.025		

3.6.5 Type of Mobile Equipment

For mobile equipment to be used in crushing / grinding, processing ore and in transporting the mine product to the point of sale, describe:

- *type, size and capacity of machines;*
- *approximate number of units;*
- *noise and vibration outputs;*
- *exhaust outputs; and*
- *fire ignition sources.*

All equipment used on site is required to meet Australian mine industry standards. OEM design mining equipment to meet required industry standards to reduce or eliminate noise, vibration and heat sources to protect the environment and operators as far as practicable. The equipment Rex proposes to use within the process plant is detailed in Table 3-35.

Table 3-35: Indicative process plant mobile equipment

Item	Indicative manufacturer/ model	Size	Capacity	Number included	Location	Day/Night operation	Sound Power Level, L_wdB(A)
Wheel loader	CAT 992K	100t	12m^3 bucket	1	ROM pad	Day + Night	114
Front-end loader	John Deere 644K	19t	3m^3 bucket	1	Processing plant	Day + Night	108
B-double truck	N/A	20t	55t	1	Entry road	Day + Night	105
Excavator with rock breaker	John Deere ZX470 with Rock breaker	47t	-	1	Pit	Day	120

The source of operational noise and vibration from the equipment used include:

- engine operation;
- operational alarms and warning systems including tramming or reversing alarms (again 'white noise' reversing alarms will be used);
- loading noise in truck bodies;
- track noise from tramming tracked equipment;
- hammer noise from drilling rigs; and
- Potential ignition sources include equipment engine exhaust systems, grading and dozing operations, railing operations, loading operations, electrical equipment and operating plant conveyors and screens.

3.6.5.1 Exhaust emissions

The mobile equipment tabulated in Table 3-35 meets the Vehicle Standard (Australian Design Rule 80/03 — Emission Control for Heavy Vehicles) 2006 and meets the appropriate emissions requirements as permitted within the Australian Design Rule, and/or the following US, European Union and Japanese emissions limit options as cited within Australian Design Rule 80/03 (Table 3-36):

- European Union / European Commission Directive (Diesel, Liquefied Petroleum Gas and Natural Gas Engines), and European Commission Regulations 595/2009 and 582/2011;
- US EPA Code of Federal Regulations (Diesel, Liquefied Petroleum Gas and Natural Gas Engines), and Code of Federal Regulations (Petrol, Liquefied Petroleum Gas and Natural Gas Engines);
- Japanese Ministry of Land, Infrastructure and Transport Regulations (Diesel Engines) and Regulations (Natural Gas Engines); and
- UN Regulation No 49 — Uniform provisions concerning the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines and positive ignition engines for use in vehicles.

Table 3-36: Emission limit options for US transient and steady state tests

		Emission Limits (g/kWh)	
		Oxides of Nitrogen	Particulates
Transient test	Option 1	2.0	0.03
	Option 2	3.0	0.01
Steady state test	Option 1	2.0	0.02
	Option 2	3.0	0.01

3.6.5.2 Fire ignition sources

The mobile equipment tabulated in Table 3-35 are equipped with diesel engines not operating in a potentially explosive atmosphere and protection is such that all primary ignition sources are contained.

3.6.6 Conveyors and Pipelines

Provide a description of any conveyors or pipelines to be used for transporting material to or from the mine, processing facilities and the point of sale including:

- *length, size (volumes to be transported, design and type of construction and location;*
- *the material being transported;*
- *noise sources;*
- *dust sources and composition;*
- *fire ignition sources; and*
- *maps, plans and cross-sections.*

3.6.6.1 Conveyor details

- Primary crusher discharge conveyor - capacity 890tph, 275m length, 16m lift, 1m/s, belt width 1500mm. This conveyor will transport 750tph of -150mm crushed ore to the SAG mill;
- Scats recycle conveyor – capacity 100tph wet tonnes, 145m length, 3m lift, and belt width 600mm. This conveyor will transport 47tph of -30mm SAG mill ore scats back to the SAG mill feed;
- Conveyor sections will be modular, constructed off site and integrated into the stick build structure on site;
- Dust and noise sources pertaining to these conveyors have been addressed in Sections 3.6.1.2 and 3.6.2.10;
- A conveyor is a potential fire ignition source. However, Rex's conveyors are transporting damp (approximately 4% moisture) inert crushed ore which will not pose a fire risk; and
- Conveyor noise source is tabulated in Table 3-24.

3.6.6.2 Pipeline details

The pipeline layout from the borefield is outlined below in Figure 3-60. The borefield will comprise of pipes of 2500m of HDPE standard, P4L8, PN16 pipe of 280mm outside diameter.

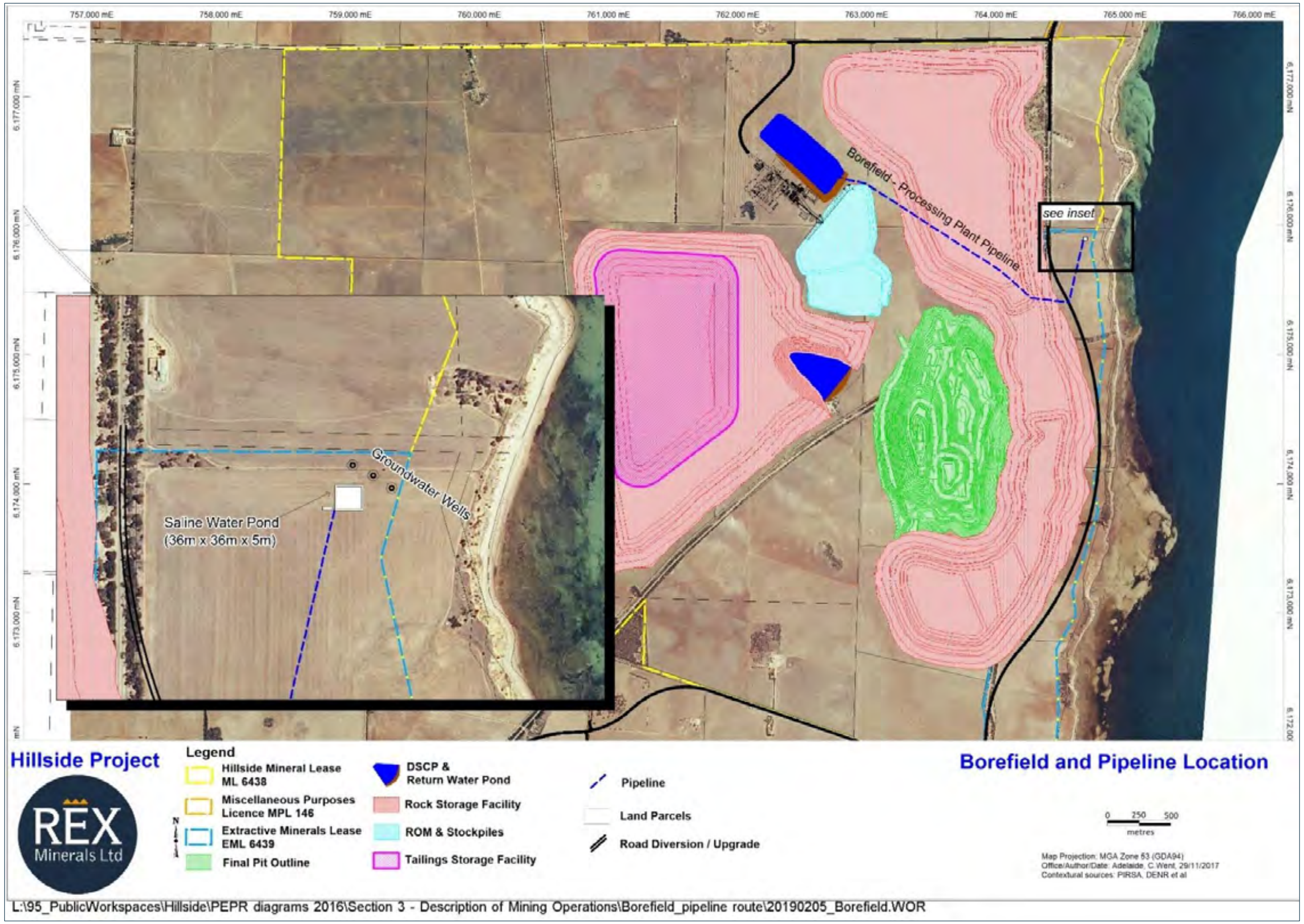


Figure 3-60: Pipeline layout from borefield

3.6.7 Hours of Operation

The process plant will operate continuously, 24-hours-a-day, seven-days-a-week, 365 days of the year, including public holidays. Transportation of concentrate can occur 24 hours per day. The process plant will operate on a shift roster system to ensure full 24-hour production is maintained. The open pit mining will occur seven-days a week on a continuous basis (24-hours-a-day, seven-days-a-week, 365 days of the year).

The process plant and associated facilities operating schedule is shown in Table 3-37.

Table 3-37: Operating schedule

Operating Schedule	
Operating days per year	365
Operating hours per day	24
Calendar hours	8,760
Shifts per day	2
Hours per shift	12

The assumptions for downtimes and corresponding operating times and availability rates are summarised in Table 3-38.

Table 3-38: Assumed facilities' downtimes, operating times and availabilities

Facilities	Calendar Hours	Operating Hours	Overall Utilisation (%)	Shutdowns (days)		Power Outages
				Scheduled	Unplanned	
Copper concentrator	8760	8000	91.3	10	20	2
Filter plant and concentrate transport	8760	7872	82.4	10	25	2

3.6.8 Care and Maintenance

Detail all activities and strategies required for care and maintenance of processing facilities, and material transport systems, should the mine suspend production, but not progress immediately to closure.

Several key strategies will be implemented to enable the process plant and associated infrastructure to be placed in a care and maintenance operation should economic circumstances dictate this course of action. Specifically, the care and maintenance requirements for the crushing, grinding, processing and product transport infrastructure will allow it to be maintained in a state that ensures environmental outcomes are still achieved, mine closure strategies are not compromised, and economic extraction of ore can recommence should the circumstances change. Those requirements are listed below

- Crushing and grinding equipment will be emptied so that no solids remain within the machinery and any immediate ore stockpiles are minimised and sprayed with a dust inhibitor. The immediate areas surrounding the crushing and grinding equipment will be cleaned to remove the possibility of fugitive dust emissions due to a build-up of loose material. All mechanical equipment will be greased and sumps pumped out with pump sump dump flaps left open. A mechanical and electrical check sheet will be developed to ensure all electric motors are bumped (i.e., tested) on a regular basis to ensure the plant remains in a sound mechanical condition. The SAG mill will be inched on a periodic basis to ensure that the remaining ball charge does not freeze.

- Flotation, regrinding, thickening and filtration equipment will be emptied so that no solids remain within the machinery. They will then be dumped and washed out so that no water remains within the vessels. All mechanical equipment will be greased and sumps pumped out with pump sump dump flaps left open. A mechanical and electrical check sheet will be developed to ensure all electric motors are bumped to ensure the plant remains in a sound mechanical condition.
- Reagent liquid stocks will be purposely minimised prior to closure and once the plant is closed, the reagent stock tanks will be emptied and hosed out and left with dump flaps opened. Only minimum solid stocks of reagents will be retained within the reagent storage shed and depending on the length of the proposed closure, any reagents that have the propensity to deteriorate with time will be resold to the mining industry. Those reagents, grinding media and ball stocks held on site as consignment stock will be returned to their respective vendors.
- The concentrate shed floor will be hosed down and the shed doors closed.

It is estimated that two to three people and availability of specific tradesmen will be required in the Process Plant during an extended care and maintenance period.

3.6.9 Rehabilitation Strategies and Timing

Detail all activities, strategies and designs relating to mine closure for removal, disposal, and rehabilitation of processing facilities, and material transport systems, including timing of these activities.

For rehabilitation strategies and timing related to Heap Leach, provide:

- *a Heap Leach detoxification strategy;*
- *identification of the volumes of process solution and flush water to be disposed of at closure; and*
- *a methodology for the disposal of residual process solution and flush water at closure.*

The following sections describe the mine closure activities, strategies, designs and timing for the removal disposal and rehabilitation of the processing facilities, material transport systems and mine rock storage facilities. Rex does not intend to have a heap leach facility at this time.

3.6.9.1 Dismantling, remediating and rehabilitating the processing plant

The processing plant and all above ground infrastructure and buildings will be dismantled and sold, recycled or disposed of in an appropriate manner. All tarmac and compacted road base material from sealed roads in and around the processes plant will be ripped up, removed and reinstated with topsoil. All sedimentation dams, drains and costeans, that are not required following closure, will be filled in and rehabilitated. Unwanted concrete pads and footings will be removed down to an appropriate depth ~1m compatible with the proposed agricultural land use.

3.6.9.2 Decommissioning and rehabilitating infrastructure

All processing area sedimentation dams, drains and costeans, which are not required following closure, will be filled in and rehabilitated. Unwanted concrete pads and footings will be removed down to an appropriate depth ~1m compatible with the agricultural land use. HDPE lined dams will be drained and pumped into the pit or TSF depending on water quality. The dam walls will be removed and if suitable, the material will be used as fill during rehabilitation or placed in a RSF. The magazine compounds, sheds and shipping containers will be dismantled and all associated infrastructure removed from site for reuse or recycling. All fittings, pipes, lining and pumps etc. will be disposed in accordance with the EPA requirements at the time of mine closure.

Any concrete, compacted clay, asphalt, plastic liners or any materials used to cover or seal the ground will be removed, recycled or disposed of in an approved manner. Mining tracks will also be rehabilitated and revegetated. The remediated disturbed land will be rehabilitated to be used for agricultural pursuits.

3.6.9.3 Preserving value to the community

If there is a downstream benefit to the local community or infrastructure that could add value to any subsequent land use, (for example the use of storage sheds and associated water and power reticulation), these structures will be left in place and handed over to the new owner on relinquishment who will be responsible for any future maintenance and liability.

3.7 Wastes

3.7.1 Waste Rock and TSFs

For waste rock and TSFs provide:

- *the estimated tonnes and volumes of all waste rock and tailings to be stored;*
- *the reserve and any resource or potential resource that the estimated tonnes and volumes of waste rock and tailings is based on;*
- *the type, location, size, shape, height and method of construction of permanent and temporary waste storage facilities;*
- *a geochemical and geotechnical assessment of the waste rock and tailings based on the geochemical and geotechnical properties determined from the analysis of representative sampling of all waste rock types and tailings to be disposed;*
- *an assessment on the weathering and erosive potential of waste rock to be disposed;*
- *specifications, drawings and plans for the design, construction, operation and completion of all facilities;*
- *the method and rate of waste rock/tailings disposal where relevant, a description of the placement and encapsulation of waste material deemed to be hazardous, including Potentially Acid Forming material (PAF);*
- *the method of stabilisation and erosion control of waste storage facilities, both during operations and post-completion;*
- *surface water run-off control on disturbed and rehabilitated areas;*

- *a geotechnical stability assessment and a factor of safety analysis;*
- *an assessment of seepage of liquids through the waste rock and tailings storage facilities;*
- *strategies for the containment of any seepage that has the potential to impact the environment;*
- *an assessment of the post-completion chemical and physical stability of the structure following rehabilitation, including the expected extent of erosion; and*
- *an assessment of the source, pathway and ultimate fate of any potential mobile contaminants.*

Include a water balance for the TSF (if not included in the water balance in Section 3.5.4).

3.7.1.1 RSF design

The proposed location of the rock storage facilities (RSFs) are presented in Figure 3-63. In designing the RSFs for the Hillside Project, the following objectives and constraints were considered:

- provide sound, dust and visual barriers around the perimeter of the ongoing mining operations;
- provide early opportunities for progressive site rehabilitation meeting the final lease closure conditions and lowering the impacts on neighbours and the public;
- provide options for encapsulation of any identified potentially acid forming PAF waste material;
- protect, buttress and strengthen the confining embankments of the IWMS;
- minimise total project footprint, haulage costs and final landform construction cost;
- adopt compound angle, concave final slopes to improve aesthetics, long term stability and land use; and
- provide material for the staged lifting of the TSF.

The main surface RSFs have been designed to fit within the available land inside the Hillside Project boundary. Rex is also proposing to create in-pit RSFs which form an integral part of the haulage network and provide access into the pit in phases 4 and 5. The RSF – North and RSF – South provide screening to minimise both noise and visual impact of the Project on the Yorke Highway and the townships of Pine Point and James Well – Rogue's Point. RSF – West is integral to the TSF construction. The ROM, low grade and oxide stockpile are located on valleys upstream of the pit to provide a passive backup in the event of extreme rainfall, ensuring any overflow run-off from these areas reports to the pit and cannot leave the ML.

There are two main areas allocated for surface rock storage. The first is the bulk rock fill forming the TSF walls and the surrounding RSF to the west of the pit. The second is the RSF running north to south along the eastern project boundary immediately east of the pit and wrapping around the southern end of the pit.

The first location, referred to as RSF – West is part of the IWMS which sees the TSF and the RSF incorporated into a single structure. The RSF – West is also adjacent to the ROM and stockpiles and hence also incorporates the storage/disposal of the low grade ore and mineralised oxide material if this is not processed.

The second location is more substantial in size and serves a vital role as a perimeter bund to reduce noise transmission and screen the operations from neighbours and the public. The key screening areas are the northern and southern peripheries and for this reason Rex has divided this dump into RSF – North and RSF – South regions to better manage these obligations.

In addition to the two main RSFJs, the ROM pad, LG ore and oxide stockpile bases will also be built from waste rock.

The construction sequence of all the RSFs is governed by four main objectives:

- the ROM pad, stockpile bases and initial TSF lift must be constructed during the pre-strip period to ensure ore can be stockpiled and the facilities are ready for use by the start of Year 1;
- the RSF – North and RSF – South perimeters must be constructed to provide the required perimeter bunding as the next highest priority;
- the bulk fill for the TSF stages must be placed by the required deadlines to maintain TSF capacity; and
- the selective sequencing of the various RSF regions is the only mechanism available to manipulate haul distances and thus manage haulage fleet requirements over the mine life.

General description of RSFs

RSF – West expands slightly beyond the TSF footprint; mostly to the south where it is constrained by the ML boundary or land owned by a third party and to a lesser extent to the east where it integrates with the ROM, stockpile and the DSCP. RSF – North occupies the majority of the land north of the pit, between the plant and other site infrastructure on the west, and the northern and eastern ML boundary.

RSF – South occupies all available land between the pit edge and the southern and eastern project boundary. The smaller footprint of the EFS pit allows the narrow area between the eastern edge of the pit and the project boundary to be used more effectively than in the MLP, allowing one continuous RSF along the eastern project boundary.

The in-pit RSF sit against the eastern wall of the final pit void extends above the pit crest and merges with the surface of RSF– South.

Standoff distance from the RSF toe to the ML boundary varies with location depending upon the adjacent land use and the nature of services and accesses required on the Rex side of the boundary.

Along the eastern side, the RSF reaches its closest point to the ML boundary at 20m. Along the southern and southwestern side of the Project the standoff to third party property boundary is in the order of 100m. Along the southern, western and northern sides of the TSF, and the northern side of the RSF – North, the standoff is in the order of 50m to third-party properties.

Figure 3-61 and Figure 3-62 refer to vertical cross-sections of the RSF and TSF. Figure 3-63 shows the footprint of the RSFs with respect to the pit and Project boundary.

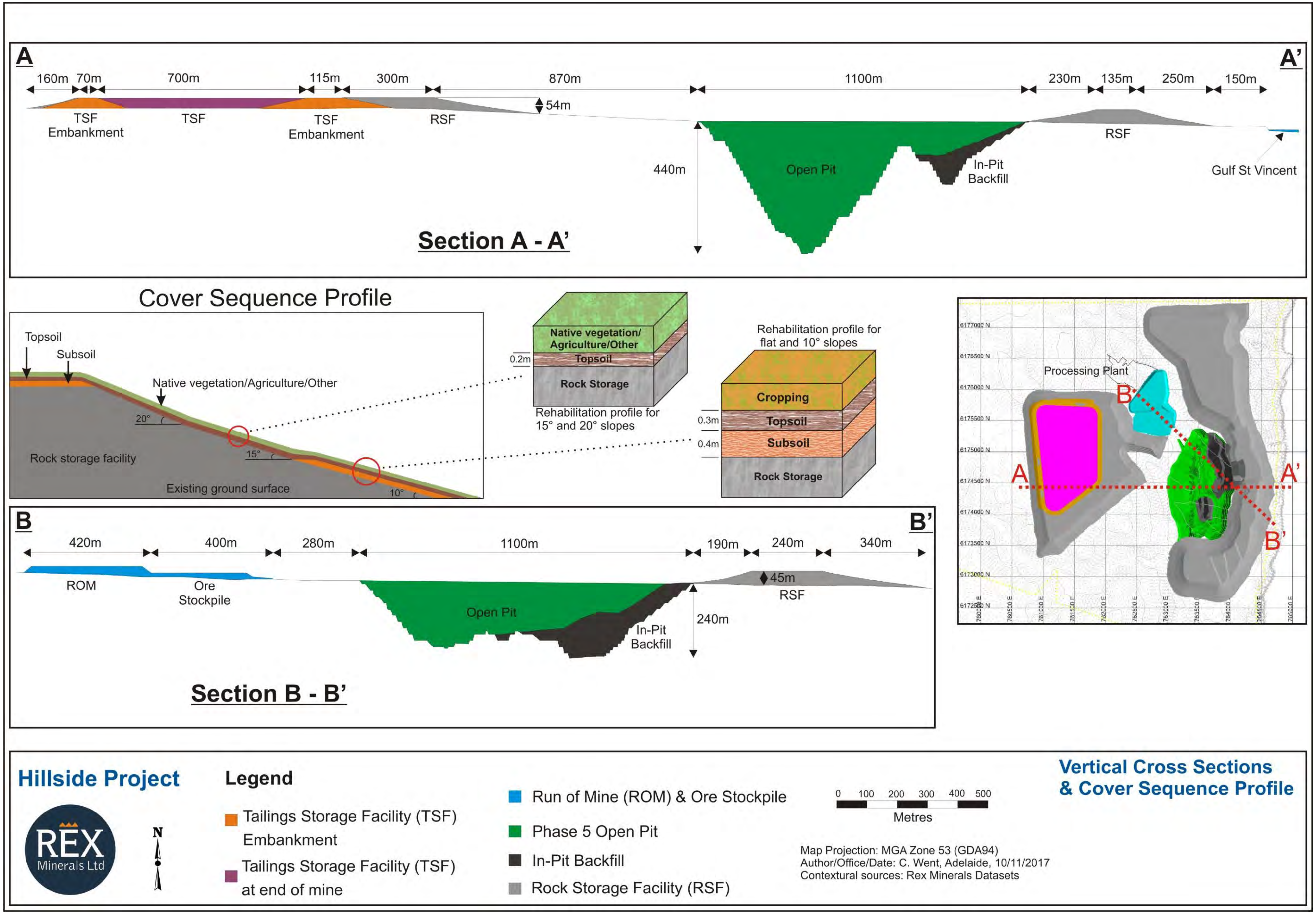


Figure 3-61: Vertical cross-sections of the Project site (A-A' and B-B')

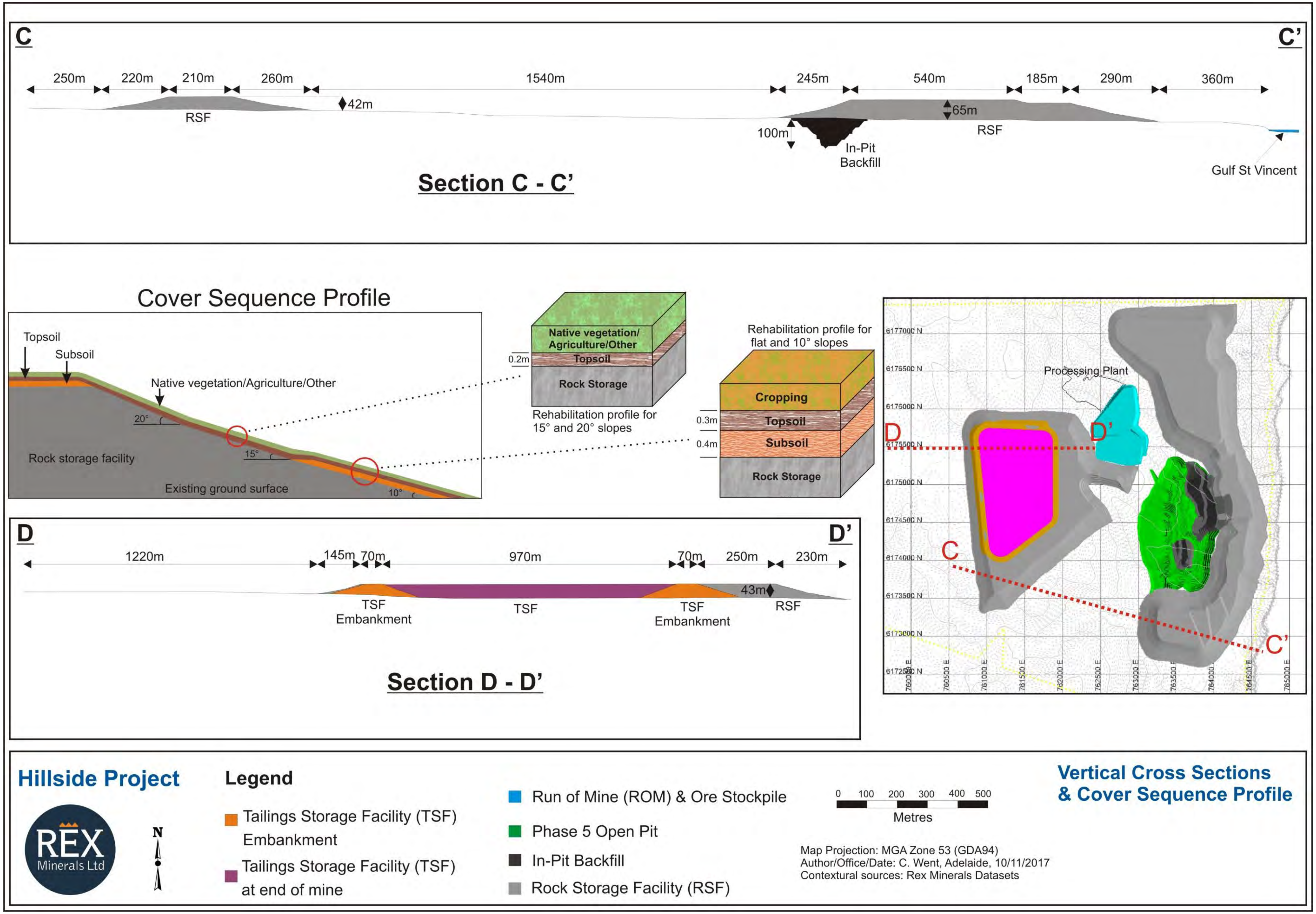


Figure 3-62: Vertical cross-sections of the Project site (C-C' and D-D')

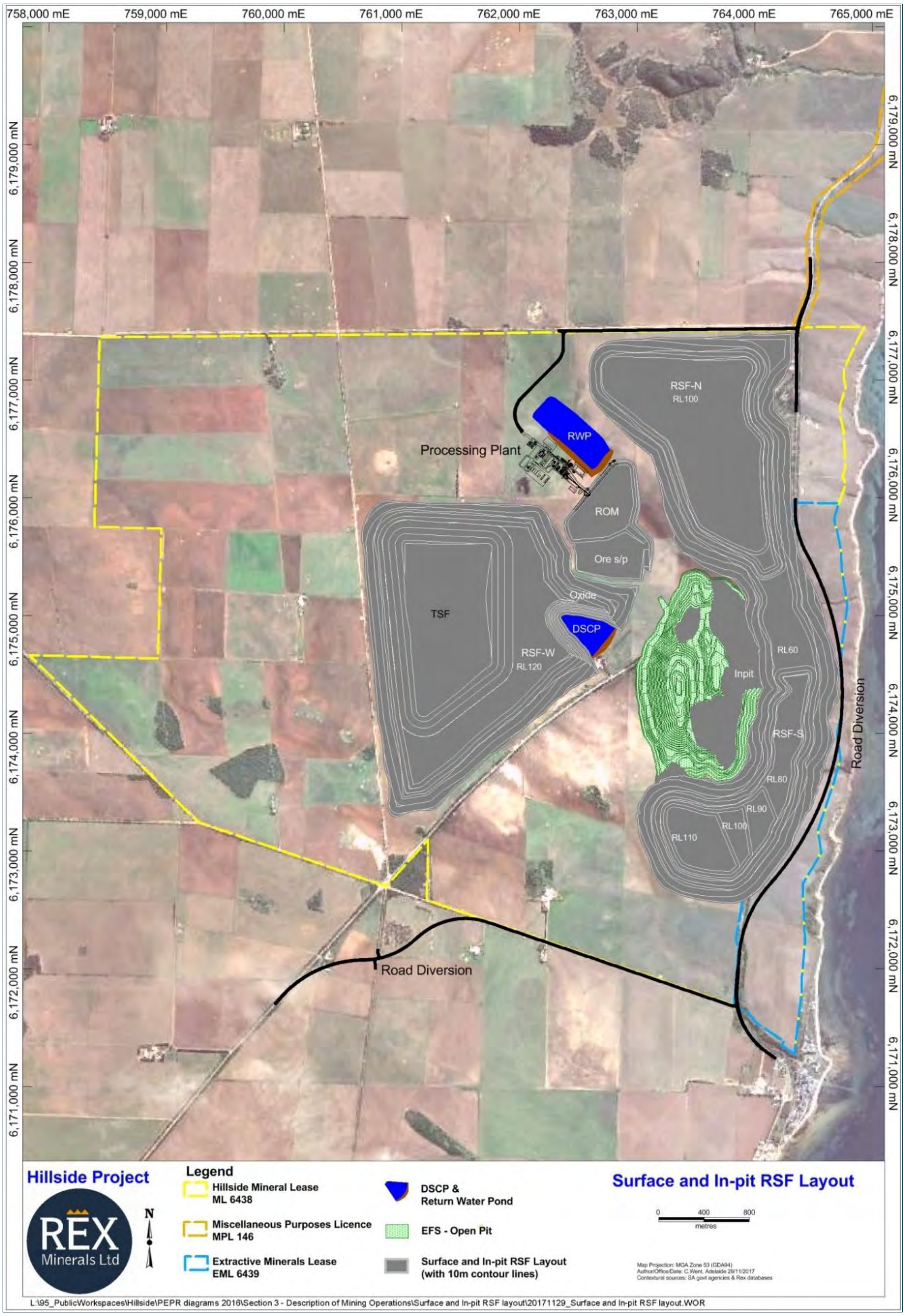


Figure 3-63: Surface and in-pit RSF layout

3.7.1.2 General RSF design parameters

The surface RSFs were designed to deliver the nominal post-mining footprint and shape which incorporates a concave final slope surface comprising a 10 degree slope for the lower 20m, a 15 degree slope for the next 20m, and a 20 degree slope above. A schematic of this profile is shown in Figure 3-64.

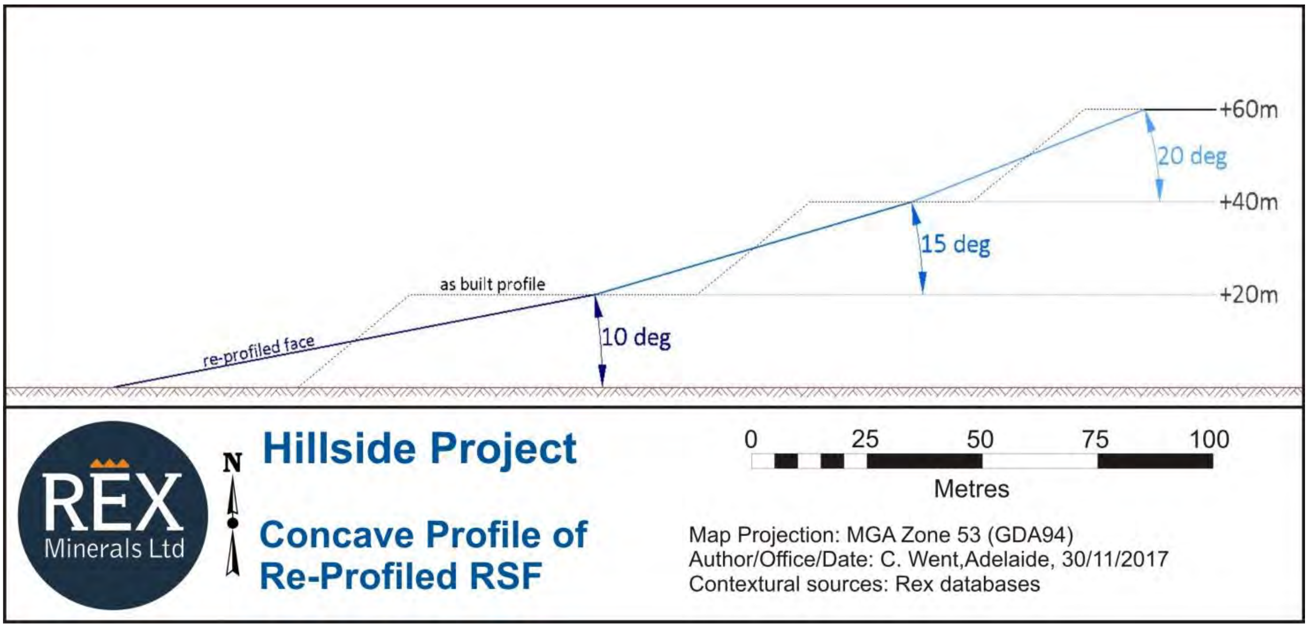


Figure 3-64: Schematic of concave profile of re-profiled RSF face

In-pit storages were designed at 37 degrees (angle of repose). Surface RSFs with toes near the pit crest will be battered down into the pit and/or incorporated into the in-pit rock storages. For the purposes of haulage modelling and haul path estimation, a 10m dump lift height was assumed.

3.7.1.3 Rock storage facility construction methodology

Rex's intention with the surface RSFs is to progressively rehabilitate them at the earliest practical opportunity. With respect to dump construction, the best way of achieving progressive rehabilitation is to advance the external dump faces in short stages and within each stage progress through the entire clearing, dumping, battering and rehabilitation cycle. Such a cycle will commence with topsoil and sub-soil clearing and stockpiling. Rock storage construction will follow until a sufficient storage area has been constructed. The completed RSF face will be battered to the final profile and rehabilitated.

Rehabilitation may occur in parallel with the RSF construction, but in a manner that maintains safe operating demarcation. Once a sufficient re-profiled area is available, the clearing of topsoil and sub-soil will commence for the next storage stage and the storing, battering and rehabilitation cycle will be repeated.

Haulage estimation assumes the surface RSFs will be constructed in nominal 10m high lifts. To reduce the amount of dozing required for re-profiling, each storage will first be free-stored and then the final storage level advanced over the top. A schematic of this, including an indication of dozing volume required for each final slope angle is shown in Figure 3-65.

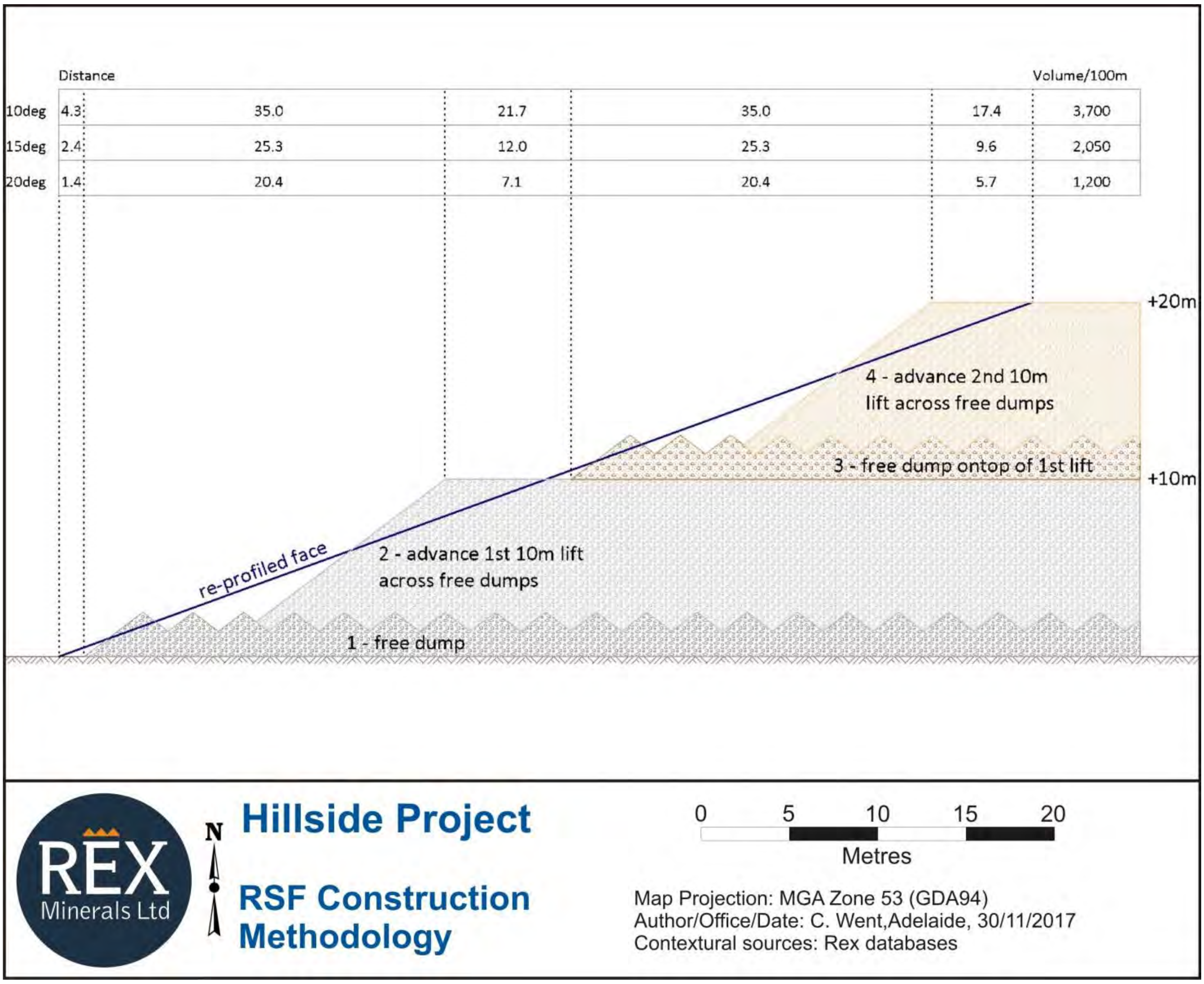


Figure 3-65: Schematic of RSF construction methodology

A buffer of at least 20m from the toe of the RSFs to the boundary of the proposed operating area within the ML has been maintained to ensure that there is adequate room for surface water management infrastructure, access roads, topsoil/subsoil stockpiles etc.

3.7.1.4 RSF summary

There is a total rock excavation of 685Mt comprised of 82Mt of ore and 603.5Mt of waste. The waste rock is comprised of approximately 585Mt of non-mineralised waste and 18.5Mt mineralised oxide material. Table 3-5 presents a summary of the footprint, capacity and height for the various RSF and stockpile regions. The density of the loose rock is estimated to be 2.18t/m^3.

3.7.1.5 Method of placement

Mining trucks will transport the waste rock to the rock storage area. The waste rock will be paddock dumped on the RSF area in nominal 2m lifts and then dozer levelled and compacted by heavy vehicle traffic.

3.7.1.6 Rate of placement

The rate of placement of waste rock to the rock storage area is tabulated below (Table 3-39).

Table 3-39: RSF waste rock placement rate summary

Year	Waste (kt)
-1	53,139
1	52,791
2	42,831
3	55,476
4	53,274
5	50,719
6	48,534
7	52,673
8	56,587
9	58,144
10	47,207
11	28,825
12	2,787
13	366
Total	**603,453**

3.7.1.7 Acid rock drainage

External consultants (Earth Systems) conducted a review in 2017 of the existing geochemical database, with the aim of re-classifying the waste rock and tailings utilising a more scientifically accurate approach, to establish a system for classifying the acid rock drainage (ARD) risk of materials on site.

ARD Classification System

To assess and classify the potential ARD risk for the Project, the available mineralogical data and geochemical assay database were used to calculate the net acid producing potential (NAPP) values for each assay interval of ore and waste rock. The NAPP value provides an indication of the net acid generating capacity of a material, by calculating the difference between the maximum potential acidity (MPA) and the acid neutralising capacity (ANC). The NAPP value can then be used to classify the material as either potentially acid forming (PAF) (NAPP >0kgH_2SO_4/t) or non-acid forming (NAF) (≤ 0kgH_2SO_4/t).

The classification system adopted by Rex is identified in Appendix 3.6-A ARD Classification System and has been developed to provide a preliminary indication of the proportion of PAF and NAF materials in the very low grade ore (VLGO), waste rock and tailings materials and the appropriate treatment of oxide material. The classification system will permit the development of a detailed ARD risk layer in the mine block model, which will ensure PAF and NAF boundaries derived from the ARD classification system are included in the open pit bench plans.

ARD Classification Results – Fresh and Transitional Material

Using a waste rock copper cut-off of 0.17%, and a VLGO grade ranging from 0.17–0.25% copper, the AMD risk classification approach was applied to the Hillside Block Model to provide a preliminary ARD risk classification for VLGO, waste rock and tailings (see Table 3-40).

Table 3-40: ARD classification of VLGO, waste rock and tailings

Mining Stream		EFS Tonnage (Mt)	%	ANC/MPA Ratio
VLGO	NAF	2.53	53.3%	1.39
	PAF	2.22	46.7%	
Waste rock	NAF	388.42	94.8%	8.1
	PAF	21.13	5.2%	
Tailings	NAF	60.13	75.0%	2.16
	PAF	20.09	25.0%	

Note: Excludes oxide (Met_code = 1).

The ANC/MPA ratio is frequently used as a means of assessing the risk of acid generation from mine waste materials. The ANC/MPA ratio is another way of looking at the acid base account. A positive NAPP is equivalent to an ANC/MPA ratio less than 1, and a negative NAPP is equivalent to an ANC/MPA ratio greater than 1. A NAPP of zero is equivalent to an ANC/MPA ratio of 1.

The purpose of the ANC/MPA ratio is to provide an indication of the relative margin of safety (or lack thereof) within a material. Various ANC/MPA values are reported in the literature for indicating safe values for prevention of acid generation. These values typically range from 1 to 3. As a general rule, an ANC/MPA ratio of 2 or more generally signifies that there is a high probability that the material will remain circum-neutral in pH (Australian Government 2016a).

As can be seen from Table 3-40, the Hillside Project waste rock and tailings have an ANC/MPA ratio of >2 indicating that there is a high probability that the material will remain circum-neutral in pH.

ARD Classification Results – Oxide Material

The classification of oxide materials which are generally devoid of Sulphur differed from fresh and transitional based on the potential for the oxide materials to generate neutral and metalliferous drainage (NMD) on site. The primary driver of this potential is the mineral atacamite $Cu_2Cl(OH)_3$ and it is therefore important that Rex ensures no atacamite is present within the oxide waste material that will be used for general rock storage/tailings construction or capping purposes.

Rex is proposing to classify the oxide material from the deposit into three separate categories.

1) **Oxide ore:** Rex will specify a copper cut-off grade for oxide ore material (herein referred to as 0.2% copper). Any oxide materials with a copper grade ≥0.2% copper will be placed on a clay lined oxide ore stockpile with the intention of potentially recovering the copper from this ore later in the project life.
2) **Oxide waste rock – NMD potential:** For oxide material with a copper grade <0.2% copper, Rex will use a two-step process to identify oxide waste that has NMD potential, i.e., atacamite present.
    a. Adopt a chlorine cut-off of 0.07% chlorine (700ppm) to break-out that material which potentially has atacamite. Figure 3-66 shows that all atacamite that Rex has encountered has had a chlorine grade of above 0.07% chlorine.
    b. Accept that any material from Step A with a copper grade of >0.05% copper will have potentially leachable levels of atacamite and hence will be classified as oxide waste with NMD potential.
3) **Oxide waste rock – No NMD potential:** All remaining oxide material is deemed to have no NMD potential and will be suitable for general construction or capping purposes anywhere on site.

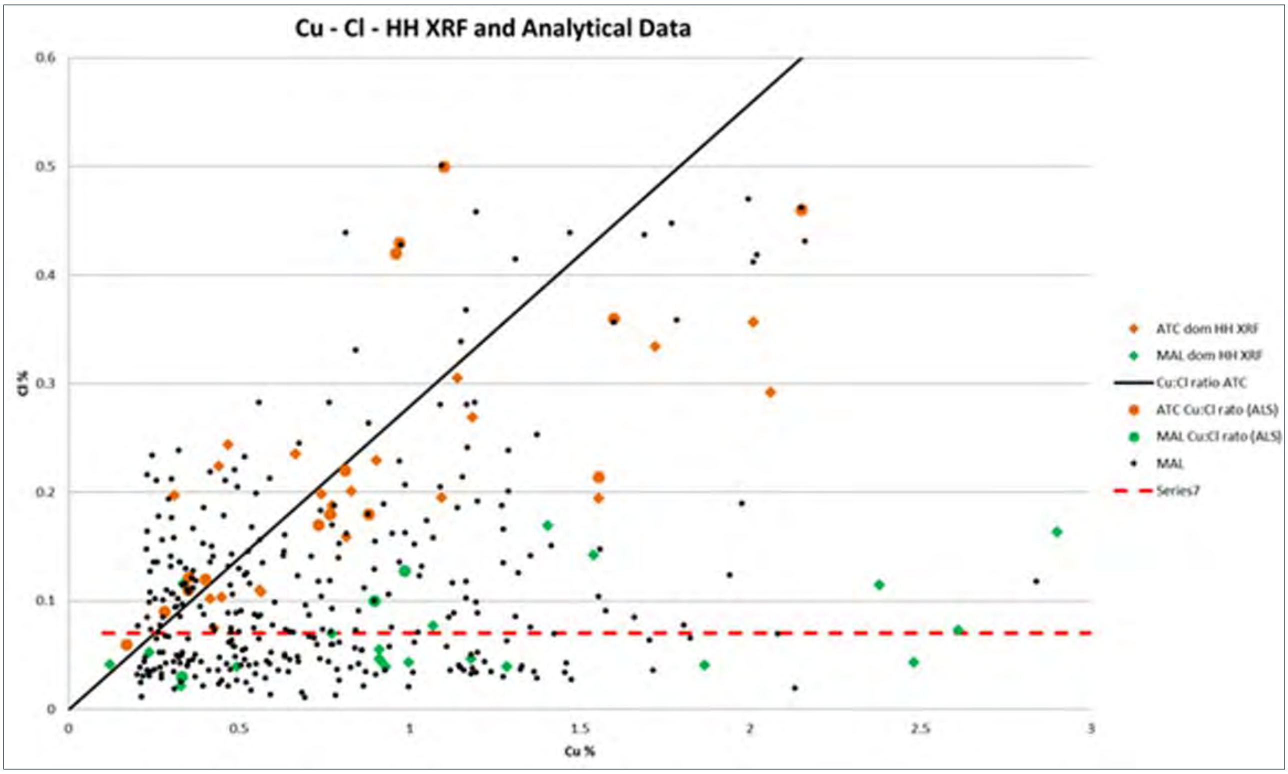


Figure 3-66: Scatter plot of copper and chlorine assay values. Atacamite identified shown in orange

Based on the classification system outlined above,

Table 3-41 shows the proportions of oxide ore, oxide waste (NMD) and oxide waste (no NMD).

Table 3-41: Classification of oxide ore, oxide waste (NMD) and oxide waste (no NMD)

Oxide Category	Tonnage (Stage 1 Project)
Oxide ore	19.27Mt
Oxide waste (NMD)	23.77Mt
Oxide waste (no NMD)	157.45Mt

ARD Classification Results – Tailings

In addition to the tailings assessment conducted in 2013, Rex expanded on this work by adopting a tailings classification approach in 2017 using a similar 'whole of model assessment' method.

The classification system adopted by Rex, presented in Appendix 3.6-A, provides Rex the ability to assess the ARD potential of the tailings on a block by block basis. As seen in Table 3-40, this work determined that 25% of the tailings are classified as PAF. This tailings material has an ANC/MPA ratio of 2.16 indicating the there is a high probability that all of the tailings material will remain circum-neutral in pH (Australian Government 2016a).

Given the block by block accuracy of the work completed in 2017 on the tailings material, Rex chose to use this work as the primary classification method for tailings ARD.

3.7.1.8 Management of PAF

Due to the potential presence of PAF waste rock material, an encapsulation strategy has been adopted so that the outer layer of the final rock storage comprises only of NAF material and the cover system for the backfilled PAF comprises NAF material. This ensures that PAF material is encapsulated and surface water/oxygen ingress into the PAF material is minimised.

During mining operations, the location of the PAF waste rock zones are verified from assays during grade control and blast hole drilling. As the material is excavated, the PAF waste rock is placed in the PAF waste rock cells of the rock storage facility and the backfilled areas of the pits.

Notwithstanding further and ongoing work as outlined above, current estimates of the relative volume of PAF is in the order of only 5.2% of total waste rock, indicating that sufficient NAF material is available to encapsulate the PAF material.

PAF Management Strategies

Rex will implement the following PAF Management Strategies.

- Using the classification methodology outlined above and Appendix 3.6-A ARD Classification System. Rex will determine an ARD classification on a block by block basis during operations within the Hillside Project grade control model. This classification methodology will utilise grade control and blast hole analytical data collected daily (including Sulphur and Copper assays) as per the classification algorithms in Appendix 3.6-A ARD Classification System;
- Block modelling of the PAF and NAF distribution and the estimation of the volume of each, will occur daily within the Project grade control model utilising the classification approach noted in above and Appendix 3.6-A ARD Classification System;

- Rex will integrate the grade control model (containing an estimate of PAF and NAF) with the geological model to provide further confidence in the definition of PAF boundaries, potential zones of high neutralising capacity and potential geological controls on mineralisation. Importantly, this is already included in the existing Rex Block Model;
- The PAF and NAF boundaries derived from the Hillside Project grade control model will also be incorporated into open pit bench plans and distributed to the short-term mine planning team daily, or on a time frame that the short-term planning team requires; and
- Drill cuttings from RC grade control drilling will be sampled on 1m or 2m intervals, whilst drill cuttings from the bulk blasthole drilling cone will be sampled. All samples will be sent to the Project on-site laboratory for a geochemical suite of elements which will include Sulphur and Copper completed by inductively coupled plasma-atomic emission spectrometry (ICP). Analytical results from the laboratory will be incorporated into the grade control block model to ensure NAF and PAF classification is updated daily.

Daily open pit bench plans will be provided to the mining team which will highlight the identified PAF and NAF boundaries derived from the grade control model. Selective mining of PAF and separate placement of PAF will then be completed as per the procedure.

PAF Control Measures – Waste Rock

Waste rock classified as PAF will be encapsulated in the RSF areas noted in Figure 3-67 The RSF construction will commence with topsoil and sub-soil clearing. Once a sufficient footprint is cleared, waste storage construction will proceed in the following sequence and as shown in.

- NAF/ACM with some clay will be paddock dumped and built up in 2m lifts and then dozer levelled and compacted by heavy vehicles to create a layer 4–6m in thickness. The NAF base layer is expected to have a hydraulic conductivity of at least 10^{-2}m/d K value, based on expected achievable compaction with the NAF materials and methods available during construction. The provided K value assumes worst case conditions, i.e., saturated conditions and falling or constant head conditions;
- PAF material will be paddock dumped with layers of NAF and ACM within a designated cell to ensure a NAPP value of zero or less (net NAF). Layers will be built up in nominal 2m lifts and then dozer levelled and compacted by heavy vehicle traffic;
- The PAF cell will be bounded by 10–20m of paddock dumped NAF/ACM material on all sides with, at minimum, 4m to 6m of NAF/ACM material on top. The bounding and capping material (NAF and/or ACM) will also be paddock dumped and built up in 2m lifts and dozer levelled and compacted by heavy vehicle traffic; and
- The indicative cover system for the upper layer of the RSF will be a dry (soil) cover as recommended in the cover design investigation undertaken by ATC Williams consultants. The cover design investigation found that the proposed cover system when modelled based on a 1.2m NAF thickness with vegetation, resulted in net infiltration rates approaching zero. The cover design is based on a ‘store and release’ cover system, which is designed to capture rainfall and store it within the rhizosphere (root zone) for uptake and evapotranspiration by plants without significant movement of moisture into lower layers of the landform. Excess run off water will report either to the decant seepage or collection pond or into the pit where it will be pumped back to the decant seepage and collection pond.

The strategy presented above and in Figure 3-65 is designed to minimise material segregation and to prevent the formation of a basal rubble layer. Small lifts of 2m allow for regular dozer and heavy vehicle compaction. These combined factors minimise oxygen ingress and water flow into the encapsulation PAF cells, thus removing the mechanism for oxidation reactions to occur. Importantly, the location of the PAF cells within RSF – West are well away from the open pit walls thus this material will not be exposed in the event of an open pit wall failure.

Rex will also implement a program for determining the erodibility of waste rock to ensure that no erodible waste rock is placed immediately underneath subsoil on external batters.

Testing of erodibility involves laboratory or field studies using overland flows and simulated rain, or could use instrumented field plots under natural rain (Loch 2000).

Current leading practice in Australia has made extensive use of soil erosion and landform evolution models to develop landform profiles that are site and goal specific (Howard et al. 2011) and in many cases, incorporate most, or all, of the elements considered aesthetically desirable.

Effective designs are based on:

- site climate and rainfall erosivity;
- the erodibility of the materials used to construct the landform; and
- the likely vegetation cover and resultant changes in soil function (Australian Government 2016b).

Soil properties that can directly affect erodibility include:

- infiltration capacity, which is affected by soil structure and structural stability;
- vegetation, and by soil fauna;
- soil cohesion, which can affect rates of detachment of sediment; and
- sediment properties (size and density), which affect rates of sediment transport.

The program of future work (Section 5.15) will entail determining the site specific appropriate model parameters; rock particle size distribution, rock geochemistry, the rainfall intensity and duration, obtain site relevant sediment loads, site topography as waste storage facilities are completed, soil compaction rates (affects infiltration) and surface texture.

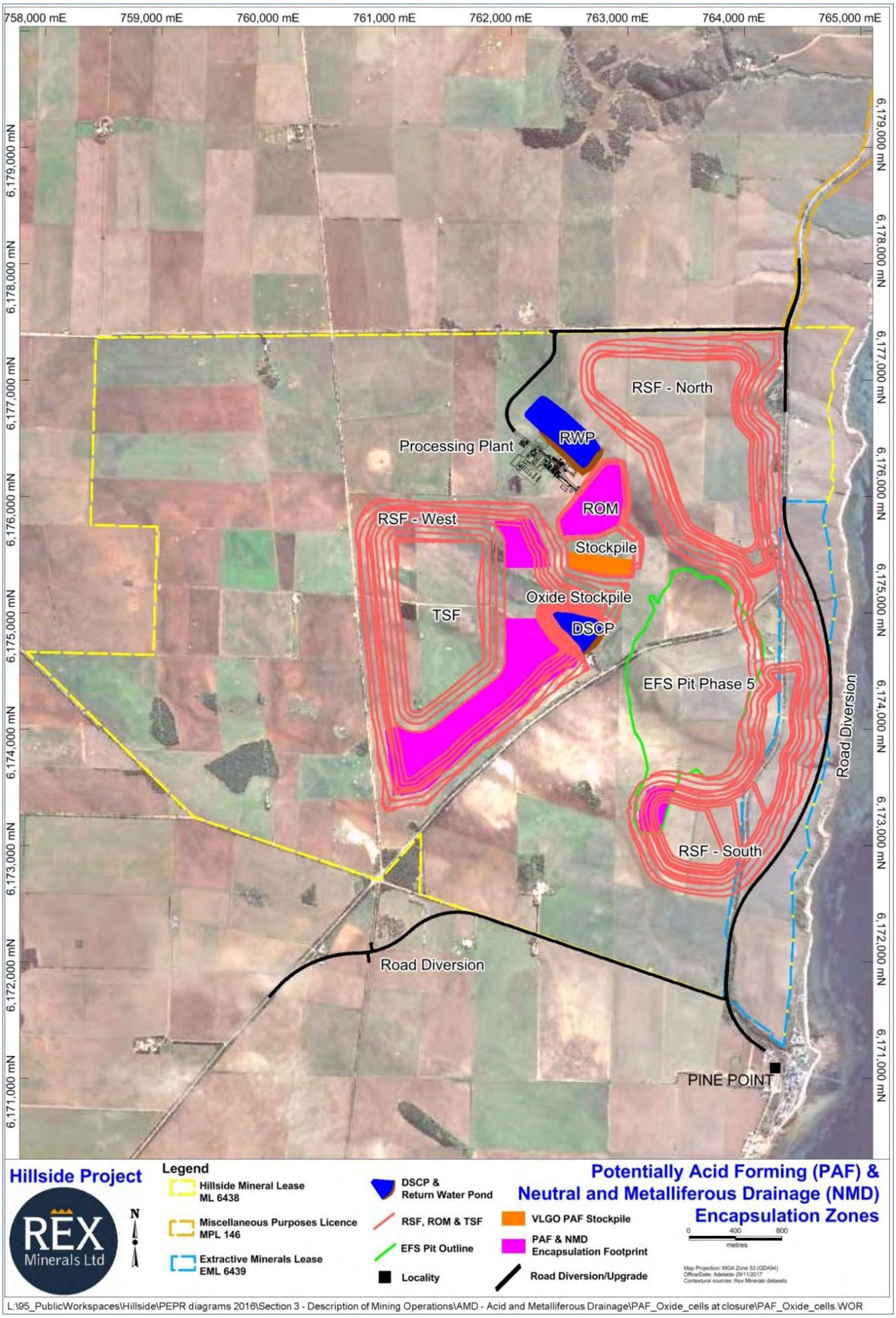


Figure 3-67: PAF and NMD encapsulation zones

PAF Control Measures – Very Low-Grade Ore (VLGO)

The VLGO stockpile will be created by haul trucks paddock dumping on the VLGO stockpile. Further expansions of ore stockpiles will expand the areal extent of the pad and will be reclaimed later in the mine's life. The ore stockpile will reach a maximum height of 12m and area of 22ha containing a maximum of approximately 4.7Mt of VLGO. The stockpile will be placed on a layer of impermeable clay. The amount of PAF material will be very small (2.2Mt), and will be paddock dumped within this stockpile (refer to Figure 3-67) immediately on the impermeable clay layer in line with the methodology noted in the PAF Control Measures – Waste Rock section above. It will be stockpiled separately from the 2.5Mt of NAF material as this material will be processed at the end of the operation to ensure 2m of NAF tailings on the surface of the TSF. Excess run off water will report either to the decant seepage collection pond or into the pit where it will be pumped back to the decant seepage and collection pond. Due to the design of the stockpiles, there is not expected to be any significant stability or erosion issues.

Control Measures – Oxide Ore

The oxide ore stockpile will be created by haul trucks paddock dumping on the oxide stockpile. The stockpile will be placed on a layer of compacted clay and will be dumped within this stockpile in line with the methodology noted in the PAF Control Measures – Waste Rock section above. Due to the design of the stockpiles, there is not expected to be any significant stability or erosion issues.

Control Measures – Oxide Waste Rock (NMD Potential)

The oxide waste rock with NMD potential will be trucked by haul trucks paddock dumping in two separate locations. In Year 0, Rex predicts approximately 9.2Mt of this material will be paddock dumped on the clay lined ROM pad and encapsulated in line with the PAF encapsulation methodology in Figure 3-68. The remaining 14.6Mt of this material coming out during the life of the project will be paddock dumped and encapsulated in the RSFs in line with the methodology noted in the PAF Control Measures – Waste Rock section above. Due to the design of the RSFs, there is not expected to be any significant stability or erosion issues.

3.7.1.9 Stabilisation and erosion control

Water falling directly on the RSFs will be contained within drains established as the waste storage develops. The drains will carry any water to sediment ponds located on site. Water will be kept away from the toe of the RSFs so water does not cause instability of the structure. The water will be kept away by the placement of a bund near the toe of the RSF so that water from other areas of the site cannot flow towards the toe. Prior to progressive rehabilitation, the RSFs are also tiered and stepped, to minimise degradation.

The corners of the RSFs are not designed with square (90°) corners (Figure 3-69). The corners of the RSFs will be formed with 50m minimum radiuses both on internal and external corners, as per standard design protocols. This reduces the possibility for instability and erosion of the final landforms.

Erosion control protection methods, stormwater controls, silt controls and surface water drainage is presented in Section 3.8.7 for operations and Section 3.10.1.1 for post-closure.

Additional surface water controls are presented in Section 5.14.

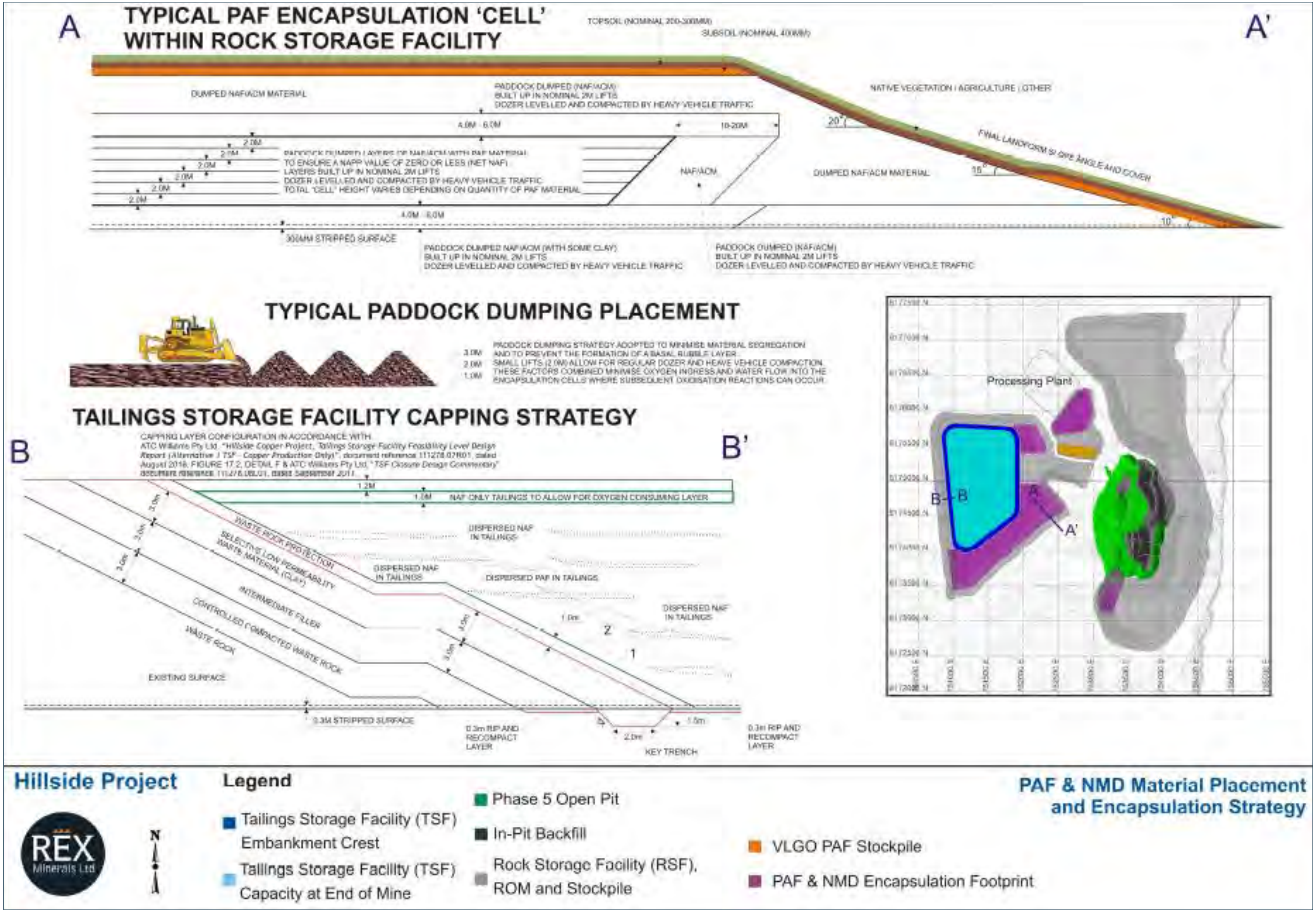


Figure 3-68: Typical PAF encapsulation cell within RSF and Indicative TSF capping strategy

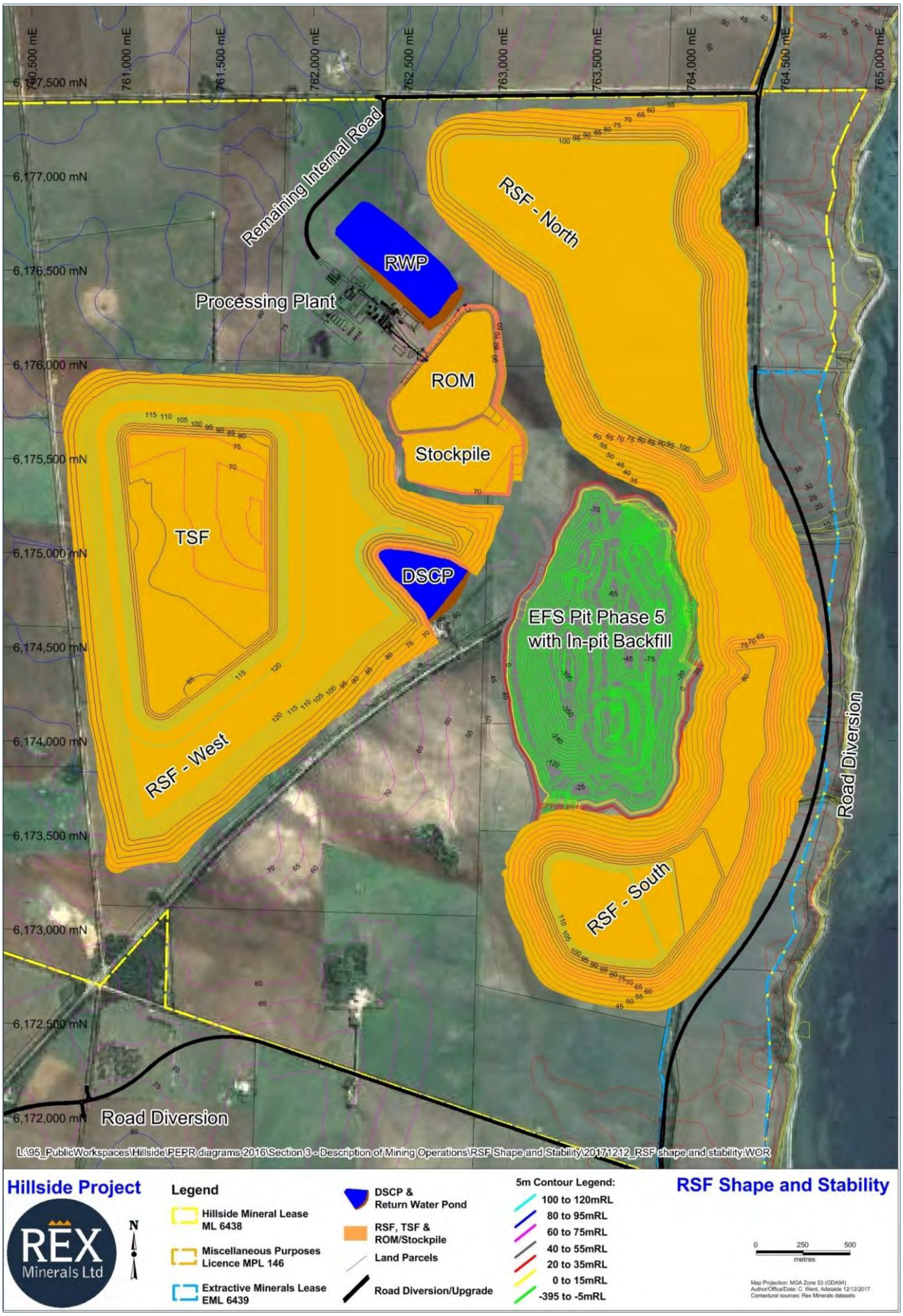


Figure 3-69: RSF shape

3.7.1.10 Slope stability assessment

Ground Control Engineering (GCE) conducted a rock storage facility stability assessment for the Hillside Project (MLP Section 6.7.1.5). A Factor of Safety (FoS) of 1.3 was applied in the assessment. The results of the analysis are summarised in Table 3-42. The analysis indicated that an RSF with an overall slope angle of 28.7° would be stable to at least 240m overall storage height.

Table 3-42: RSF – stability analysis for different slope configurations summary

Slope Configuration	Lift Height (m)	Minimum Berm Width (m)	Overall Slope Angle (°)	Maximum Lifts for FOS >1.3 (Overall Slope Only)	Corresponding Maximum Dump Height (m)
A	40	20	28.7	6	240
B	40	15	30.4	2	80
C	40	10	32.4	1	40
D	30	10	31.1	4	120
E	20	10	28.7	6	240

Each of the Project RSFs is designed with natural rill angles of 37˚ and 10m lift heights. The berm widths on all stockpiles are 15m. The overall slope angle for each stockpile with these construction dimensions is therefore 19.5˚.

During operations, inspections will be undertaken at the base of RSFs and at the crest, looking for any signs of slope instability or conditions that may create future instability such as erosion at the toe. Earthworks will be undertaken to progressively contour the RSFs to ensure long term stability, requiring no ongoing maintenance post-closure.

3.7.1.11 Tailings

An estimated annual average of 5.73Mt/a of tailings will be produced and deposited into the TSF. Prior to being pumped to the TSF, the tailings are thickened to a density of 58% solids. Tailings thickener underflow is pumped to the TSF, while the tailings thickener overflow gravitates to the process water pond. The water within the decant return pond is pumped to the DSCP where the water is then pumped back to the process pond to be recycled within the processing plant.

No hazardous material (i.e., asbestos forming, radioactive, toxic, corrosive or flammable) have been identified within the tailings solids that will potentially exceed relevant guidelines (NEPM or SA EPA).

3.7.1.12 Tailings geochemistry

Tailings characterisation test work has shown the material to be low plasticity sandy silty clay, with a P80 of 90Gm and a particle specific gravity of 2.92.

A suite of geochemical test work was completed on the tailings solids and liquor. The test work included:

- pH, alkalinity;
- acid neutralising capacity (ANC) of tailings solids;
- net acid generation (NAG) capacity of tailings solids;
- multi-element analysis of solids; and
- determination of net acid producing potential (NAPP).

While approximately 25% of the samples tested were classified as potentially PAF, when viewed holistically, the results of the laboratory flotation and pilot plant testing indicate that the tailings mass has a very low potential of acid generation. This is because PAF material within the tailings is expected to be dispersed within NAF material and there is a high neutralising capacity in the NAF material.

The tailings acid forming characteristics are:

- net acid generation capacity (NAG) -8.7kg H_2SO_4/t;
- acid neutralising capacity (ANC) 226kg H_2SO_4/t;
- net acid producing potential (NAPP) -198kg H_2SO_4/t.; and
- pH 8.77.

As can be seen from the NAPP value, it is unlikely that the tailings material will generate any significant acids if exposed to atmospheric conditions. As a highly conservative precaution, Rex is proposing to place 1m of NAF material over the entire TSF at the end of mine (EOM) life to create an oxygen consuming layer which will further prevent the unlikely occurrence of acid generation within the tailings post-closure. This will be reviewed as part of the TSF closure design trials to be conducted over the LOM.

3.7.1.13 Description of tailings management

An operational Tailings Management Plan will be implemented to effectively control tailings within the TSF throughout the life of the facility. The tailings beaching will be exploited to provide sufficient consolidation and desiccation of the tailings material. During mine life, tailings management will consist of control and monitoring activities as follows.

- Tailings slurry control – the particle size grading and discharge solids content of the tailings slurry will affect the beaching slope and volume of water that will be removed from the system. Greater consistency of tailings material properties over the life of the facility will provide more accurate volume requirement predictions.
- Continual rotation of the tailings deposition spigots – the tailings beach will be developed evenly over the entire facility to allow time for water to evaporate.
- Reduce ponded supernatant water – control of supernatant water through the RWP and process water feed will maximise desiccation and consolidation of the tailings.

3.7.1.14 Tailings tonnage

Rex defined the tailings production tonnage rate parameters that ATC Williams utilised for the feasibility design (Appendix 3.4-A), as presented in Table 3-43.

Table 3-43: Hillside Project tailings production summary

Year	Tailings Production (Mt)	Average Daily Production (t/d)
1	5.09	13,935
2	5.89	16,126
3	5.91	16,180
4	5.88	16,098
5	5.86	16,044
6	5.87	16,071
7	5.89	16,126
8	5.91	16,180
9	5.87	16,071
10	5.82	15,934
11	5.79	15,852
12	5.85	16,016
13	5.90	16,153
14	4.69	12,840
Total/Average	**80.22**	**15,688**

The tailings production data presented in Table 3-43 relates to the open pit mining operations on which the TSF design is based.

3.7.1.15 Tailings storage

An overall layout plan for TSF stages (lifts) 1 to 6 of placement of tailings and the TSF closure layout of the Hillside TSF can be viewed in Figure 3-59 to Figure 3-64. The TSF is generally referred to as paddock type tailings storage, comprising a single cell and using a ring main and spigot tailings delivery pipe network.

The paddock TSF system is an ‘isolated’ system that is cut off from the surrounding catchments. The base and sides of the facility will be lined using reworked in situ clays to minimise excessive seepage from the facility. Seepage is likely to have high salinity.

All surface runoff and bleed water will accumulate at the supernatant pond, water will be pumped to the RWP. Seepage will be removed from the TSF via a gravity drain and discharged into the DSCP, which in turn will be returned to the RWP.

Tailings discharge will be moved on a rotation around the facility (northern, eastern and southern sides) to ensure an even progression of the beach slope. The rate of rise of the tailings material will remain consistent around the facility, resulting in relatively even consolidation of the tailings material. Due to the deposition strategy, the decant pond will form along the western embankment where the floating decant pontoon and pump system will remove supernatant water from the TSF and be discharged into the RWP at the process plant.

A 100ML DSCP has been included in the design, to efficiently remove any seepage from the TSF via an underdrainage system and to accommodate the open pit dewatering requirements.

A 160ML RWP has been included in the design to alleviate the build-up of supernatant water on the TSF, which will be pumped to the RWP via the TSF decant system. The RWP will provide a buffer to the water balance between the TSF and DSCP, for reuse in the process plant. In addition to the TSF decant water, any water from the DSCP will be pumped to the RWP for re-use in the process plant.

The TSF geometry has been largely dictated by the final RSF design. The footprint area of Stage 1 has been refined to minimise the initial construction costs. Part of the final TSF footprint will be filled in Stage 1 (see Figure 3-70) and the remainder of the footprint area will be filled in Stage 2.

It is important to note that the final embankment raise (stage (lift) 6) will be completed as a ‘top-hat’ raise, reducing the embankment crest width from 70m to 37m.

The adopted geometry results in a tailings height deposition rate commencing at an initial 7.5m/year at the end of Stage 1 (end of Year 1), to 4m/year at the end of Stage 2 (end of Year 3) and progressively decreasing to 2m/year at the end of deposition.

The confining embankment will be constructed from mine waste rock with two 6.7m wide zones of controlled compacted waste rock and then a controlled, lower-permeability-facing of selective waste material constructed on the upstream side of the embankment. An additional 6.7m wide sand filter zone will be constructed in the area of the decant pond in order to collect potential seepage through the low permeability zone and protect against the risk of piping. This filter zone will be connected to the underdrainage system and potential seepage will be removed from the TSF area and stored in the DSCP. The overall final embankment height will be constructed to RL 125.5m with an approximate average height of 45.5m and a maximum height of 65.5m above the ground surface.

3.7.1.16 Tailings thickening

Tailings thickening test work, completed by Outotec Pty Ltd, has identified the optimum tailings thickening conditions for the Project. It is proposed to use high rate thickeners to produce thickened tailings with the following properties:

- solids loading rate – 0.9t/m^{2}h;
- feed slurry density (w/w solids) – 14.7%;
- slurry pH – 8.6;
- flocculent dosage – 10g/t;
- underflow density (% solids) – 56.7–58.4%;
- overflow clarity – 130ppm; and
- required thickener diameter – 47m.

3.7.1.17 TSF design

All modelling and design work for the TSF was undertaken by ATC Williams (Appendix 3.4-A) and is summarised in this section.

Design Standard

The design criteria adopted for the Project TSF is based on the EPA and ANCOLD guidelines. Based on the consequence category assigned to a storage facility ('High C'), the ANCOLD guidelines identify several design criteria that should be incorporated into the design as summarised in Table 3-30.

Size and Location

The TSF is located within the West RSF as shown in Figure 3-63. The initial catchment area (Stage 1) is approximately 129ha and the final stages catchment area is approximately 165ha. The overall final embankment height will be constructed to RL 125.5m with an approximate average height of 45.5m and a maximum height of 65.5m above the ground surface.

The estimated total tailings production is approximately 80.22Mt, with an overall in-situ dry density of 1.7t/m^3 at the end of filling. The required life of mine TSF capacity for feasibility study purposes is 47.2Mm^3.

Embankment Crest Level

Design calculations on the final stage tailings surface (when the TSF water storage area is least) show that the facility can store tailings, rainfalls and allow for a contingency without overtopping. The designed embankment crest level factors (in the tailings beach), level as the mine life progresses, with allowance for wet season storage, capacity for extreme events and contingency storage. Calculations carried out on the final stage tailings surface (when the TSF water storage area is the smallest) show that the facility can store tailings and high demand rain events (with a contingency), without overtopping. The staging of the TSF embankment raises has been determined by targeting relatively even quantities of tailings being deposited for each embankment stage.

The TSF design has allowed for a 6m wide berm in order to maintain tailings deposition while the TSF embankment raises are constructed. The embankment staging schedule is presented in Table 3-6. The overall average rate of rise is estimated to be 3m/year. Note at the western end (highest point) of the TSF location the ground surface ranges from 76RL to 86RL.

Tailings Discharge

A beach slope is formed after tailings material has been deposited within the TSF. The slope is dependent on the tailings discharge solids content, segregation threshold and rheology. The segregation threshold is below the expected discharge solids content, which indicates that there will be little or no segregation or sorting on the beach.

Tailings beach slopes are related to the sheared yield stress and viscosity, as well as the total flow in the tailings stream. Increases in sheared yield stress and viscosity result in an increase in the beach slope of the tailings surface. Reducing the flow in a tailings stream increases the beach slope, thus the number of tailings discharge points is an important consideration.

The beach slope design has been based on the adopted average tailings discharge solids content of 58%. At this solid content, and based on particle size distribution, mineralogy and rheology, the test results for the bulk floatation tailings indicate beach slopes in the following ranges:

- one to two discharge points 0.5 to 0.9%; and
- two to three discharge points 0.9 to 1.1%.

Experience shows that, in practice, the percentage solids from the thickeners will vary from day to day. The variation depends on many factors such as fluctuations in feed rate, flocculent behaviour, ore type, and operational decisions. The outcome is a slightly concave beach profile as the lower density tailings will beach at the toe of the slope at the flattest angle and the highest density tailings will beach at the head of the beach at the steepest angle.

As a consequence, the 'rule of thirds' has been applied to the overall average slope to account for the concave effect. This results in the following adopted profile, based on three discharge points operating at any one time:

- top one-third of beach 1.5%;
- middle one-third of beach 1.0%; and
- bottom one-third of beach 0.7%.

This assumes that two to three spigots will be in operation at any given time. It is estimated that a total of 26 spigots evenly spaced at approximately 150m centres around the facility will result in a relatively uniform beach with height differences between the spigot location and intersection of adjacent deposition cones being approximately 0.75–1.0m. A ring main and spigot system will be adopted; however, the spigot locations will likely be required to move periodically in order to assist in the formation of a uniform beach profile.

TSF Blanket Drainage

A blanket drain over the entire area of the decant pond will be constructed to remove potential seepage from the TSF.

Seepage collected from the blanket drain will be removed from the TSF area and discharged into the DSCP via a 25m wide central outlet drain. The outlet drain will consist of a 0.8m thick layer of selective waste rock (minimal fines), surrounded by a geotextile.

The approximate extents of the blanket drain for the TSF is presented in Figure 11.1 of Appendix 3.4-A and typical cross-sectional details is presented in Figure 11.2 of Appendix 3.4-A.

Allowance has been made for a HDPE concrete encased pipe through the confining embankment (north-western corner) to assist with the removal of potential seepage captured from a potential Stage 2 Project TSF underdrainage system (if constructed). If the Stage 2 TSF is not constructed, then this pipe will not be utilised. The pipe will be sealed on the upstream side (blank flange) until / if required. If the Stage 2 Project TSF is not constructed, the pipe will be buried by subsequent downstream embankment raises. The need for the concrete encased pipe for the Stage 2 of the TSF underdrainage system is due to the surrounding topography (i.e., TSF underdrainage system outlet drain is located at the base of the shallow valley over which the TSF has been positioned).

TSF and DSCP Emergency Spillway

Overview

The ANCOLD guidelines provide guidance when determining the annual exceedance probability (AEP) storm used in the spillway sizing calculations. The AEP storm is determined by considering the facilities hazard category. For a 'High' hazard category facility the guidelines suggest the spillway design be completed based on a probable maximum precipitation (PMP) storm.

Establishment of design rainfall

Rainfall intensity data for storm events up to 1-in-100-year ARI interval was obtained from the Bureau of Meteorology website <www.bom.gov.au>. Additional calculations were required to estimate the PMP storm event, which involved a combination of two methods, namely:

- generalised short-duration method; and
- estimation of long duration PMP as described in the Australian Rainfall and Runoff Guidelines.

Relevant recommended temporal patterns as described in the Australian Rainfall and Runoff Guidelines was applied to the calculated design rainfall and applied in the spillway calculations.

Derivation of design flood

The inputs in the derivation of the design flood for a given duration are the design rainfall event and the design inflow hydrograph. The design inflow hydrograph for a particular duration storm is the summation of individual component hydrographs from the pond and the natural surface catchment.

Spillway flood routing

Once the design flood for particular storm durations was derived, spillway sizing was undertaken by routing the flood through the storage. This was accomplished using the storage indication method, a direct numerical procedure which is described in Australian Rainfall and Runoff Guidelines.

A flood wave passing through the storage is both delayed and attenuated as it enters and spreads over the pool surface. The inflow volume with respect with time is determined by applying temporal patterns to the input inflow hydrographs. The surcharge storage is gradually released over the spillway. The outflow depends on the spillway configuration, as well as on the surcharge storage characteristics. In order to perform satisfactorily, the spillway configuration must be able to pass the critical duration design AEP flood without overtopping of the embankment crest.

The results of the spillway routing calculations for Stage 6 of the TSF are summarised in Table 3-44.

The spillways maximum flow depth is estimated to be 0.2m but an allowance of 1m has been included in the design to take into account any wave run-up (1:10 AEP wind) and additional freeboard allowance (0.5m) as defined in Table 6 of the ANCOLD guidelines 2012.

Table 3-44: TSF spillway flood routing results

Parameter		Unit	Spillway
Spillway dimensions	Spillway width	m	5
	Spillway depth	m	1.5
	Spillway capacity	m^3/s	24.8
Peak outflow	3-hour storm	m^3/s	3.71
	4-hour storm		3.91
	6-hour storm		4.07
Peak flood height	3-hour storm	m	0.511
	4-hour storm		0.528
	6-hour storm		0.540

Spillway design

The DSCP spillway will be constructed utilising revetment mattresses or similar to control and minimise potential erosion. The spillway will be constructed 10m wide and 1m deep. The spillway geometry will be used for all embankment lifts.

Water Recovery System

Decant system

The decant facility consists of a floating decant pontoon pump and semi-rigid floating access walkway. This system has been implemented due to the relatively high average rate of rise.

Alternate, more permanent structures were considered, however, the floating pontoon option was incorporated due to the flexibility of the system if the decant pool was to shift.

The decant pump has been sized to meet the process plant return water requirements; with a pumping rate of up to 562.5m^3/h. The decant return water will be pumped directly to the RWP via a HDPE pressurised pipe to get the return water to the embankment crest elevation. The return water will then flow under gravity via a HDPE pipeline to the RWP. Air vents will be required at peak points along the pipeline route.

Decant and seepage collection pond (DSCP)

To remove water from the TSF surface and maintain a minimal decant pond, a separate DSCP has been designed immediately downstream of the TSF. The sizing of the decant pond has been determined from the results of the water balance. The pond has been designed to contain approximately 100,000m^3 of water. This requires an embankment crest elevation at RL54.3m, resulting in the maximum embankment height of 6.3m.

The embankment geometry adopted for the DSCP is summarised as follows:

- crest width (m) 15;
- downstream slope one-in-three; and
- upstream slope one-in-two.

The DSCP embankment design will be constructed predominantly of clay and waste rock material with a two-stage selective filter between these two materials to effectively remove potential seepage through the embankment to control pore pressures.

The upstream face of the embankment will consist of a 10m wide low permeability clay zone (Zone 1) obtained from the open pit excavation (suitable overburden). An end tipped non-compacted (approximately 1m thick) layer will be placed over the low permeability facing as protection from the elements during operation.

The majority of the downstream portion of the embankment will consist of bulk waste rock material (Zone 3A and 3B). Zone 3A will consist of selective waste rock material to act as a transition between the bulk waste rock and the two-stage filter zone.

The filter material (Zone 2A and 2B) will consist of 2m of selective sand filter material placed immediately against the low permeability zone. Next to this, selective gravelly sand will be placed as a transition zone for the waste rock material (see Figure 11.8 in Appendix 3.4-A).

The DSCP return water pump has been sized based on the process plant return water requirements. The pumping system will be a variable speed drive (VSD) floating pontoon pump arrangement, sized to pump at a rate of up to 458m^3/h. The return water will be pumped directly to the RWP.

The consequence category of the DSCP has been identified as 'Significant' as per the ANCOLD guidelines 2012. The spillway design for the DSCP is presented in Appendix 3.4-A. The TSF design has been adopted to remove excess water as promptly as possible. Furthermore, if the TSF spillway does flow, the flood water will report to the Throoka Creek diversion drain in a relatively short period.

3.7.1.18 TSF water management

As the TSF forms part of the RSF, stormwater management requirements for the RSF will apply to the TSF. The blanket drains included in the TSF design will provide additional stormwater removal capabilities if required. Stormwater captured by the blanket drains will be discharged into the DSCP and RWP for reuse in the process plant.

3.7.1.19 Water balance modelling

Methodology

The Hillside water balance model was developed to assess the performance and design requirements for the proposed TSF, RWP, DSCP, and surrounding water management infrastructure. The following are the key objectives of the water balance investigation:

- assess the water level fluctuation and hence the statistical range of expected water levels in the TSF decant pond, RWP and DSCP;
- determine the required water storage capacity of the TSF decant pond, RWP, TCDP and DSCP;
- determine the capacities of the TSF, RWP, TCDP and DSCP pumps;
- determine the probable performance of the TSF decant system; and
- determine the probable availability of water for return to the process plant.

For this study, the water balance model for the TSF has been developed and run daily over the life of mine, using historical daily records from 1908 to 2015. The aim of this approach was to further investigate the behaviour of the DSCP and RWP during periods of sustained high rainfall. The model was prepared based on the conventional mass balance approach:

Δ Storage Volume = Inputs – Outputs

Inputs have included tailings bleed and catchment runoff.

Outputs were limited to decant pumping to the DSCP and RWP, decant from the DSCP, TCDP and RWP to the process plant, and evaporation. An estimated daily seepage value from the TSF (although the TSF is lined and includes an underdrainage system) has been included in the design. For the purposes of the design, consolidation water inputs were neglected.

The commercial water balance program GoldSim was utilised to simulate the water balance model. GoldSim is a probabilistic software program used to dynamically model complex systems.

A total of 115 realisations were calculated to stochastically analyse possible climatic scenarios for the TSF, RWP, TCDP and DSCP. Each realisation was run for 14 years which corresponds with the projected open pit LOM and was run in daily time steps. The realisations were stepped through the 129 years of rainfall and evaporation data starting at Year 1 and ending at Year 14 for the first realisation, starting at Year 2 and ending at Year 15 for the second realisation and so on for the 115 realisations until the entire rainfall and evaporation record set was utilised.

Model Inputs

- Tailings bleed: bleed water is the difference between the water in the tailings slurry as it leaves the thickener, and the retained water at the sedimented density. Bleed water is considered to arrive instantaneously at the surface of the tailings, where it then flows down the beach to the decant/supernatant pond. Bleed is a function of the tailings discharge solids content, and the tailings sedimented density. The design discharge thickened solids content of 58% was used; and
- Catchment runoff: as the catchment area is contained within the boundaries of the TSF confining embankments, the 'catchment surround' equates to the crest width of the embankment. In the water balance model, run-off from the following catchment areas report to the decant pond:
  - the TSF catchment surrounds;
  - the TSF dry beach area;
  - the TSF wet beach area;
  - the decant pond area and catchment surround;
  - the RWP area and catchment surround; and
  - the TCDP area and upper Throoka Creek catchment.

To provide a rational basis for the determination of runoff from the catchment surrounds, the Simplified Boughton method was used.

Model Outputs

- Decant return water: the decant return system in the model is set to pump back all the excess water in the pond up to the maximum capacity of the pump, provided that the pond volume is larger than the minimum pond storage volume. The water balance has been conducted using the peak pumping rate of decant return water from the TSF to the DSCP to the process plant. These pumping rates are summarised as follows;
  - TSF to RWP = 13,500m^3/d (average 3.41m^3/d);
  - DSCP to RWP = 11,000m^3/d (average 2.06m^3/d);
  - RWP to process plant = 9,000m^3/d (average 5.77m^3/d) and;
  - TCDP to process plant = 9,000m^3/d (average 5.77m^3/d) when containing sufficient water.
- Evaporation: for the purposes of this study, it is assumed that the evaporation occurs from the pond area and from a portion of the wet beach. A pan factor of 0.8 was adopted to enable assessment of evaporation from a free water surface and 0.35 was adopted for the tailings wet beach due to the salinity of the process water used; and
- Seepage: for this model, seepage from and into the TSF impoundment have been neglected as this value is likely to be insignificant in relation to the operation inputs.

Expected Performance of the TSF Decant System

The intention of the system is to facilitate consolidation of the tailings by reducing the water retained within the TSF. This maintains a minimum pore water pressure and when combined with increasing overburden pressure throughout the life of mine, facilitates an increase in density of the tailings mass.

Table 3-45 presents the number of days the TSF supernatant (decant) pond is above 1.5m, 2.0m, 2.5m and 3.0m with the corresponding percentage of total days in each model run.

Table 3-45: TSF supernatant (decant) pond depth for minimum, average and maximum cases

Rainfall Sum Realisation Case >	Minimum	Maximum	Average
Number of days >1.7m	4,879	5,007	5,048
% of total	95.4%	97.9%	98.7%
Number of days >2.0m	278	303	637
% of total	5.4%	5.9%	12.5%
Number of days >2.5m	3	1	303
% of total	0.1%	0%	5.9%
Number of days >3.0m	0	0	195
% of total	0%	0%	3.8%

Rainfall Sum Realisation Case >	Minimum	Maximum	Average
Number of days >3.5m	0	0	0
% of total	0%	0%	0%

Expected Availability of Water to Process Plant

The water balance modelling has shown that as water is transferred from the TSF and DSCP to the RWP, large fluctuations in the RWP level can be expected, and the pond may remain at minimal volume for extended periods. This implies that during 'normal' operating conditions, additional water will be required to supplement the processing demand. Table 3-46 presents the maximum pumping days and corresponding percentages of total for all four pumps. It is expected that the RWP will provide water to the processing plant at a maximum rate for 36% to 42% of the mine life. It should be noted that there are additional days that the pumps will be in operation, however they will not pump at the maximum rate.

Table 3-46: Maximum pump days for minimum, average and maximum cases

Rainfall Sum Realisation Case >		Minimum	Average	Maximum
TSF to RWP	Number of days at 13.5ML/d	230	280	300
	Percentage of total	4.5%	5.5%	5.9%
DSCP to RWP	Number of days at 11ML/d	1	3	6
	Percentage of total	0%	0.1%	0.1%
RWP to plant	Number of days at 9ML/d	2,124	2,030	1,826
	Percentage of total	41.5%	39.7%	35.7%
TCDP to plant	Number of days at 9ML/d	1	5	21
	Percentage of total	0%	0.1%	0.4%

Table 3-47 below presents the total pumping volumes for the RWP pump.

Table 3-47: RWP pumping volumes for minimum, average and maximum cases

RWP to Process Plant Volumes			
Description	**Minimum**	**Average**	**Maximum**
Total volume pumped (ML)	27,189	28,258	29,023
Total possible volume at 9ML/d rate (ML)	46,022		
Percentage of total volume provided	59%	62%	63%

It is anticipated that the RWP will provide between 27,189ML and 29,023ML of water during the LOM for processing activities assuming a maximum pumping rate of 9ML/d. This number considers all the seasonal fluctuations of the RWP. It is expected that the pumps will run 59–63% of the time. It is preferable to have a higher capacity pump that runs half the time to take advantage of the high water availability periods, rather than have a smaller capacity pump that runs all the time, but cannot handle the high water availability periods.

It is anticipated that the TCDP may provide up to 1,356ML of water during the LOM for processing activities assuming a maximum pumping rate of 9ML/d following creek flow events. This number takes into account all the seasonal fluctuations of Throoka Creek hence the TCDP. It is expected that the pumps will run up to 3% of the time.

TSF Supernatant (Decant) Pond Water

It is evident from the results summary that winter rainfall will produce significant volumes of run-off water, which will initially pond in the TSF but be removed and stored in the RWP. High wet season run-off will likely result in many months of sustained high pond volumes within the RWP and DSCP as can be seen in the relevant figures in Appendix 3.4-A.

Based on the modelling, the maximum excess water volume accumulating in the TSF (approximately 480ML) equates to approximately 3.4m. This water will however be removed from the TSF and stored in the RWP without either facility overtopping. To remove the 480ML from the TSF (excluding evaporation) will take approximately 160 days.

It should be noted that the 1-in-100-year, 72-hour-storm event equates to 127.5mm (based on IFD curves presented on the BOM website, <www.bom.gov.au>). Based on an analysis of the daily rainfall data used for the water balance modelling, the maximum 72-hour rainfall equates to 220.2mm (approximately 305,420m^3) equating to a 1-in-1,500 year, 72-hour storm event.

It is deemed appropriate that the provision to allow sufficient storage within the TSF to cater for the maximum water elevation obtained from the water balance results plus the estimated extreme storm storage, plus a 0.6m freeboard and wave run-up, will be sufficient to minimise the potential for the system to overtop.

Further assessments have been carried out to provide guidance on the estimated maximum allowable water volume to be stored (short term only, i.e., after a large storm event) on the TSF at any given time without compromising the overall embankment stability and affecting the overall storage capacity of the TSF.

The TSF embankment sizing was based on an average tailings beach slope of 1.0% to determine the required embankment elevation of RL 125.5m for the open pit mining operation. In Appendix 3.4-A, Figure 15.1 graphically presents the estimated beach slope in relation to the water depth over the tailings beach and the pond distance from the upstream embankment crest for the final stage of the open pit mining operation.

Specific limitations on the supernatant pond have been implemented to maintain overall embankment stability by limiting the proximity of the pond to the embankment crest and to limit the hydraulic head exerted on the Zone 1 low permeability liner. The application of these limits translates to the maximum limits for the supernatant pond during operations, as calculated by ATC Williams in May 2019 to reflect the February 2018 water balance and is provided in Table 1 of Appendix 3.6-B TSF Operating Manual. Note the ATC Williams requirement for the pond to be no less than 650m from the upstream embankment crest which was not updated in their February 2018 report has been revised to 350m under normal operating conditions as part of calculations completed in May 2019 (Appendix 3.6-B).

3.7.1.20 Stability analysis

Overview

The governing principle is that the embankment has been designed in a manner such that the integrity of the structure with respect to stability under static and seismic loading conditions is preserved.

Stability analyses of the embankments (TSF and DSCP) were conducted using the following loading cases:

- static – end of construction and long-term analyses (effective or drained strength); and
- seismic analysis.

In each case analysed, both the starter embankment and the final stage for the TSF embankment and the final embankment for the DSCP were considered.

All stability analyses were conducted using the SLOPE/W software and the GLE method, which satisfies both force and moment equilibrium criteria. The seepage analyses were conducted using the SEEP/W software, utilising a steady state analysis to predict the phreatic surface within the facility as well as to estimate the effects on seepage into the surrounding environment.

Pseudo-Static Stability Methodology

Embankment design procedures generally proceed as required from initial, simplified methods to more complex, rigorous methods. Hence the purpose of the pseudo-static analyses is to determine if more detailed embankment deformation analyses are required.

A maximum design earthquake (MDE) resultant factor of safety (FoS) less than one does not indicate an embankment failure but rather the potential for the embankment to deform during such a seismic event. Where a FoS less than one has been identified, a deformation analysis should be completed to assess the amount of deformation the embankment is likely to experience. Tests on the Project TSF indicate a FoS of 1.03.

Pseudo-static analyses were conducted using the operating basis earthquake (OBE) (serviceability) and MDE (safety) loading cases. The OBE analyses were conducted using conventional, peak strength properties and no reduction factor on the earthquake acceleration, to assess the safety of the embankment when subjected to the operational design earthquake load.

MDE analyses were performed using the US Army Corps of Engineers (USACE) screening method. The USACE method is a recognised screening tool for seismic instability, applicable to well-constructed embankments not susceptible to liquefaction, as is the case with the TSF and DSCP embankments.

The USACE method recommends use of a seismic coefficient equal to one-half of peak ground acceleration using drained conditions for free draining granular materials, with a 20% strength reduction to allow for strain weakening during the earthquake loading.

Material Design Parameters

Overview

The material properties used in the static and pseudo-static stability analyses are summarised in Tables 10.1 and 10.2 of Appendix 3.4-A and a discussion of the derivation of the properties is presented in the subsequent sections.

A conservative approach has been adopted for the tailings material, i.e., assuming the tailings do not contribute to the stability. These properties were obtained from laboratory tests, published literature, established correlations and previous experience, as explained in the following sections.

Foundation material

Effective stress (drained) parameters have been derived from the laboratory triaxial test results. The triaxial test for the proposed foundation materials tested (drained) are c' = 10kPa, Φ'=28º.

Waste rock/rockfill

The overall foundation profile adopted for seepage and stability analyses is based on the borehole and test pit logs.

The TSF site local geology comprises between 1.5m and 4.5m of gravelly, sandy clays. These materials are underlain by weathered rock material.

A detailed waste rock material investigation has been completed by Ground Control Engineering (GCE).

The investigation included numerous in-situ and laboratory tests. The following data was reviewed during the assessment to determine suitable waste rock and foundation rock material parameters:

- direct shear test results for metasediments, granites, skarn and saprock;
- numerous point load testing completed on the abovementioned materials at various depths; and
- triaxial test results completed on the abovementioned materials.

With regard to the shear strength of the rockfill, Leps has shown that the shear strength as expressed by its friction angle varies noticeably as a function of the effective normal stress. Functions have been derived to incorporate these relationships for Zone 3A and 3B/3C Rockfill for both static and pseudo-static loading conditions, together with the Leps' lower bound, average and upper-bound functions.

Based on laboratory test results, it is estimated that the material will have an unconfined compressive strength ranging from 5.5 to 44.5MPa, classifying it as a weak to medium strong rock.

Clayey material

Due to the impervious nature of clayey material, it would be expected that any short-term static (end of construction) or dynamic failure of Zone 1 will occur largely under undrained conditions. Consequently, undrained shear strength parameters were considered for Zone 1 in the end of construction static stability analyses, and in the assessment of seismic stability. The drained strength parameters were derived from the theoretical method introduced by Thorne (1997).

The ratio of undrained shear strength to the effective overburden stress has been derived assuming that the clayey material will be compacted within the embankment at optimum moisture content to 95% relative standard density.

Results

DSCP embankment

A summary of the stability analyses results is presented in Table 3-48.

Table 3-48: Stability analyses results – DSCP embankment

Case		Location	FoS	Allowable FoS
Static loading – End of construction	DSCP empty	Upstream	2.77	1.3
	DSCP empty	Downstream	3.40	1.3
Static loading – Long-term analysis	DSCP at NOL	Upstream	2.05	1.5
	DSCP at MOL	Downstream	2.09	1.5
Seismic – OBE (a = 0.02g)	DSCP at NOL	Upstream	3.11	1.0
	DSCP at MOL	Downstream	2.81	1.0
Seismic – MDE (USACE, a = 0.09g)	DSCP at NOL	Upstream	2.26	1.0
	DSCP at MOL	Downstream	2.08	1.0
Rapid drawdown	50% drawdown	Upstream	1.29	1.3

Notes: FoS = factor of safety;
NOL = normal operating level; and
MOL = maximum operating level.

It is important to note that the seismic coefficients adopted for the analyses of the DSCP embankment are that of an ANCOLD 'High C' consequence facility. This has been adopted due to the relative proximity of the embankment to the open pit (conservative approach).

All static and seismic cases analyses indicate the DSCP embankment to be stable (i.e., FoS greater than minimum requirement).

RWP embankment

A summary of the stability analyses results is presented in Table 3-49.

Table 3-49: Stability analyses results – RWP embankment

Case		Location	FoS	Allowable FoS
Static loading – End of construction	RWP empty	Upstream	3.83	1.3
	RWP empty	Downstream	5.19	1.3
Static loading – Long-term analysis	RWP at NOL	Upstream	2.39	1.5
	RWP at MOL	Downstream	2.07	1.5
Seismic – OBE (a = 0.012g)	RWP at NOL	Upstream	3.68	1.0
	RWP at MOL	Downstream	4.41	1.0

Case		Location	FoS	Allowable FoS
Seismic – MDE (USACE, a = 0.02g)	RWP at NOL RWP at MOL	Upstream Downstream	2.87 3.42	1.0 1.0
Rapid drawdown	50% draw down	Upstream	1.53	1.3

FoS = factor of safety;
NOL= normal operating level; and
MOL = maximum operating level.

All static and seismic cases analysed indicate the RWP embankment to be stable (i.e., FoS greater than minimum requirement). It should be noted that all analyses were completed on the assumption that the ROM pad is not constructed. Nevertheless, it is anticipated that the ROM pad will be constructed before the RWP and hence the FoS results for the downstream analyses will increase substantially.

TSF embankment

A summary of the stability analyses results is presented in Table 3-50 and Table 3-51 and illustrated in Figures B25 to B36 in Appendix 3.4-A.

Table 3-50: TSF stability analyses results – Starter embankment (Stage (lift) 1)

Case		Location	FoS	Allowable FoS
Static loading – End of construction	TSF empty TSF empty	Upstream Downstream	2.99 2.60	1.3 1.3
Static loading – Long-term analysis	TSF empty TSF at max	Upstream Downstream	1.82 2.01	1.5 1.5
Seismic – OBE (a = 0.09g)	TSF empty TSF at max	Upstream Downstream	2.30 1.98	1.0 1.0
Seismic – MDE (USACE, a = 0.15g)	TSF at max	Downstream	1.36	1.0

Table 3-51: TSF stability analyses results – Final embankment (Stage (lift) 6)

Case		Location	FoS	Allowable FoS
Static Loading – End of construction	TSF at max	Downstream	1.67	1.3
Static Loading – Long-term analysis	TSF at max	Downstream	2.57	1.5
Seismic – OBE (a = 0.09g)	TSF at max	Downstream	1.47	1.0
Seismic – MDE (USACE, a = 0.15g)	TSF at max	Downstream	1.06	1.0

All static and seismic cases analyses indicate the TSF embankment to be stable (i.e., FoS greater than minimum requirement).

Additional analyses have been carried out to simulate instances where the placed waste rock material may not be suitably mixed thereby creating zones of impermeable layers within the embankment geometry. This may result in lower strength shear zones between the low permeability and waste rock material. Perched water tables may develop above these low permeability zones through the embankment profile. The analysis was carried out assuming the embankment filter and toe drains are not functioning (i.e., worst-case scenario). The result of the analysis is presented in Table 3-52.

Table 3-52: Stability analyses results – Final embankment with shear zones

Case		Location	FoS	Allowable FoS
Seismic – MDE (USACE, a = 0.15g)	TSF at max	Downstream	1.03	1.0

The seismic case analysed indicates the TSF embankment to be stable (i.e., FoS greater than or equal to the minimum requirement).

Embankment deformation

As suggested in the ANCOLD guidelines, an embankment deformation analysis was completed using the Makdisi and Seed method. The results are summarised in Table 3-53.

Table 3-53: TSF embankment deformation analyses results

Earthquake Magnitude (M_w)	Deformation (mm)
6.5	125
7.5	160

It can be seen from the results presented in Table 3-50 that the deformation of the embankment is relatively minor (less than 200mm). It is unlikely that this will result in any loss of containment within the facility as the tailings freeboard level is in excess of 1.0m. It is therefore concluded that the TSF embankment will be stable under MDE load conditions. The Project also lies within an area identified as having a hazard factor of less than 0.06 over a return period of 500 years (Leonard et al. 2013), i.e., with a very low probability of an earthquake occurring.

RSF and topsoil stockpile

A summary of the stability analyses completed on the RSF and topsoil stockpiles are summarised in Table 3-54 and Table 3-55.

Table 3-54: Stability analysis results – RSFs

Case	Location	FoS	Allowable FoS
Static loading – End of construction	Downstream	1.51	1.3
Static loading – Long-term analysis	Downstream	3.19	1.5
Seismic – 1-in-1,000 year (a = 0.09g)	Downstream	1.55	1.05

Table 3-55: Stability analysis results – Topsoil stockpile

Case	Location	FoS	Allowable FoS
Static loading – End of construction	Downstream	1.45	1.3
Static loading – Long-term analysis	Downstream	1.98	1.5
Seismic – 1:1,000 year (a = 0.09g)	Downstream	1.27	1.05

All static and seismic cases analysed indicate the RSFs and topsoil stockpiles should remain stable (i.e., FoS greater than minimum requirement).

3.7.1.21 Seepage assessment

DSCP embankment and foundation

Two seepage analyses were completed for the DSCP, namely:

- pond at normal operating level; and
- pond at maximum level (i.e., invert of spillway).

It should be noted that a two-stage filter has been included in the embankment geometry to assist with the removal of potential seepage, thereby reducing the build-up of potential pore pressure within the embankment.

The results indicated that due to the configuration of the embankment to include the waste rock material, any seepage into the embankment will migrate along the interface of the clay foundation and the rockfill. The results indicate an estimated seepage amount of between $4.0x10^{-4}$L/s/m length of embankment to $1.2x10^{-4}$L/s/m length of embankment could be expected. The total flow is estimated to be in the range of 0.03L/s to 0.11L/s.

These seepage rates calculated will only occur if the pond remains at the levels indicated for an extended period (i.e., foundation and embankment materials are fully saturated). As identified in the water balance, the water within the various ponds around the mine will fluctuate based on seasonal rainfall. There will be periods where the ponds will be dry and periods where the ponds will operate near MOL. It is therefore unlikely that the analysed seepage rates will be achieved. Seepage will be captured via the pit dewatering process and returned to the process system.

TSF embankment and foundation

Steady state seepage analysis was carried out for the area below the decant pond to assess the effects of water ponding on the tailings surface for extended periods of time after large storm events.

The models analysed the final TSF geometry with approximately 34m of deposited tailings placed over the lined facility to determine the underdrainage requirements, as follows:

- no drains;
- drains spaced at 25m to 100m; and
- blanket drain.

Assessments were carried out for the following low permeability foundation permeability conditions:

- Case 1 – 300mm rip and re-compact layer permeability equating to 1x10m/s and the underlying in-situ low permeability material equating to $1x10^{-8}$m/s;
- Case 2 – 300mm rip and re-compact layer permeability equating to $1x10^{-10}$m/s and the underlying in-situ low permeability material equating to $1x10^{-8}$m/s; and
- Case 3 – 300mm rip and re-compact layer permeability equating to $1x10^{-9}$m/s and the underlying in-situ low permeability material equating to $1x10^{-9}$m/s).

It is important to note that a near surface calcrete layer was identified in the geotechnical investigation, however this layer is not continuous across the entire TSF site. The seepage analyses have been completed assuming the proposed clay liner has been installed and provides a low permeability layer continuously across the entire site, hence the calcrete layer has not been included in the analyses.

Seepage Analysis Results

The seepage results obtained by utilising the conservative permeability value of $1x10^{-8}$m/s and $1x10^{-9}$m/s for the in-situ and re-compacted low permeability material has resulted in a conservative underdrainage design. The analysis identified the potential worst-case seepage results as presented in Table 3-56.

Table 3-56: Conservative TSF embankment seepage analysis results

Analysis Condition	Potential Seepage Through TSF Base					
	Embankment Filter		Downstream Toe Drain		Downstream Toe	
	(m^3/s)	(L/s)	(m^3/s)	(L/s)	(m^3/s)	(L/s)
Steady state	$1.9x10^{-3}$	1.9	$1.9x10^{-5}$	$1.9x10^{-2}$	$2.4x10^{-8}$	$2.4x10^{-5}$
Transient	$2.9x10^{-3}$	2.9	$2.0x10^{-5}$	$2.0x10^{-2}$	$2.5x10^{-8}$	$2.5x10^{-5}$

Source: Table 9.2 in Appendix 3.4A

The downstream toe drains for Stages 1 and 2 (see Figures A18 and A19 in Appendix 3.4-A for details) have been designed to cater for the potential maximum seepage of $2.0x10^{-2}$L/s hence are more than adequate for the modelled worst case potential seepage.

The results of the transient analyses indicate that there is the potential for an increased seepage rate of 9.5x10 ^{4}m/s for the embankment filter under worst case conditions, however it is unlikely that there will be an increase in seepage for the downstream toe drain or through the downstream toe of the embankment due to the inclusion of the underdrainage and embankment filter systems to assist in the capturing of potential seepage.

Construction Specifications

Confining Embankment

The presence and suitability of rockfill materials generated from the open pit excavation will be utilised to construct the starter embankment and subsequent downstream embankment raises.

The two upstream zones have been sized for a minimum width of 6.7m each to provide sufficient work area to construct the low permeability facing. The first 6.7m zone in contact with the bulk waste rock will consist of a controlled compacted waste rock zone (Zone 3A) and act as a transition between the general waste rock and the lower permeability overburden material. The second 6.7m wide zone (Zone 1) will consist of controlled compacted selective lower permeability overburden/waste material (generally a higher clay content material), constructed in 300mm layers and compacted to approximately 95% maximum modified dry density at optimum moisture content ± 2%. This lower permeability zone will be keyed into the in-situ foundation material via a key trench. An additional 6.7m zone of filter (Zone 2A) material will be placed between the low permeability (Zone 1) material and the controlled compacted (Zone 3A) material in the area of the decant pond to remove potential seepage through the low permeability facing to the DSCP and provide protection against possible piping occurrences (see Figure 8.1 in Appendix 3.4-A).

The final RSF elevation is envisaged to be RL120m and the final TSF embankment elevation will be approximately RL125.5m equating to an estimated maximum TSF height of approximately 65.5m above ground level.

Suitable rockfill materials generated from the open pit excavation will be utilised to construct the starter embankment and subsequent downstream embankment raises. The bulk of the waste rock material will be constructed using mine equipment as part of the mining operations. The bulk waste rock material placement has been divided into Zones 3B and 3C. Zone 3B will be placed, spread and compacted in 2m layers using a dozer or similar equipment and compacted via vehicular traffic (haul trucks and other large equipment). Zone 3C will be placed via end tipping waste rock material in a maximum of 15m raises, spread and shaped as required with nominal compaction.

Subsequent embankment construction will be carried out using downstream raising methodologies and constructed as described above. The 6.7m zones (Zones 1, 2A and 3A) should be vertically continuous over the entire embankment upstream face.

The final embankment raise (TSF Stage (lift) 6) will be completed as a ‘top-hat’ raise, reducing the embankment crest width from 70m to 37m. The embankment geometry is summarised in Table 3-57.

Table 3-57: Embankment geometry summary

Description	Confining Embankment (no Zone 2A filter) (Lifts 1 – 5 / Lift 6)	Confining Embankment (including Zone 2A filter) (Lifts 1 – -5 / Lift 6)
Crest width (m)	70.0 / 37.0	77.0 / 44.0
Upstream slope (h:v)	2.75 : 1	
Downstream slope (h:v)	3.25 : 1	

The upstream face of the TSF embankment will be protected by end tipped (uncompacted) waste rock material (approximately 1m thick).

Base configuration

During the various ATC Williams design phase site investigations, as well as selective exploratory borehole data obtained from Mining Plus, it was identified that the upper 10 to 20m of the overburden material will consist mostly of clayey material.

On review of the test pit logs, once the topsoil has been stripped (approximately 0.3m depth), it is likely that a near surface calcrete layer will be exposed in the western and, potentially, the central portions of the site. This calcareous material can be utilised either to assist with potential acid neutralisation (if and where required), or as haul road construction material. It is therefore recommended that this material be removed to expose the clayey material below the calcrete layer. This clay material is suitable as a low permeability foundation for the TSF and will be ripped, moisture conditioned and re-compacted to achieve the required density.

The laboratory permeability tests conducted on near surface remoulded samples using deionised water, identified the clay material to have permeabilities in the range of 1.9×10^{-10}m/s to 4.4×10^{-10}m/s.

The subsequent permeability tests results, using saline water, on both reconstituted and in-situ samples were in the range of 1.2×10^{-10}m/s to 3.5×10^{-11}m/s, indicating that the salinity of the water has only a minor effect:

- the process water is likely to have high salinity (upper bound of approximately 40,000mg/L). The results of the groundwater chemical tests identify the natural groundwater salinity levels to be of the order 18,600mg/L to 58,000mg/L; and
- to allow access to the open pit during mining operation, the natural water table will be drawn down via pumping.

This will result in a localised draw-down being generated within the surrounding area. The TSF will be located within the draw-down and potential seepage from the TSF is likely to be captured as part of the open pit draw-down cone thereby further reducing potential for the base to be in contact with saline water.

Laboratory test-work has identified the clay material to be non-dispersive (Emerson class number 4).

To protect the compacted foundation material from drying out and cracking during the construction of the TSF, the design will include provision to ensure that the foundation area is protected with a thin layer of overburden sand or waste rock. This will minimise the moisture loss within the re-compacted clayey material from evaporation.

3.7.1.22 Operating specifications

TSF Development

It is envisaged that the development of the TSF embankments will take place on a continuous basis. The mining fleet will be used to construct the bulk of the confining embankments while a separate dedicated operation will be utilised to construct the two 6m wide controlled compacted zones for the duration of the TSF operation.

The embankment has been configured in such a way to allow for a series of 6m wide benches on the upstream face of the embankment. This allows tailings deposition to continue during future embankment raises.

The starter embankment will be constructed to an appropriate elevation to contain two years of tailings storage. The rate of rise of the deposited tailings from Year 2 onwards will reduce from approximately 6m/year to 3m/year (see Figure 3-76).

Of importance will be to schedule mine production and placement of potential construction material in appropriate stockpile locations to facilitate the construction of the controlled embankment zones. It is envisaged that several stockpiles will be required to minimise interaction of the mining fleet and the civil contractor.

To this end, a detailed scheduling programme will need to be established in the next design phase to formulate the appropriate RSF development plan that will minimise safety and operational risks for the interaction of mining equipment, civil contractor plant and TSF operation personnel.

Several construction material stockpiles of the selected zones will be required around the facility to minimise interaction with mining operations whilst allowing the construction of the TSF embankment raise to continue with minimal interruptions.

It is acknowledged that the TSF development will be particularly complex and a detailed risk assessment will be required in the next design phase to identify and address all construction and operational workplace risks.

A comprehensive operational management plan for the TSF will be required to successfully operate the facility. This plan will require continual review and updating during operation to factor all operational variances.

Operation and Maintenance Manual

A Project TSF Operating Manual (Appendix 3.6-B) has been prepared in accordance with the regulatory requirements and lease conditions for an ANCOLD rated ‘High C’ tailings facilities. This will include instructions and forms to cover all necessary monitoring, daily and weekly routine inspections and surveillance activities.

Tailings deposition and decant management procedures will also be documented. The manual will contain a section on emergency response and will be an integral part of the overall risk management plan for the facility itself and the mine. The manual will be prepared prior to commissioning the facility.

Monitoring

Monitoring requirements for the TSF will incorporate the following items:

- monitoring boreholes installed in the surrounding area to monitor groundwater conditions throughout the life of the facility;
- piezometers installed at various stages of construction to monitor the phreatic surface within the facility. The piezometers will be placed around the entire facility; and
- if required, as determined by a suitable qualified Dam Engineer during their surveillance audits, piezometers will be installed on completion of the Stage (lift) 2 embankment raise and locations will be finalised at the time of the Stage (lift) 2 design.

Surveillance

Surveillance requirements for the Project TSF will involve routine daily and weekly inspections, as well as mandatory annual audits. The focus of such surveillance will be as follows.

- **Daily Inspections** – Focus on operational issues to do with the TSF, including inspections of the tailings pipelines, discharge point management, main embankment condition, spillway condition, decant pond location and decant system operation. A similar inspection will be carried out on the DSCP.
- **Weekly Inspections** – Focus on issues that may develop over time and may impact on the safety of the TSF or the environment. These include detailed inspections of the TSF Embankment and all appurtenant structures, tailings beach development and decant pond level, and surveillance of all monitoring installations. This will also be carried out for the DSCP.

- **Intermediate Annual Audits** – These are conducted by a qualified dam engineer, and will focus on the identification of deficiencies by visual examination of the TSF embankments and all appurtenant structures, as well as a review of all surveillance and monitoring data.
- **Comprehensive Audit** – These are conducted by a qualified dam engineer, and focus on the identification of deficiencies by visual examination of the TSF embankments and all appurtenant structures, as well as a review of all surveillance and monitoring data. Equipment will be tested to identify any deficiencies. The comprehensive audit will be carried out on the TSF and DSCP at two and five-year intervals.

TSF design diagrams are shown below from Figure 3-70 to Figure 3-80.

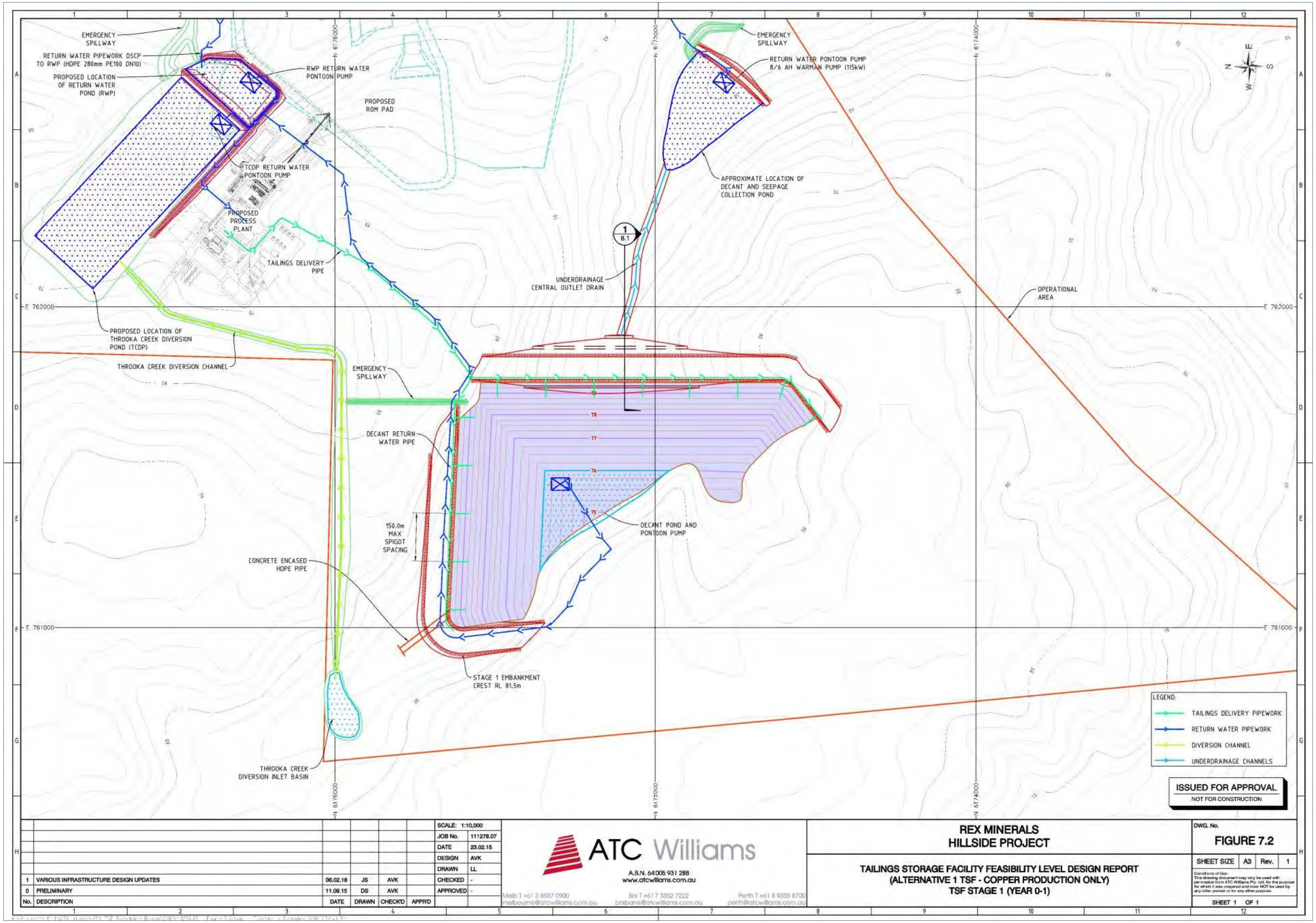


Figure 3-70: Stage (lift) 1 of TSF design (Year -1)

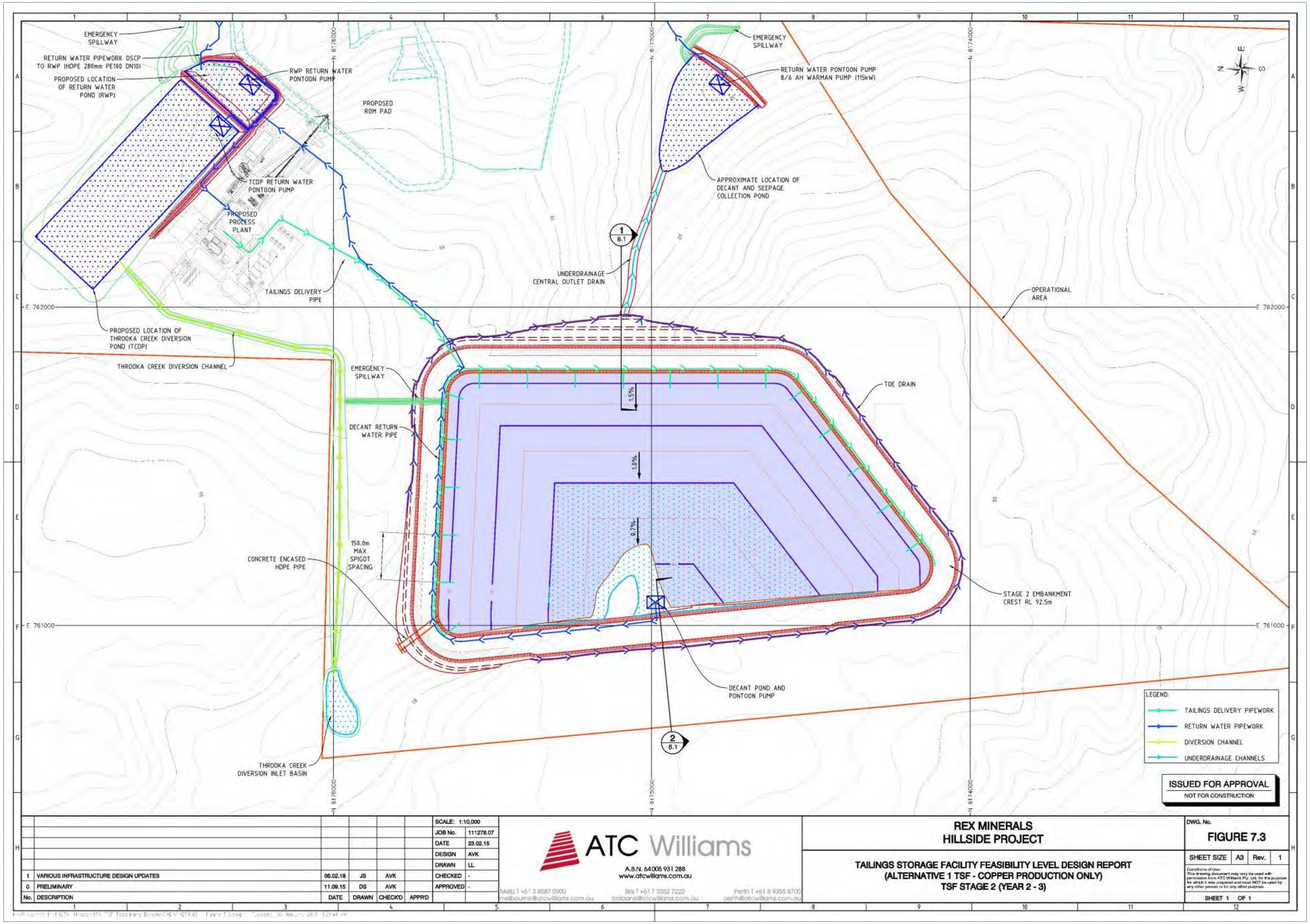


Figure 3-71: Stage (lift) 2 of TSF design (Year 2 to 3)

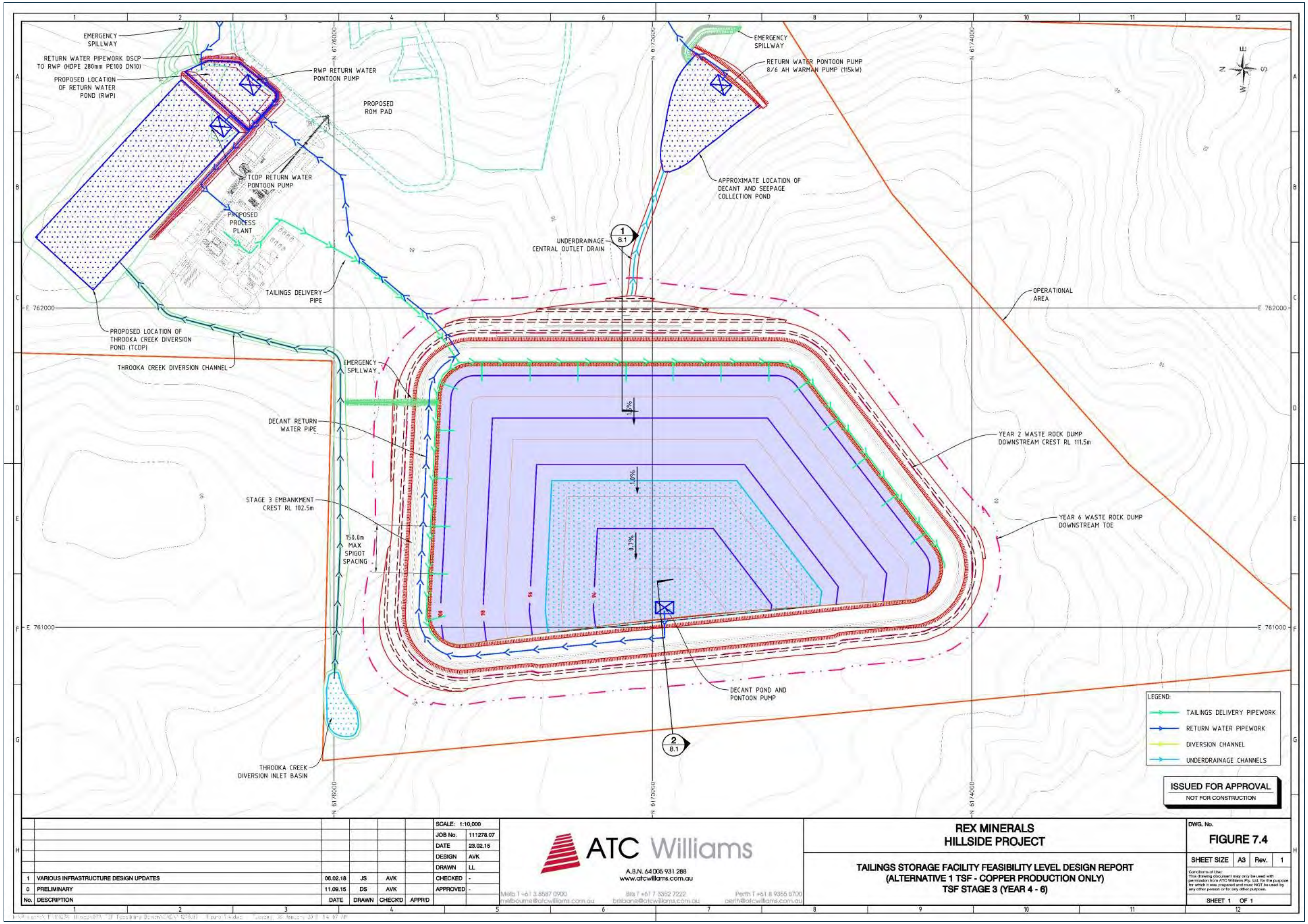


Figure 3-72: Stage (lift) 3 of TSF design (Year 4 to 6)

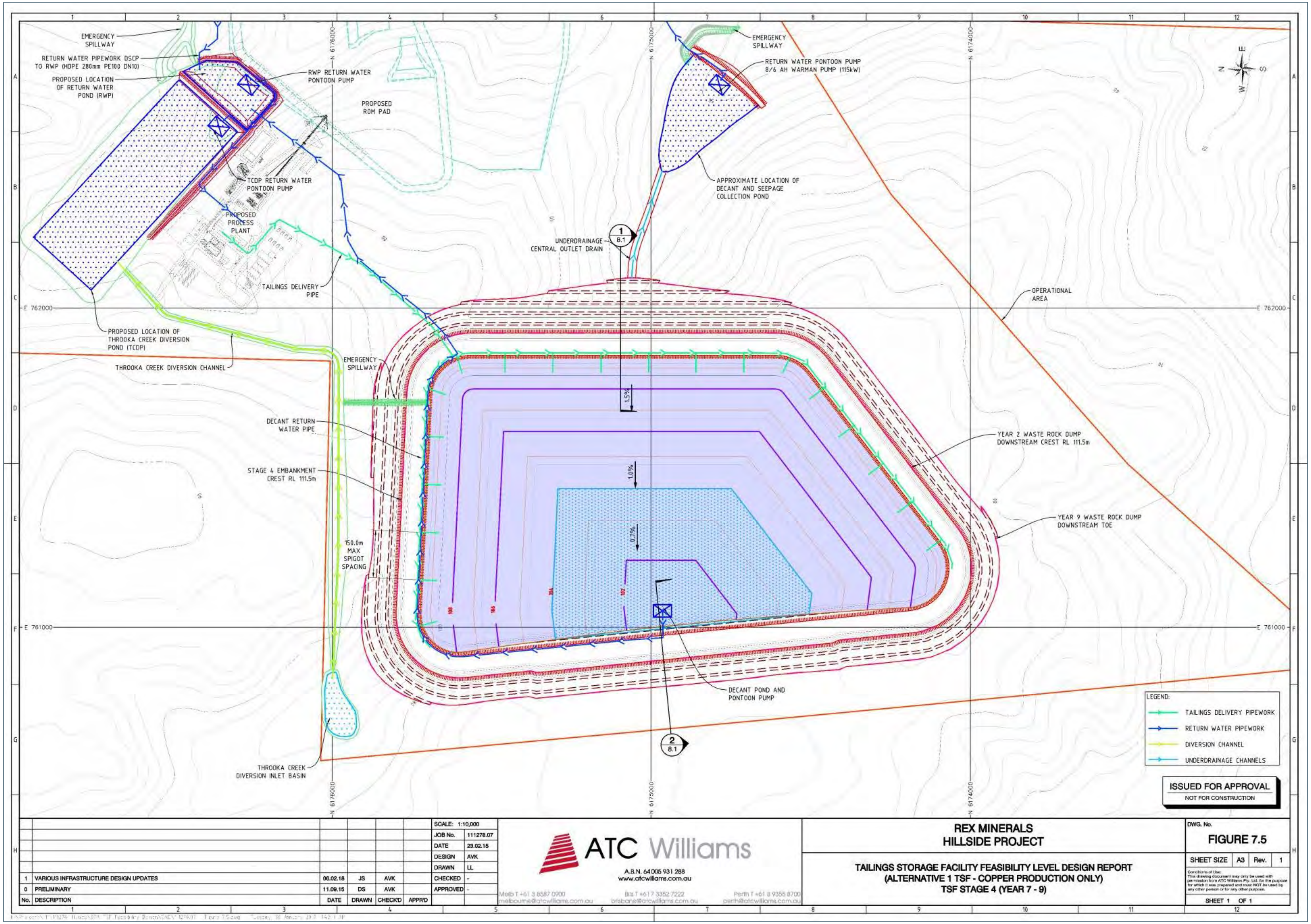


Figure 3-73: Stage (lift) 4 of TSF design (Year 7 to 9)

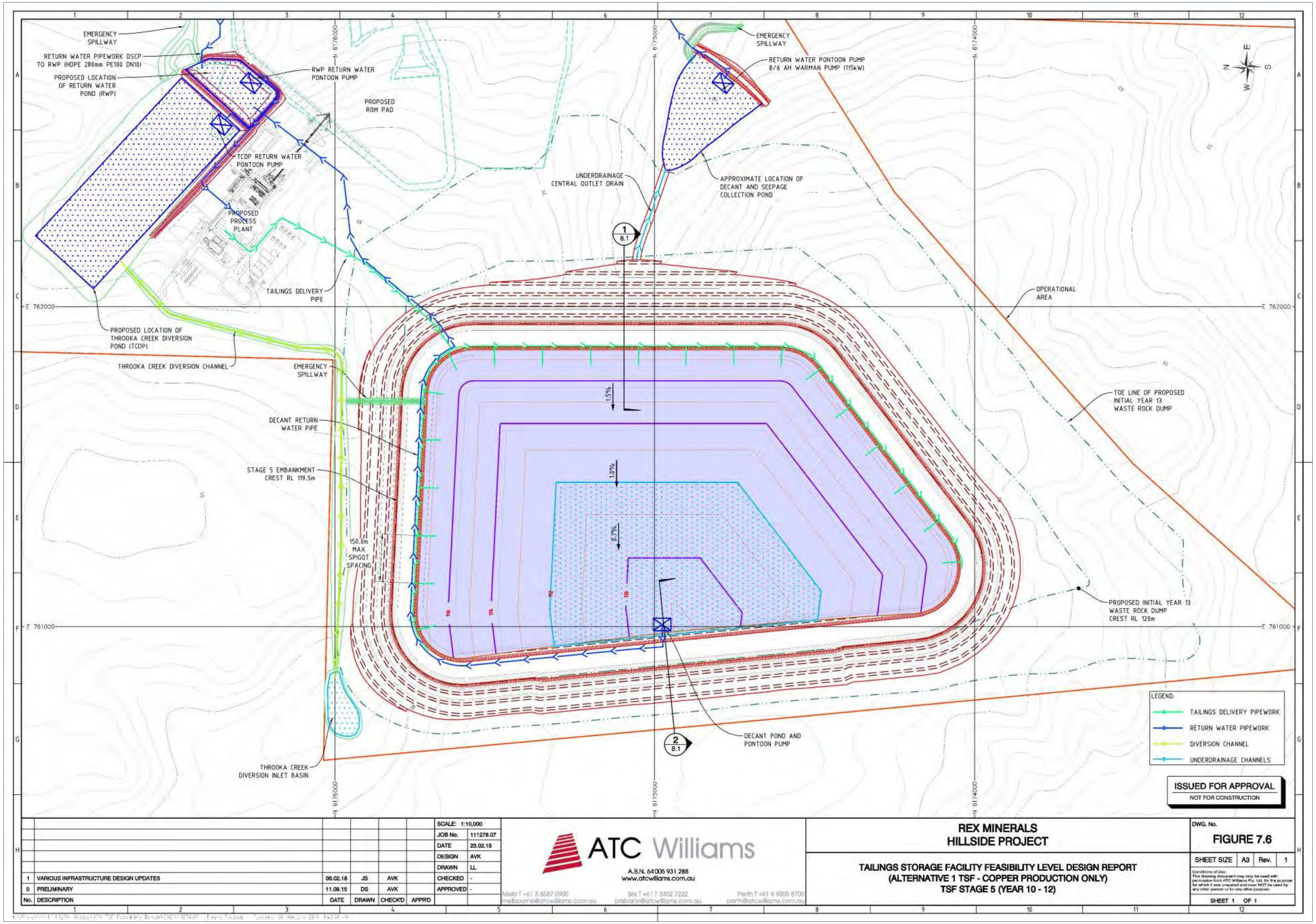


Figure 3-74: Stage (lift) 5 of TSF design (Year 10 to 12)

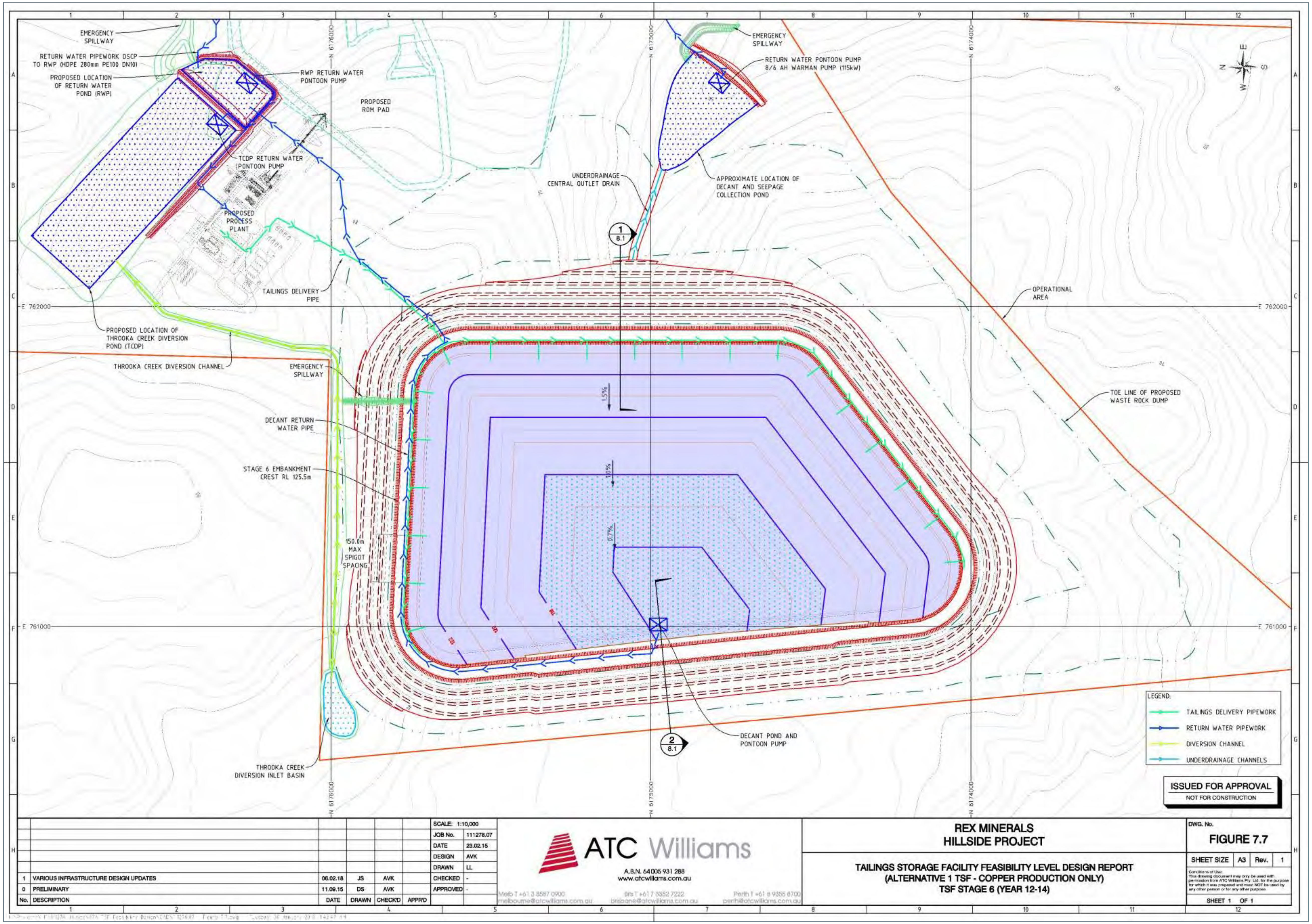
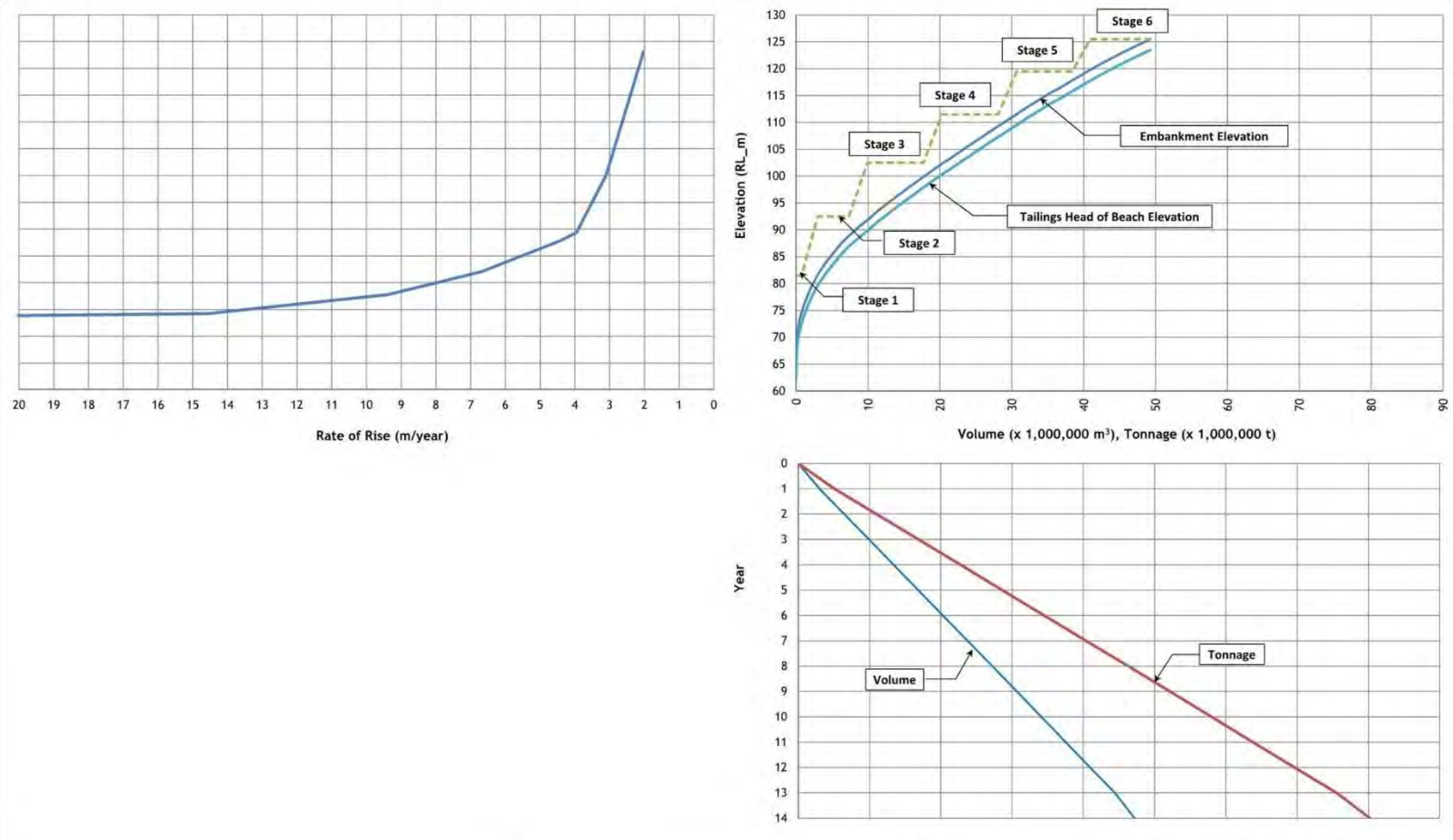


Figure 3-75: Stage (lift) 6 of TSF design (Year 12 to 14)



REX MINERALS

HILLSIDE PROJECT

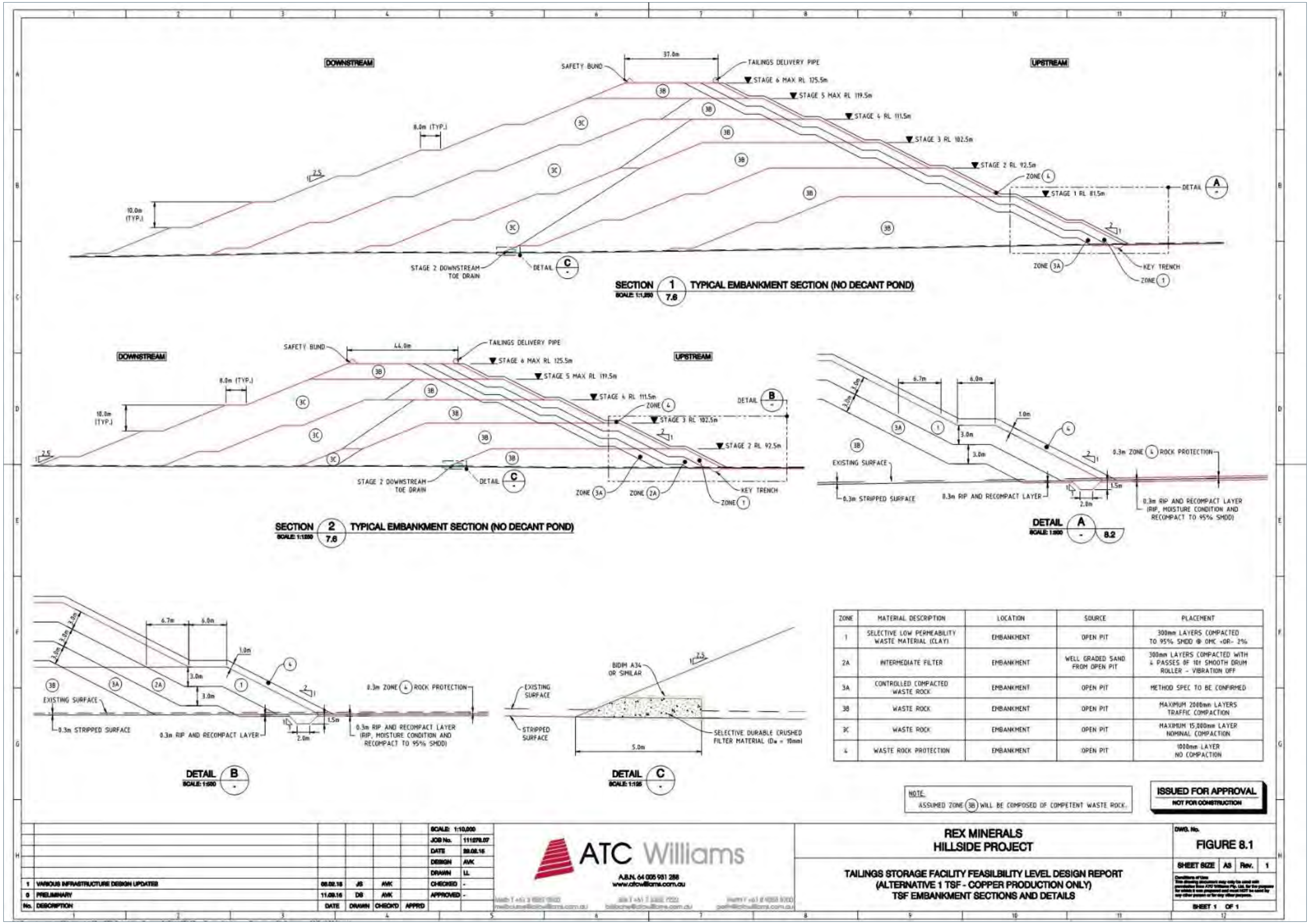
TAILINGS STORAGE FACILITY FEASIBILITY LEVEL DESIGN REPORT (ALTERNATIVE 1 TSF - COPPER PRODUCTION ONLY)

TSF Stage Capacity Curve

ATC Williams GROUNDED IN DESIGN www.atcwilliams.com.au

Date:	15/06/2016	Job No:	111278.07	FIGURE 7.8

Figure 3-76: TSF Stage (lift) capacity curve



ZONE	MATERIAL DESCRIPTION	LOCATION	SOURCE	PLACEMENT
1	SELECTIVE LOW PERMEABILITY WASTE MATERIAL (CLAY)	EMBANKMENT	OPEN PIT	300mm LAYERS COMPACTED TO 95% SMDD @ OMC +OR- 2%
2A	INTERMEDIATE FILTER	EMBANKMENT	WELL GRADED SAND FROM OPEN PIT	300mm LAYERS COMPACTED WITH 4 PASSES OF 10t SMOOTH DRUM ROLLER - VIBRATION OFF
3A	CONTROLLED COMPACTED WASTE ROCK	EMBANKMENT	OPEN PIT	METHOD SPEC TO BE CONFIRMED
3B	WASTE ROCK	EMBANKMENT	OPEN PIT	MAXIMUM 2000mm LAYERS TRAFFIC COMPACTION
3C	WASTE ROCK	EMBANKMENT	OPEN PIT	MAXIMUM 15,000mm LAYER NOMINAL COMPACTION
4	WASTE ROCK PROTECTION	EMBANKMENT	OPEN PIT	1000mm LAYER NO COMPACTION

Figure 3-77: TSF embankment sections and details

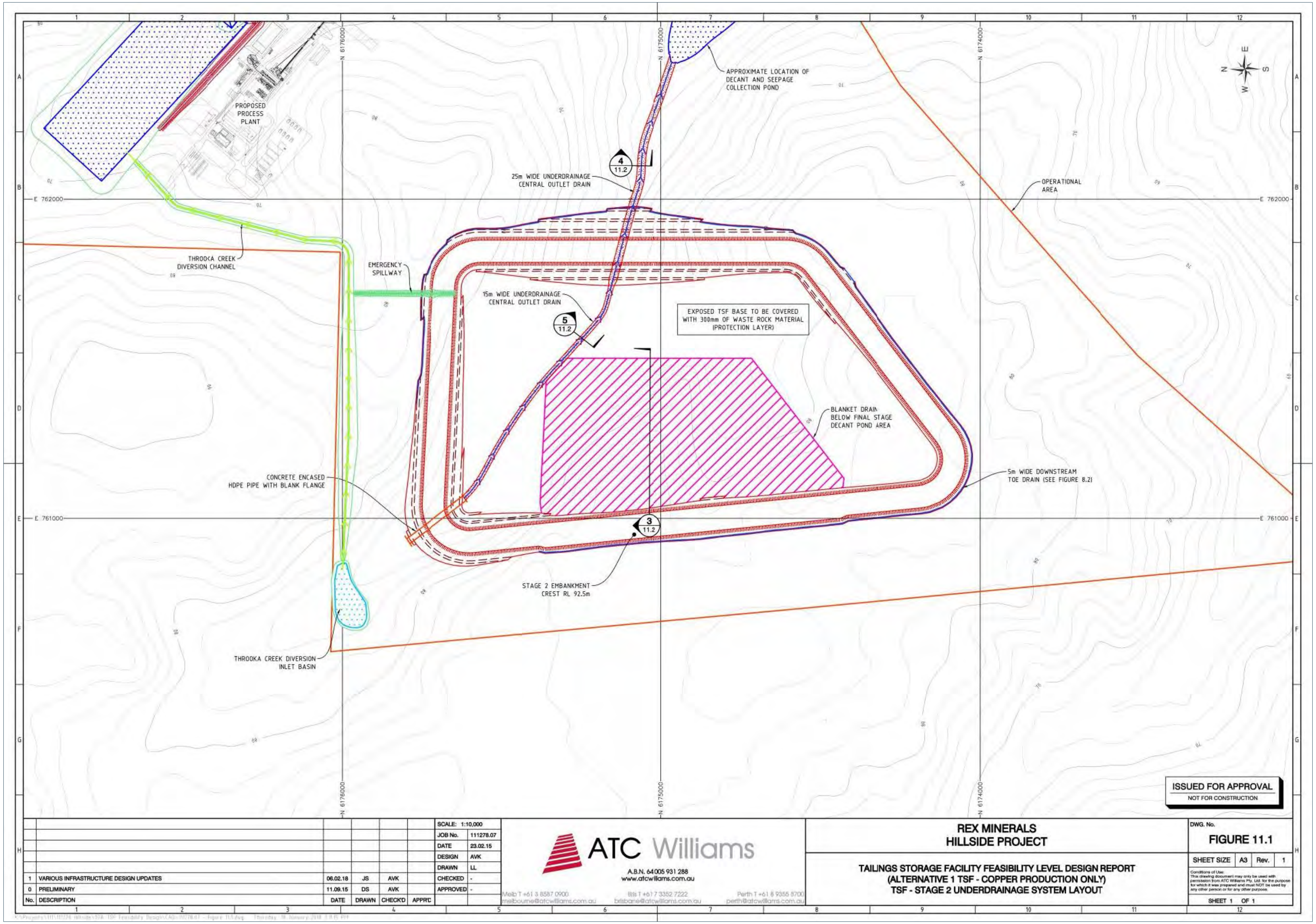


Figure 3-78: Phase (lift) 2 of TSF underdrainage system layout

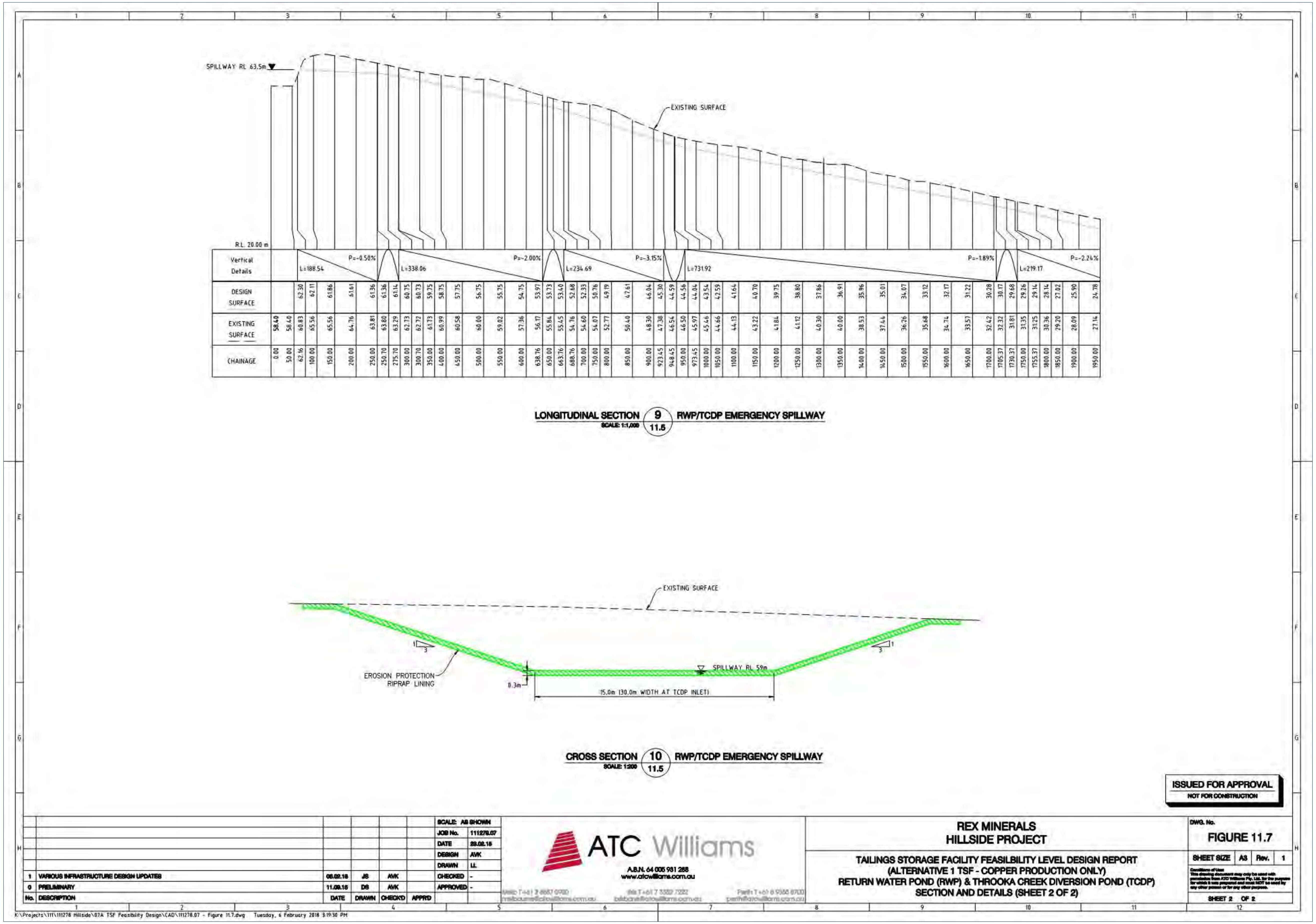


Figure 3-79: Decant and seepage collection pond layout

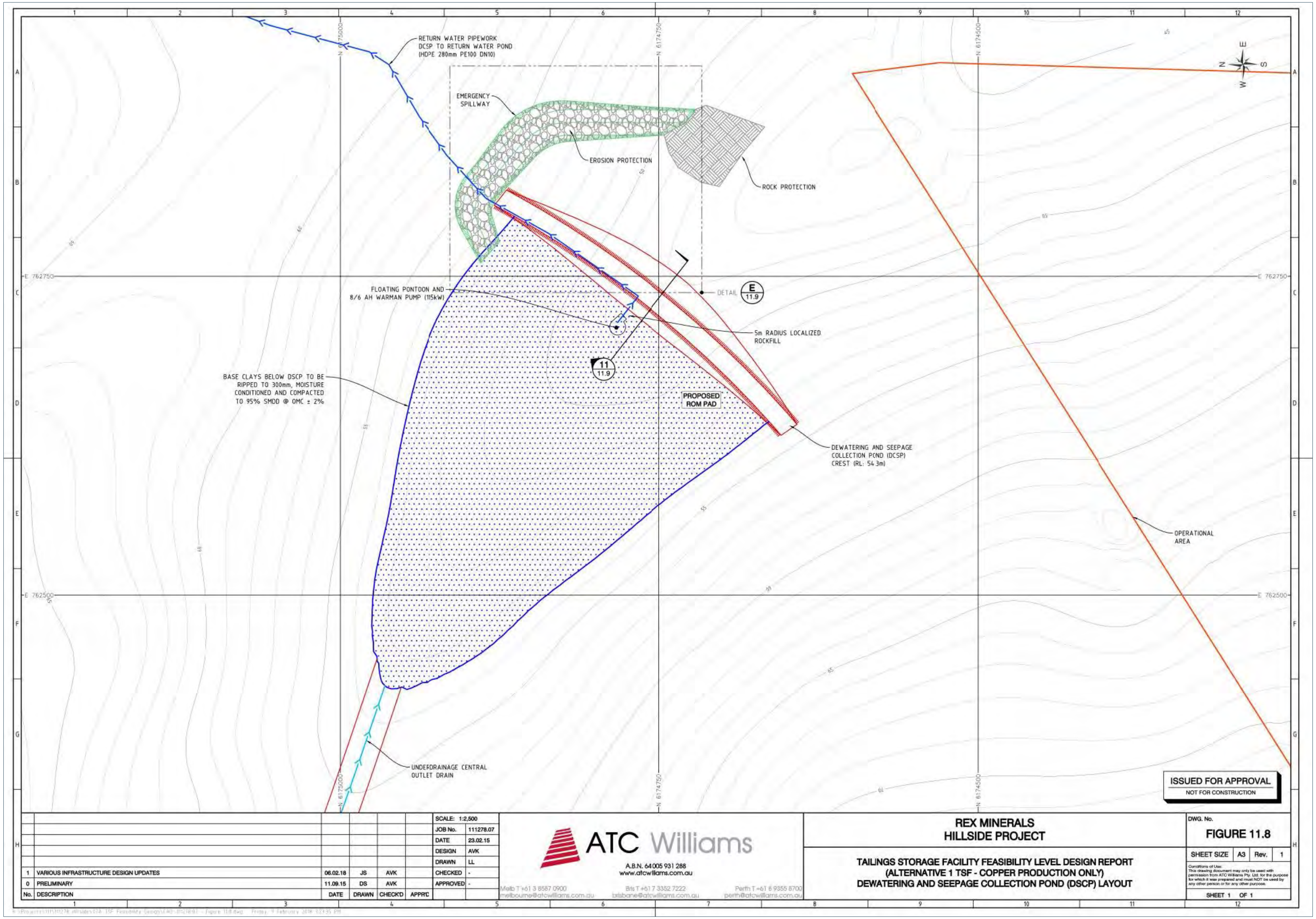


Figure 3-80: Decant and seepage collection pond sections and detail

3.7.2 Other Processing Wastes

Provide:

- *the volumes and composition of all solid and liquid wastes produced;*
- *estimated volumes of waste processing water, reverse osmosis reject water, water content of solid wastes, and method of disposal or recycling;*
- *wastewater composition;*
- *disposal and management of any hazardous material or contaminants within waste including radioactive, toxic, corrosive or flammable materials; and*
- *the source, pathway and ultimate fate of any potential mobile contaminants.*

This project will not have a reverse osmosis plant or heap leach facilities. The process water is comprised of water from the TSF, thickeners, mine dewatering and make-up water from the saline water borefield. As this water is recycled back through the processing plant, it is not considered a processing waste.

There are no other processing wastes other than tailings, which is addressed in Section 3.7.1, to be disposed of from the site. Industrial waste is addressed in Section 3.7.3.

3.7.3 Industrial and Commercial Wastes

List any industrial and commercial wastes generated including, but not limited to:

- *putrescible waste, including sewage;*
- *oils and other hydrocarbons; and*
- *tyres.*

For each waste type, describe the method of disposal including:

- *offsite disposal;*
- *on site waste disposal (including size, location and construction details);*
- *recycling (either on or offsite);*
- *the type, area and layout of sewage systems to be installed at the site; and*
- *describe what, if any approvals are required for the disposal of waste.*

For each type of waste, describe any potential contaminants that may be generated from onsite storage, and the ultimate fate of those contaminants.

The general industrial and commercial wastes expected during mining activities include:

- construction and demolition waste;
- general domestic wastes;
- recyclable materials;
- waste oils, lubricants, coolants and filters;
- wastewater and sludge/sediments from vehicle washdown activities;
- sewage waste;
- drill cuttings, unwanted samples, sample bags; and
- chemicals.

The processes summarised below, will be used to manage industrial and commercial wastes generated on site.

3.7.3.1 Putrescible waste

Putrescible waste will be placed in appropriately marked bins on site to be removed by a contractor and disposed in accordance with EPA requirements.

3.7.3.2 Recyclables

A recycling program will be instituted on site with separate on-site bins for bottles and cans, plastics HDPE and metal. These recyclables will be removed by approved private contractors.

3.7.3.3 Steel

Steel waste will be taken off site and recycled by a contractor.

3.7.3.4 Waste oil and oil filters, tyres, petrochemicals

Tyres, waste oil, filters and oily rags will be properly disposed at designated collection points, for collection and removal by private contractors to an approved EPA facility or through another approved method of disposal. Where possible, the suppliers of the products (i.e., tyres) will be responsible for their recycling/disposal.

3.7.3.5 Chemical containers

Reagent containers (both plastic and metal) will be recycled or reused where possible. These will be cleaned (triple washed with wash water which will be circulated back to the process water system) depending on the contents of the containers prior to leaving site. Those containers that cannot be recycled/reused will be washed and disposed of using a contractor to a recognised licensed landfill.

3.7.3.6 Sewerage

Allowance has been made for a suitable sewage collection and disposal plant incorporating gravity sewer lines, rising main pump station and treatment plant.

All sanitary plumbing and drainage associated with the connection of the sanitary fixtures to the waste control system will be installed in accordance with the Standard for the Construction, Installation and Operation of Septic Tank Systems in South Australia, National Plumbing and Drainage Code AS3500-2, Sanitary Plumbing and Sanitary Drainage and any SA Health Commission variations prescribed by the Public and Environmental Health (Waste Control) Regulations and South Australian Water Corporation amendments. Detailed studies will confirm the required sizes of the sewage collection and disposal plants and will ensure that these conform to the relevant standards.

All work on plumbing and drainage systems will be carried out by a competent person authorised pursuant to the *Plumbers, Gasfitters and Electricians Act 1995* (SA) and appropriate licences and approvals obtained as required.

3.7.4 Care and Maintenance

Detail all activities and strategies required for care and maintenance of waste rock and tailings and any other waste left on site, should the mine suspend production, but not progress immediately to closure.

Several strategies will be implemented to enable the waste rock and tailings and any other waste left on site to be placed in a care and maintenance operation should economic circumstances dictate this course of action. The key strategies are outlined below.

During any care and maintenance period waste rock and tailings and any other waste left on site will be maintained in a state that ensures environmental outcomes are still achieved, mine closure strategies are not compromised, and economic extraction of ore can recommence, should the circumstances change.

The RSFs will be shaped to minimise the occurrence of peak dump loads which may increase their propensity to erosion by wind. Dust control will be implemented during care and maintenance and water carts will be used for those areas subject to machinery traffic during this period.

The TSF crusted surface (by virtue of the use of saline water) will be maintained during the cessation of operations by pumping water sourced from the open pit and sprayed via a sprinkler system onto the TSF surface. Dust control will be implemented on the exposed embankment. TSF monitoring will continue as described in the Hillside TSF Operating Manual (Appendix 3.6-B) prepared in accordance with the regulatory requirements for High Hazard tailings facilities and will include instructions and forms to cover all necessary monitoring, routine inspections and surveillance activities.

3.7.5 Rehabilitation Strategies and Timing

Detail all activities, strategies and designs relating to mine closure, including timing of these activities and all opportunities for progressive rehabilitation of waste rock and tailings and any other waste to be left on site.

The RSFs will be rehabilitated progressively as soon as practicable in the mine schedule. Progressive rehabilitation significantly reduces mine closure costs by using mine equipment opportunistically and taking advantage of available run of mine materials. This will also ensure that the minimum amount of ground is exposed at any one time, reducing the potential for dust and erosion. Progressive rehabilitation will also provide an opportunity during the operational phase of mine life to confirm that the rehabilitation planned for the Project will work as intended.

The RSFs will be covered with subsoil to 0.4m and topsoil to a depth of 0.1–0.3m on all surfaces with a slope of less than 15 degrees. The eastern embankments of the South and North RSFs are currently identified as being planted with agricultural crops for the lower slopes. This may be amended, in consultation with stakeholders, to be planted with native vegetation on commencement to link with the infill planting proposed to occur along the coastal zone and the previous and realigned highway and to maximise visual amenity.

The steeper slopes (15 to 20 degrees) of the RSFs will be covered with a mix of topsoil and rock to minimise erosion and the loss of topsoil and stabilised with a dominant native shrub vegetation. Subsoil may be used instead of topsoil on these steeper slopes to avoid potential weed management issues from using topsoil recovered from previously cropped land. This rehabilitation method will be trialled and assessed during operations. Local species will be utilised for revegetation to blend in with the natural surrounds. The upper 20 degree slope of the RSF – West will be planted with native vegetation with non-deep rooted species if required by the TSF closure design and all lower slopes will be sown to pasture (see Figure 3-81 and Figure 3-82).

Any available water in the TSF will be pumped out on closure to the open pit and the surface allowed to dry out. Once sufficiently dry the TSF will be closed, potentially with overburden, subsoil and topsoil, depending on the final closure design, sourced from onsite, and rehabilitated.

The desired outcome at mine completion is to relinquish a physically and chemically stable landform with native vegetation trending towards self-sustainability and rehabilitated pastures where the new landowner can continue agricultural pursuits.

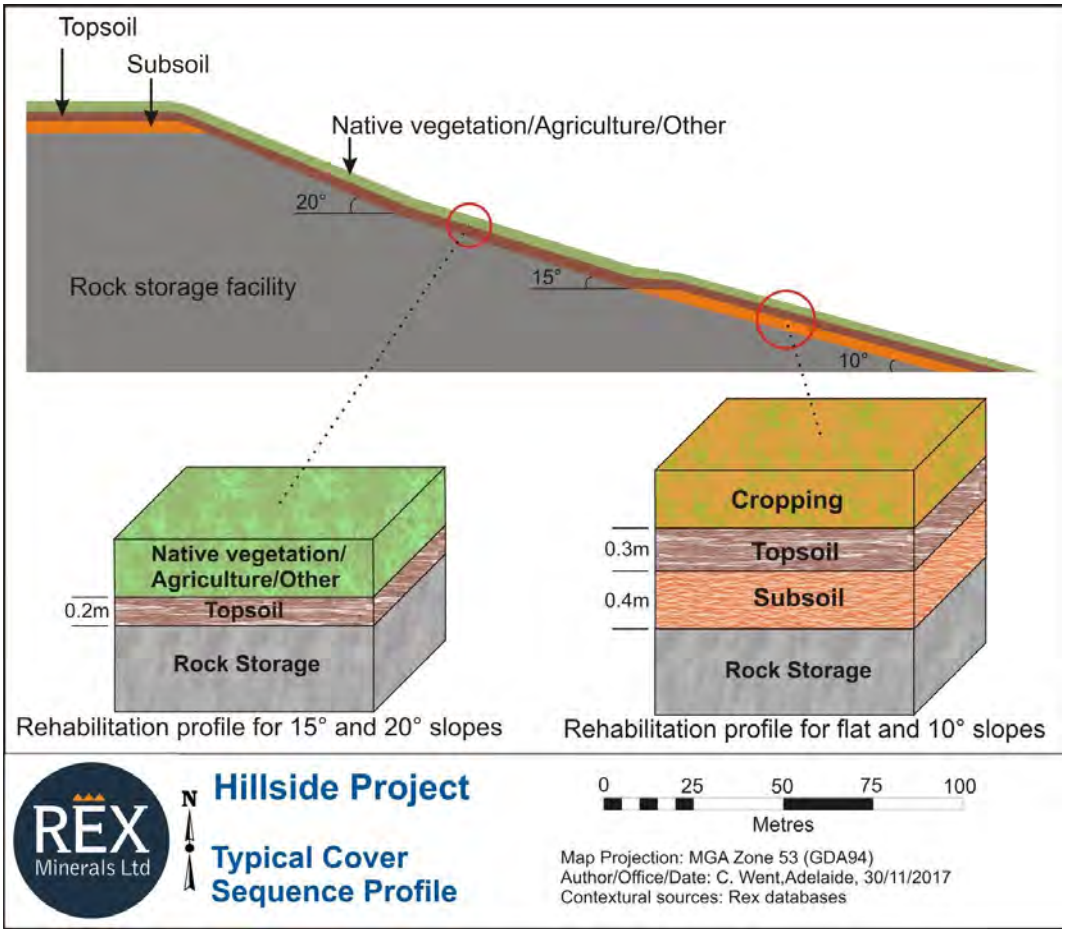


Figure 3-81: Indicative section of RSF cover sequence at closure

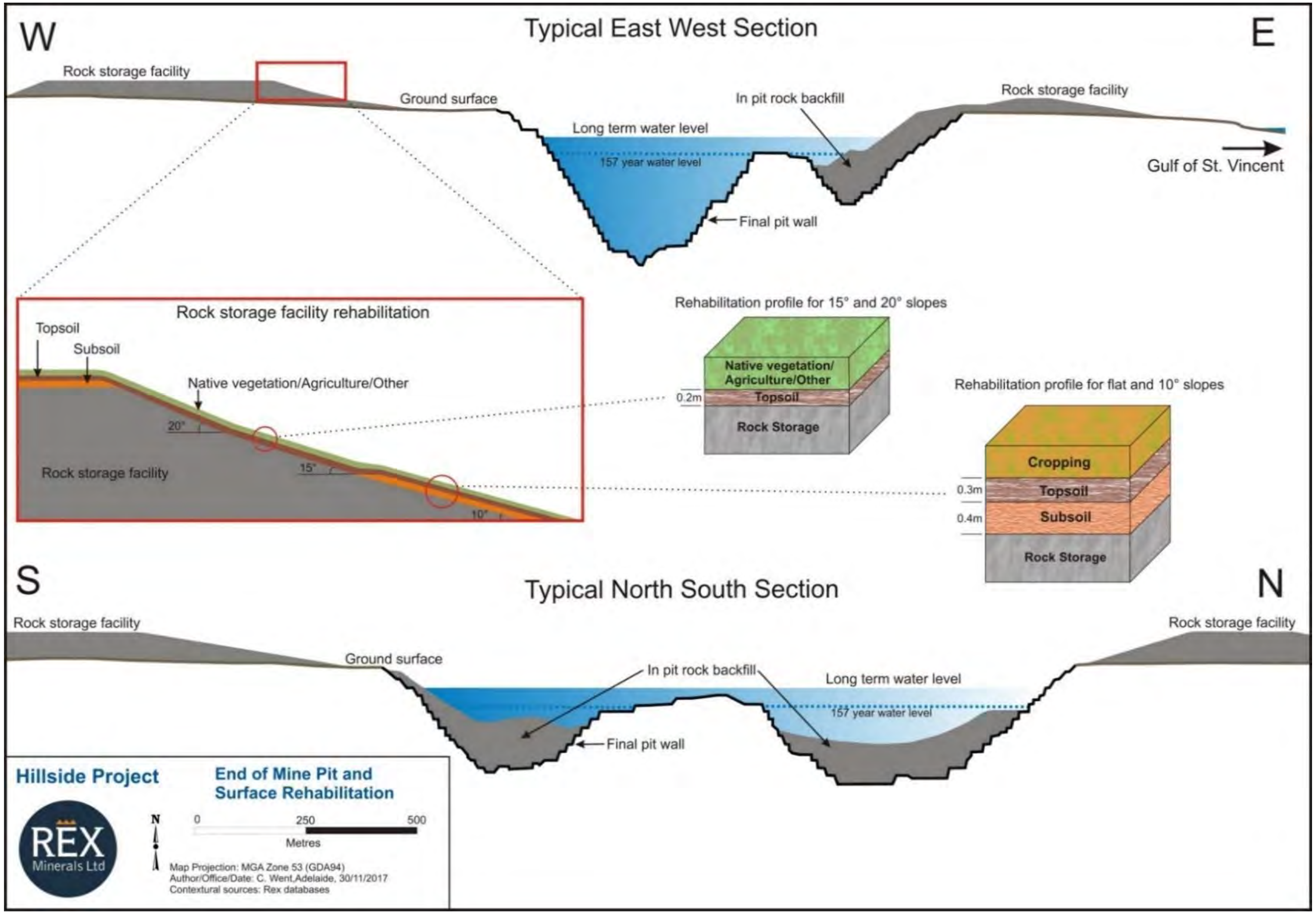


Figure 3-82: Typical cross-section of final landforms

3.7.5.1 Sequence of rehabilitation operations

A high level schedule of the Project is shown in Figure 3-34, inclusive of progressive rehabilitation activities.

Indicative sequence of rehabilitation operations

The indicative sequence of progressive rehabilitation to final mine closure is shown in Figure 3-83 to Figure 3-87.

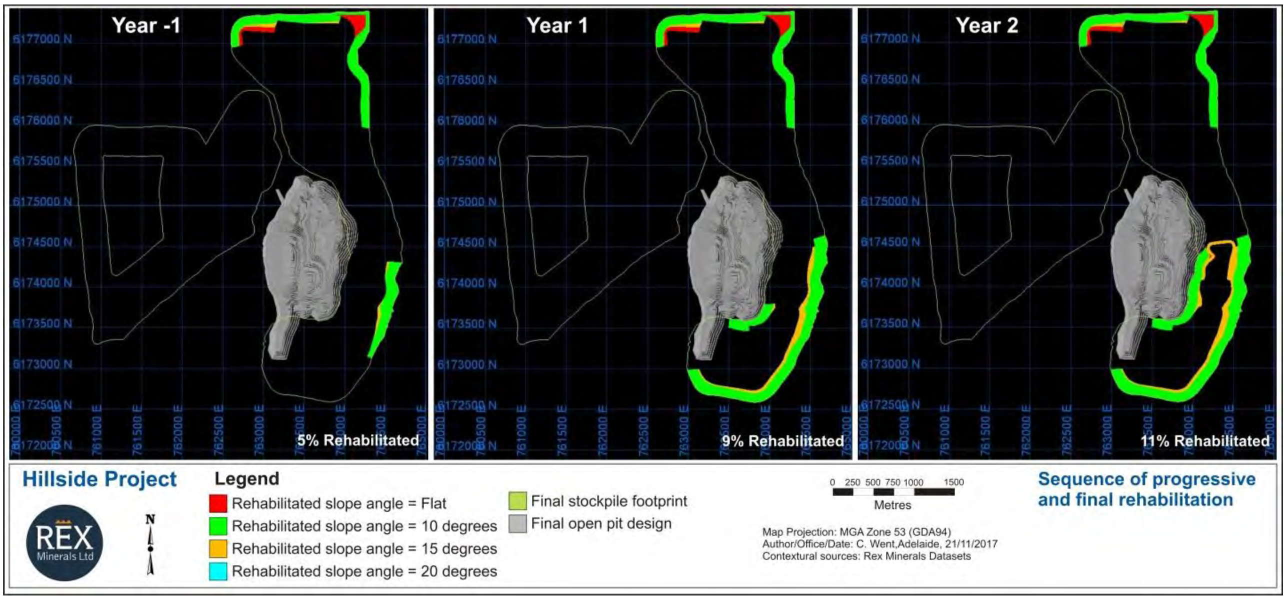


Figure 3-83: Indicative progressive rehabilitation sequence – Year 0 to 2

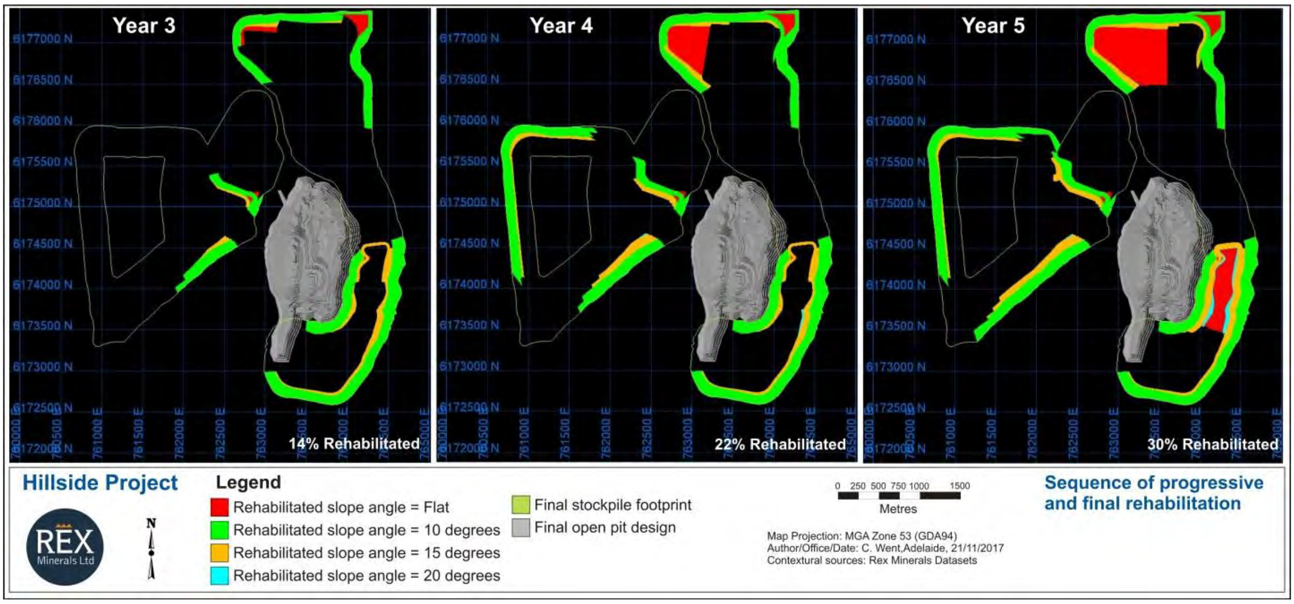


Figure 3-84: Indicative progressive rehabilitation sequence – Year 3 to 5

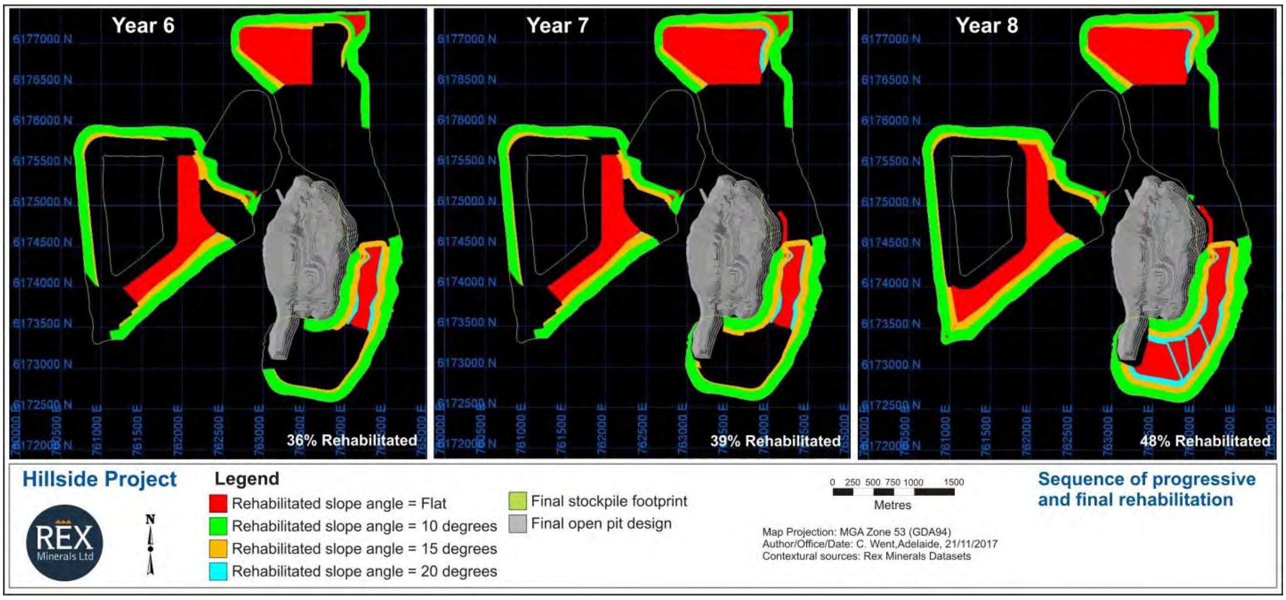


Figure 3-85: Indicative progressive rehabilitation sequence – Year 6 to 8

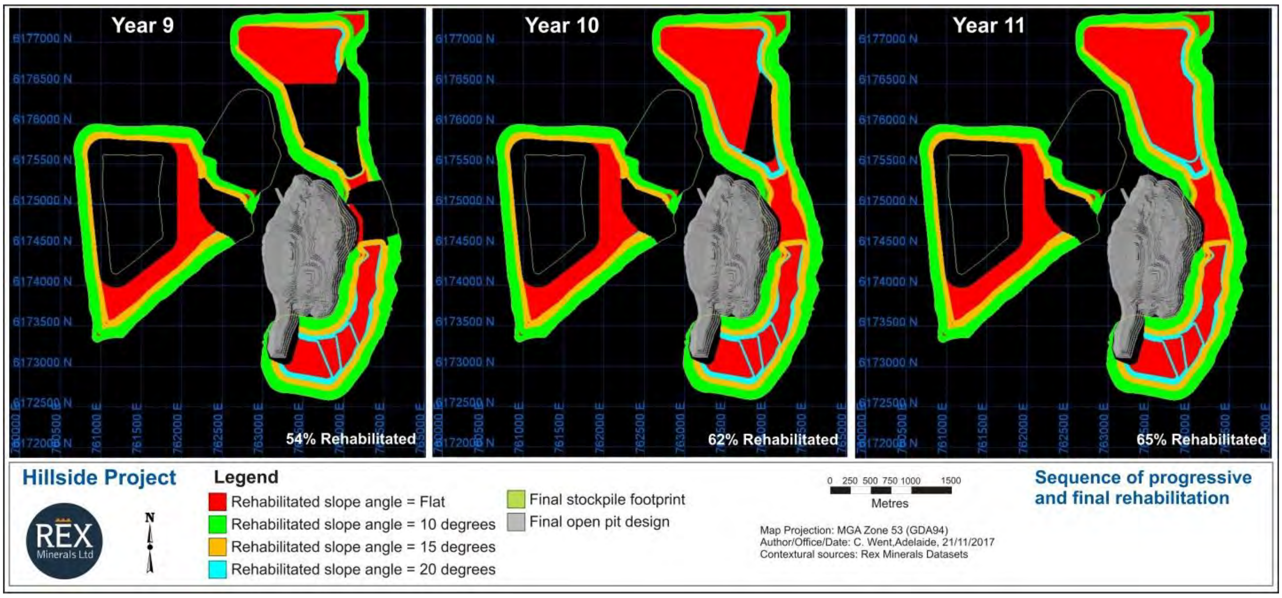


Figure 3-86: Indicative progressive rehabilitation sequence – Year 9 to 11

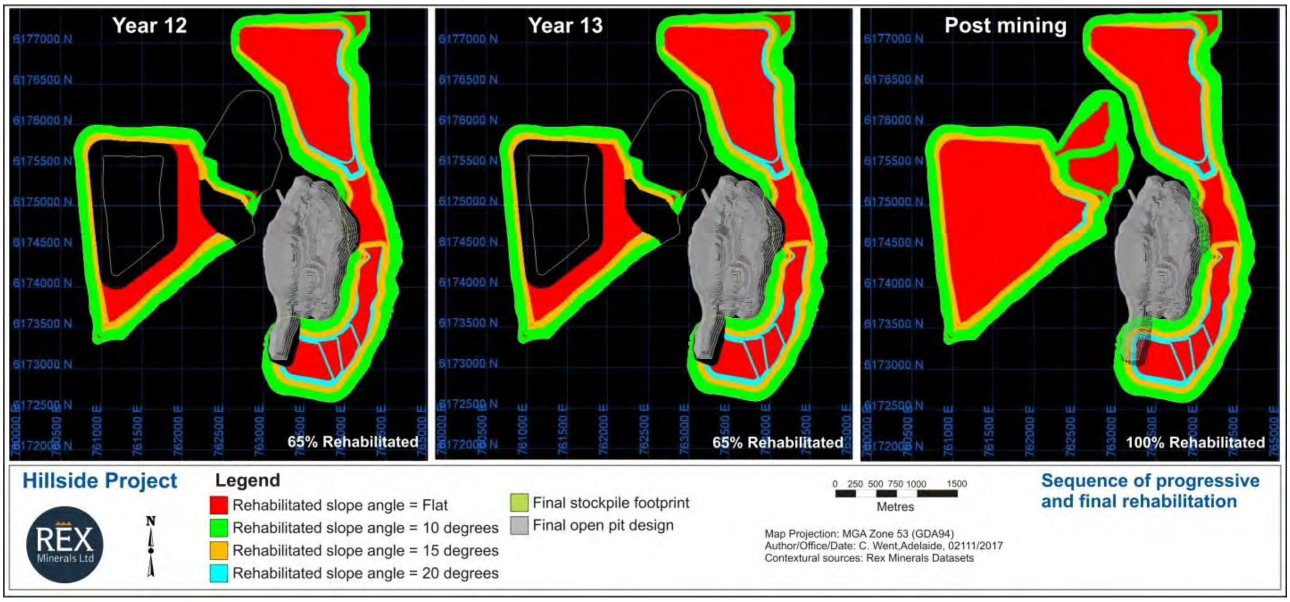


Figure 3-87: Indicative progressive rehabilitation sequence – Year 12 to 14

3.8 Supporting Surface Infrastructure

3.8.1 Access

Describe:

- *access route to the mining operations;*
- *indicate if any new roads are to be constructed, or if existing roads or intersections (public and private) are to be upgraded;*
- *transport system(s) used to and from the mining operations and the estimated number of vehicle movements per day; and*
- *airport/airstrips to be constructed.*

3.8.1.1 Regional roads

A section of the Yorke Highway will be realigned so that it is beyond the 426m exclusion zone for blasting.

In addition, the Ardrossan–Minlaton Road runs through the mine site requiring closure with an alternative route developed.

3.8.1.2 Sandy Church Road

Sandy Church Road to Sandilands is currently an unsealed road adjacent to the northern ML boundary, forming a simple T-junction with the Yorke Highway. This junction requires upgrading to a channelised right turn layout to service Rex's plant operation as the main access route from the Yorke Highway. The current junction has sight line limitations both north and south, created by localised crests which will be removed by re-profiling the road.

3.8.1.3 Redding Road

The 2013 MLP required the closure of a section of Redding Road between Sandy Church Road and Pine Point Road with no diversion planned for the closure of that portion of Redding Road. The following are a result of the section of Redding Road remaining open with the EFS project.

- Access will be maintained to three rural properties (landowners have entrances to land parcels on Redding Road and one resident who accesses their residential dwelling from Redding Road);
- The public will maintain the use of the portion of Redding Road;
- The YPC access to the Muloowurtie Conservation Reserve (parcel ID F216753A106) for the purposes of extracting road base material for road upgrades in the local area will be maintained;
- The drainage structures associated with Redding Road will be maintained; and
- The remnant roadside vegetation will not be required to be removed (including the nationally vulnerable Resin Wattle (*Acacia rhetinocarpa*).

The section of Redding Road between Sandy Church Road and Pine Point Road that no longer requires closure for the Hillside Project has been communicated to a full YPC meeting. No concerns were raised.

3.8.1.4 Hillside Site access road

Figure 3-88 depicts the proposed access road to site from the Yorke Highway, via Sandy Church Road to the Project process plant. The road will be constructed to meet the SA Regional standard and it is proposed that the portion of unsealed road between the T-junction with the Yorke Highway and the mine entrance will be sealed.

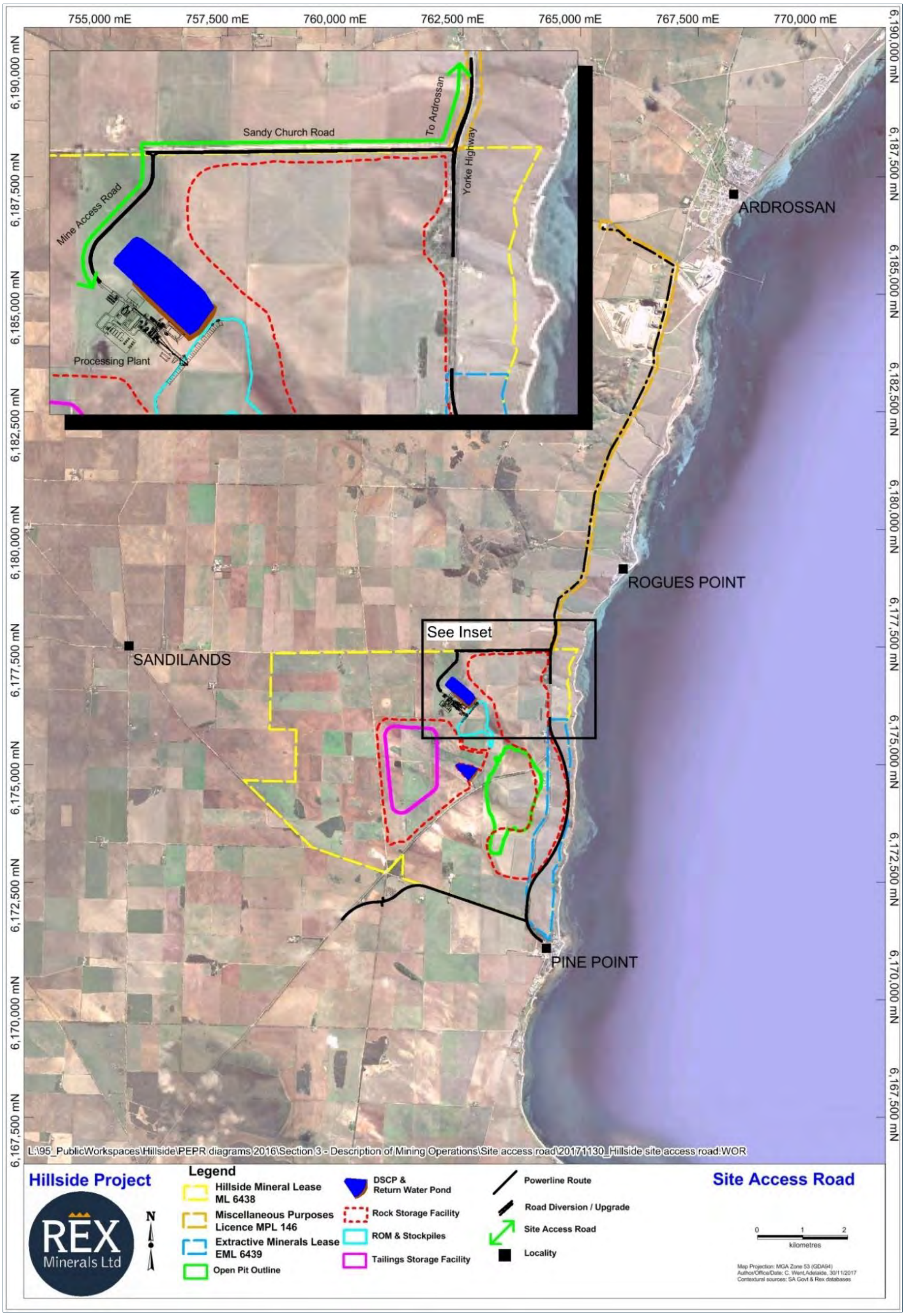


Figure 3-88: Hillside Project site road access

3.8.1.5 Extractive material stockpile access

Access to the extractive stockpiles that are located adjacent to the realigned highway will be gained via the existing Yorke Highway and St Vincent Highway.

3.8.1.6 Local mine access roads

Site access (approximately 1.7km from the administration building to the public road) will be via Sandy Church Road to Sandilands and is currently an unsealed road along the northern limits of the mine site, forming a simple T-junction with the Yorke Highway. This junction will be upgraded and sealed.

3.8.1.7 Ports

Copper concentrate is planned be exported using the facilities at Port Adelaide situated approximately 160km by road from the Project site. The current Port Adelaide loading facility is owned and operated by Flinders Logistics and is already exporting copper and magnetite concentrates from other operations.

Over the life of mine, other export options such as the Port of Whyalla and sale to domestic smelters will be investigated and implemented where feasible.

3.8.1.8 Estimated number of vehicle movements per day

Table 3-58 shows the estimated daily vehicle movements to and from the mine. The copper concentrate will be transported from Hillside to Port Adelaide daily, by seven road-train with a 55.7t payload. Each truck will carry two containers (‘rotainers’), specially designed to transport concentrate and to be emptied by rotating them into a carrier vessel.

The Project diesel requirement is for approximately 150kL of fuel per day and it was assumed to be delivered by five fuel tankers with 30,000L tanks.

Table 3-58: Estimated daily vehicle movements

	Vehicle Movements (per day)		
Traffic Type	**Light Vehicles**	**Medium Vehicles**	**Heavy Vehicles**
Passenger	260		
Buses		16	
Delivery trucks		4	
Concentrate trucks			14
Blasting agent trucks			2
Fuel trucks			10
Total	**260**	**20**	**26**

3.8.2 Accommodation and Offices

Describe:

- *number, area, size, type of construction and location of accommodation buildings, caravans or camp, and associated structures to be used on site; and*
- *state if temporary or permanent.*

3.8.2.1 Permanent accommodation

No provision has been made for the permanent accommodation of employees within the Project site. The Project's location is close to several towns, all serviced by good roads and the proposed worker bus service provided by Rex will cover the nearby region of the Yorke Peninsula up to Port Wakefield.

3.8.2.2 Temporary construction accommodation

During the construction phase, a dedicated camp will be used to accommodate the construction and mining teams. The camp will be built, owned and operated by a facility management company that will charge Rex's management, the contractor and subcontractors a nightly rate per person. The facility management company will provide accommodation, messing, meals, ablutions, cleaning, amenities, water, power, internet connection, sewage treatment and waste disposal for workers staying at the camp. The responsibility for transporting workers from the camp to the work site will rest with the respective employees' company during construction.

The third party owned and operated camp will have the capacity to accommodate an estimated 500 construction employees at the peak of the construction phase, with an initial set-up of around 150 beds. Features of the camp will include single ensuite rooms, ice rooms, laundries, kitchen, dining room, wet mess, gymnasium, car park and first aid room.

Ideally, the camp will be located within approximately 12km of the Project site, with the final location to be determined through negotiations between the facility management company, potential landowners and the Yorke Peninsula Council. The facility management company will be responsible for obtaining appropriate camp approvals.

3.8.2.3 Buildings

The Project site buildings that have been allowed for in Stage 1 of the Project are listed in Table 3-59 along with their type and footprint area.

The buildings are either transportable modular buildings or steel structure buildings and the design and construction of each type forms separate subcontracts. The scopes of these building contract packages include the design of the foundation or concrete slab. However, the concrete supply and works is part of the concrete works contract packages.

The design and construction of the specific mine buildings is part of the Rex mining scope and is likely to include additional transportable type buildings, crib room, ablutions and heavy vehicle workshop within the operational area.

Figure 3-89 shows the indicative layouts of the buildings in relation to the process plant.

Table 3-59: Plant buildings

Building	Indicative Type	Indicative Area (m^2)
Plant		
Plant maintenance workshop	Steel structure	1 200
Plant stores	Steel structure	360
Reagents store	Steel structure	315
Administration	Transportable	894
Crib room	Transportable	100
Change room	Transportable	243
Plant laboratory	Transportable	274
Plant gatehouse	Transportable	58
Plant control room	Transportable	72
Plant medical and mine rescue	Transportable	86
Plant Total		**3 602**

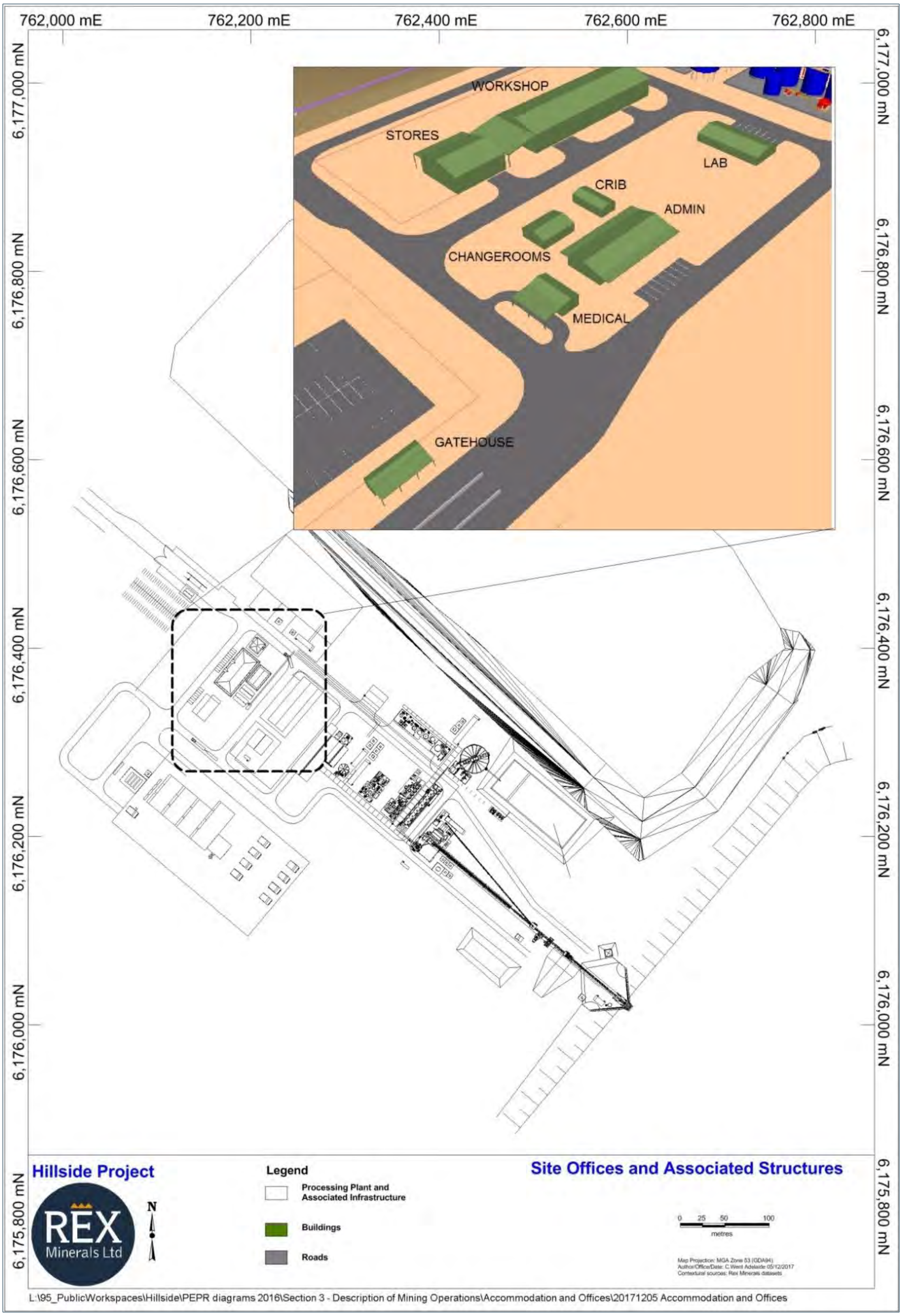


Figure 3-89: Process plant buildings layout

3.8.3 Public Services and Utilities Used by the Operation

The Project is well situated for services within the Yorke Peninsula and is approximately 160km from Adelaide. Equipment to support the operations will therefore either be contracted or hired for a short term, e.g., large cranes, commute buses and road maintenance plant.

3.8.3.1 Regional roads

Once developed, the Project open pit mine will require blasting of the overburden to access the ore. This requires the closure or diversion of both the Yorke (north–south portion only) and St Vincent Highways. It is therefore proposed to realign a section of these highways so that it is beyond the 426m exclusion zone for blasting.

In addition, the Ardrossan–Minlaton Road (Yorke Highway) runs through the mine site and an alternative route has been developed for this road, given that this portion of the Yorke Highway will be permanently closed (see Figure 3-90). This figure is sourced from the Development Application for the roadworks.

The road realignment works were completed by Tonkin Consulting, see Appendix 3.7-A.

3.8.3.2 Power – Grid connection

ElectraNet is the principal transmission network service provider and system control centre operator in South Australia and operates in the National electricity market.

Power infrastructure for the process plant site will be managed by ElectraNet from the 132kV Yorke Peninsula network from a direct connection to the Ardrossan West 132kV substation, which is identified Figure 3-91.

Power to the borefield will be supplied from an existing single 33kV overhead power line running adjacent to the borefield.

Figure 3-90: Development application plan for amendment to road network in proximity to Hillside Project (new alignments = red linework, road upgrades = black)

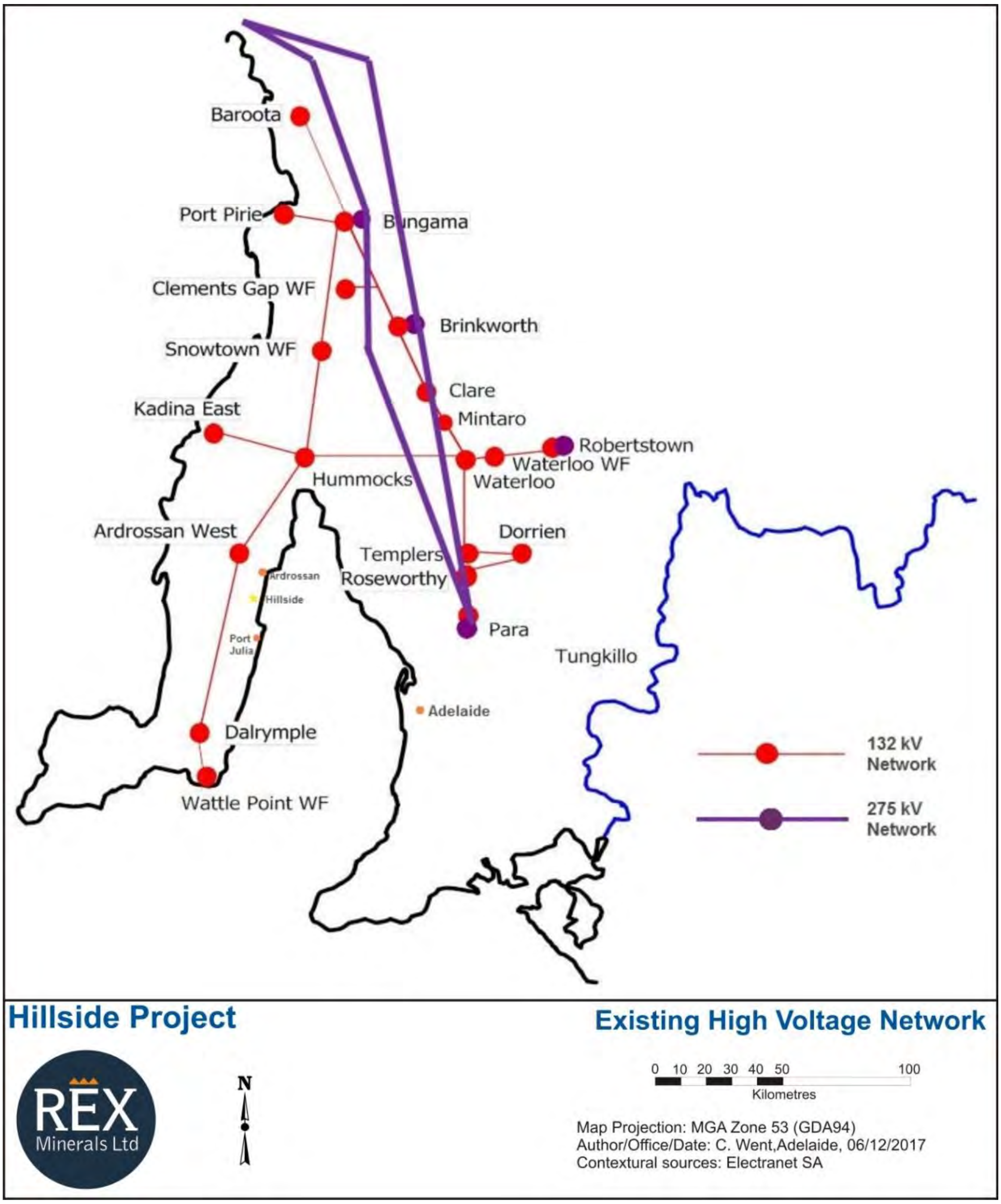


Figure 3-91: ElectraNet grid – South Australia (existing high-voltage network)

3.8.4 Visual Screening

Describe the type of screening, including existing or planned vegetation (i.e. species and density of plantings).

Both the North and South RSF have been placed strategically to screen both the processing plant and the open pit from the public road. These RSFs will be rehabilitated with native vegetation, grassland/salt bush and /or agricultural species to further assist visual screening of the mine site as described in Sections 3.5.5.2 and 3.5.9.1 and Figure 3-99. Species and planting density will be finalised based on results of vegetation trials and stakeholder consultation.

3.8.5 Fuel and Chemical Storage

For all fuels and chemicals stored on site, detail:

- *types of bulk chemicals and the volumes of each; and*
- *details on bunding for all chemical and fuel storage vessels.*

3.8.5.1 Fuel storage

Diesel fuel supply and distribution for the mine and plant will be the responsibility of a Build, Own, and Operate contractor.

The strategy is for Rex to install a centralised self-bunded fuel and lubricants farm located near the processing plant with the capacity for 0.6ML (6x0.104ML fuel tanks). The average diesel consumption at full production is estimated to be 0.15Ml/d. This fuel storage capacity should be sufficient for 4.2 days of production from full. Equipment with restrictive mobility will be serviced by two service trucks. The fuel farm will have the capacity to pump 1,000L/min for large equipment and 80L/min for small equipment such as light vehicles.

3.8.5.2 High explosive magazine and bulk storage facility

Refer to Section 3.5.6 for details of the explosives magazine.

3.8.5.3 Chemical storage

Table 3-60 outlines the indicative annual consumption and storage vessels of the chemicals used on site. All liquid chemicals and fuel will be bunded as per EPA Bunding and Storage Guidelines 080/12.

Table 3-60: Indicative annual consumption and storage vessels for chemicals used on site

Reagent	Annual Consumption (tpa)	Storage Vessels	Storage Volume (m^3)
Sodium metabisulphite (SMBS)	1578	1.2t bulka bags	32
Collector – PAX (90)	180	0.9t bulka bags	5
Collector – DSP 052	72.6	0.9t bulka bags	46
Frother – MIBC	156	Storage tank	74
Tails and concentrate flocc – Magnafloc 800 HP	178	0.7t bulka bags	6
Antiscalant (Nalco Scaleguard 84614)	6.2	Stored as supplied	3

3.8.6 Site Security

Describe infrastructure and measures that will be adopted to prevent unauthorised access by the public, including fencing, signage etc.

It is proposed that the site will be securely fenced with a chain link fence a topped with three runs of barbed wire security fence coupled with no entry signage. The security fence will generally follow the operational area boundary (impact footprint) as illustrated in Figure 3-3. Access to site will be via the site access road as described in Section 3.8.1.6. The access will be controlled using a boom gate for vehicles and a turnstile type person gate with swipe card access for personnel entering the site.

It is proposed that site security will be contracted to a recognised security firm during construction and revert to owner operator during operations. Fit for work testing will be conducted at the guard house prior to personnel entering the site.

3.8.7 Stormwater, Silt Control and Drainage

Describe:

- *location and design of silt management structures;*
- *run-off control on disturbed and rehabilitated areas;*
- *storage, diversion and disposal of clean water (discharge water must comply with the applicable Environment Protection Authority South Australia water policy); and*
- *a whole of site stormwater balance, if not included in the water balance in Section 3.5.4.*

3.8.7.1 Surface drainage

The existing flow regime will change as site infrastructure will intersect the two northern drainage lines (Unnamed Creek and Throoka Creek) shown in Figure 3-92. Surface water drains have been designed and will be constructed along the toes of the TSF and RSF (see Figure 3-92 for location and flow directions and Figure 3-93 and Figure 3-94 for surface water infrastructure typical design).

Surface water flow from the Pine Point Creek catchment will not intersect any site infrastructure during a 1-in-100 critical storm event. Upstream surface water (from Unnamed Creek and Throoka Creek) will be redirected around mine infrastructure via surface drains (Throoka Creek diversion drain) and into the Throoka Creek Diversion Pond (TCDP) which has been designed for a 1:100 ARI (1% AEP six-hour) storm event (Figure 3-95).

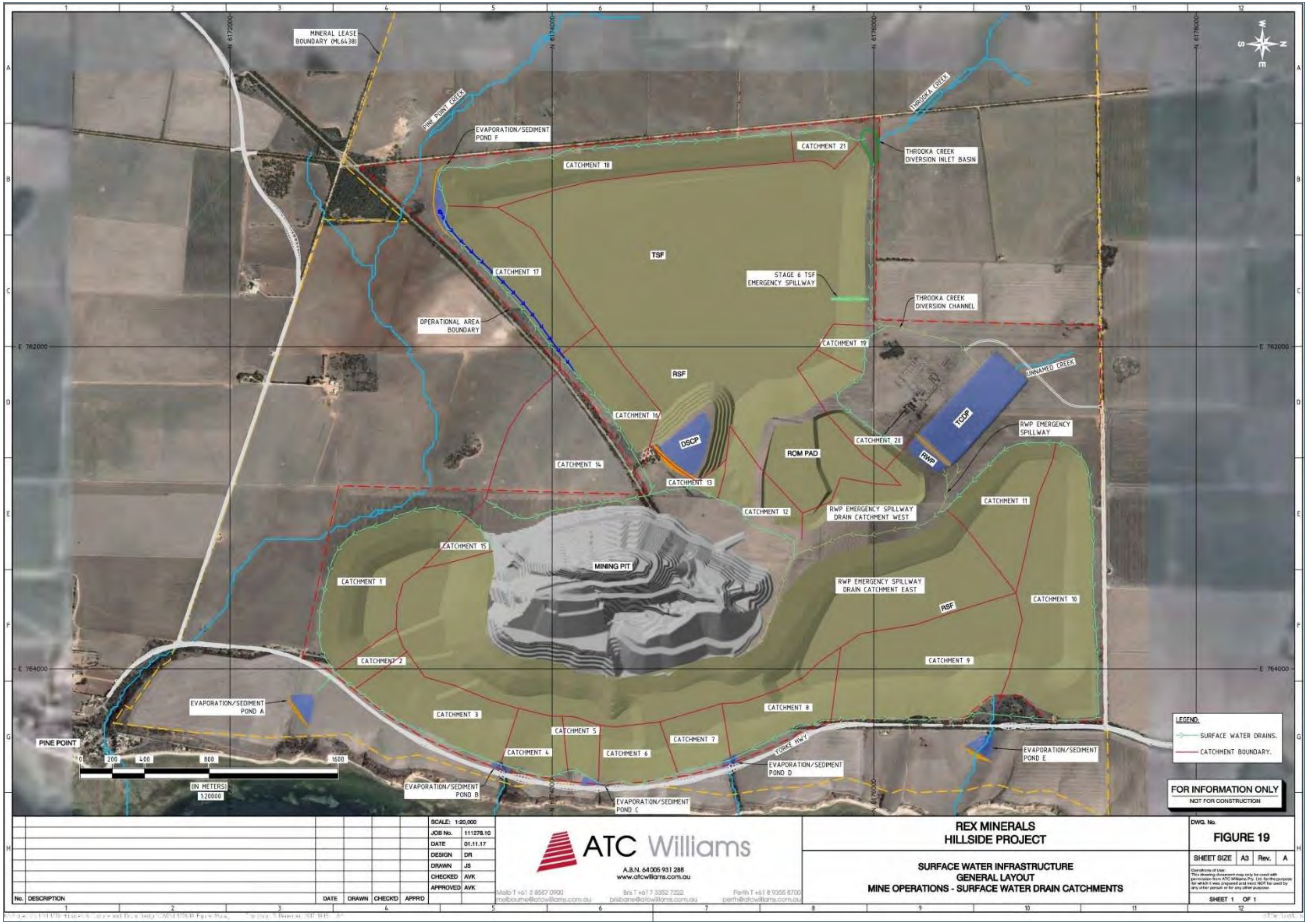


Figure 3-92: Sediment ponds and surface water drainage design

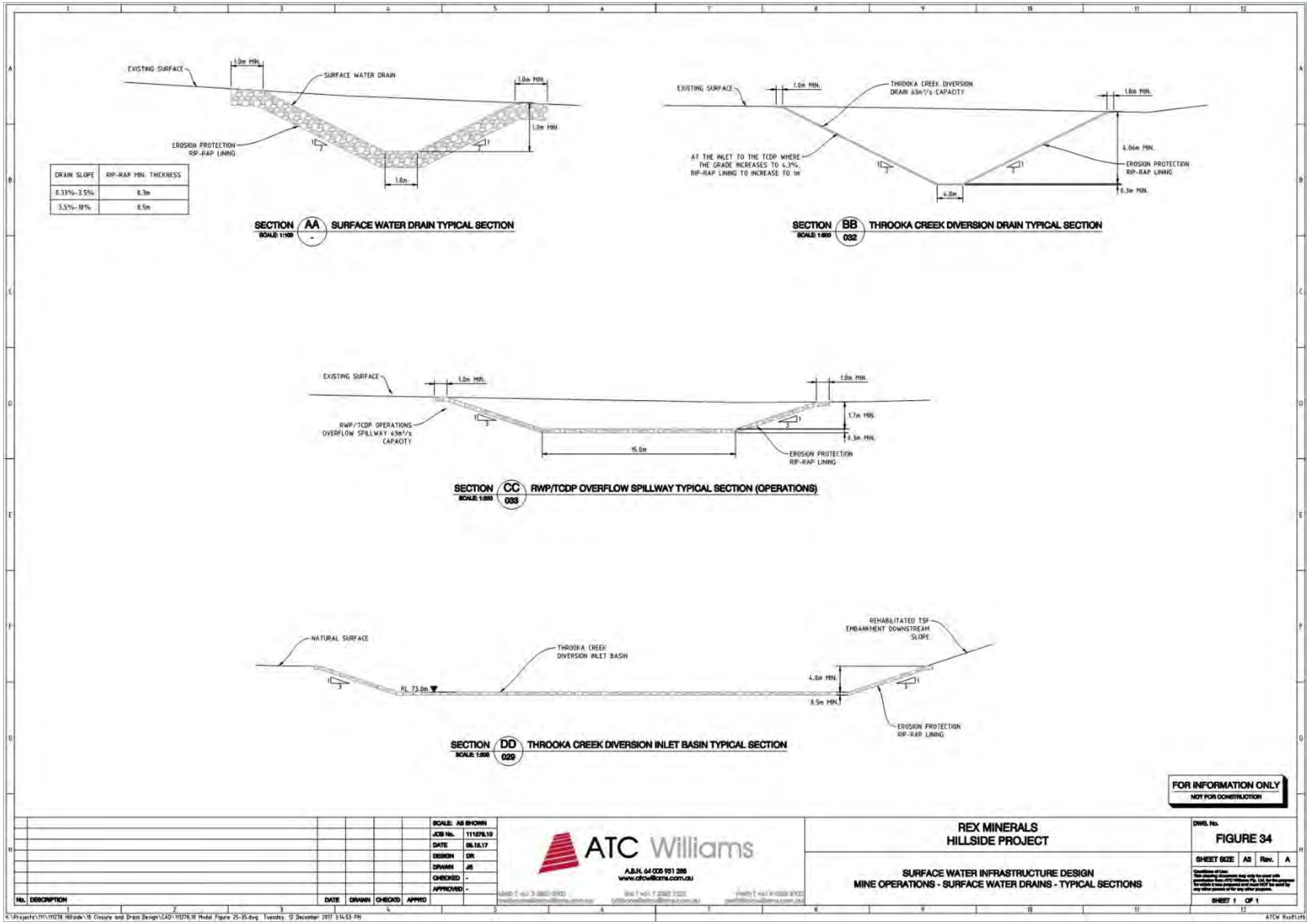


Figure 3-93: Surface drains and spillway design sections

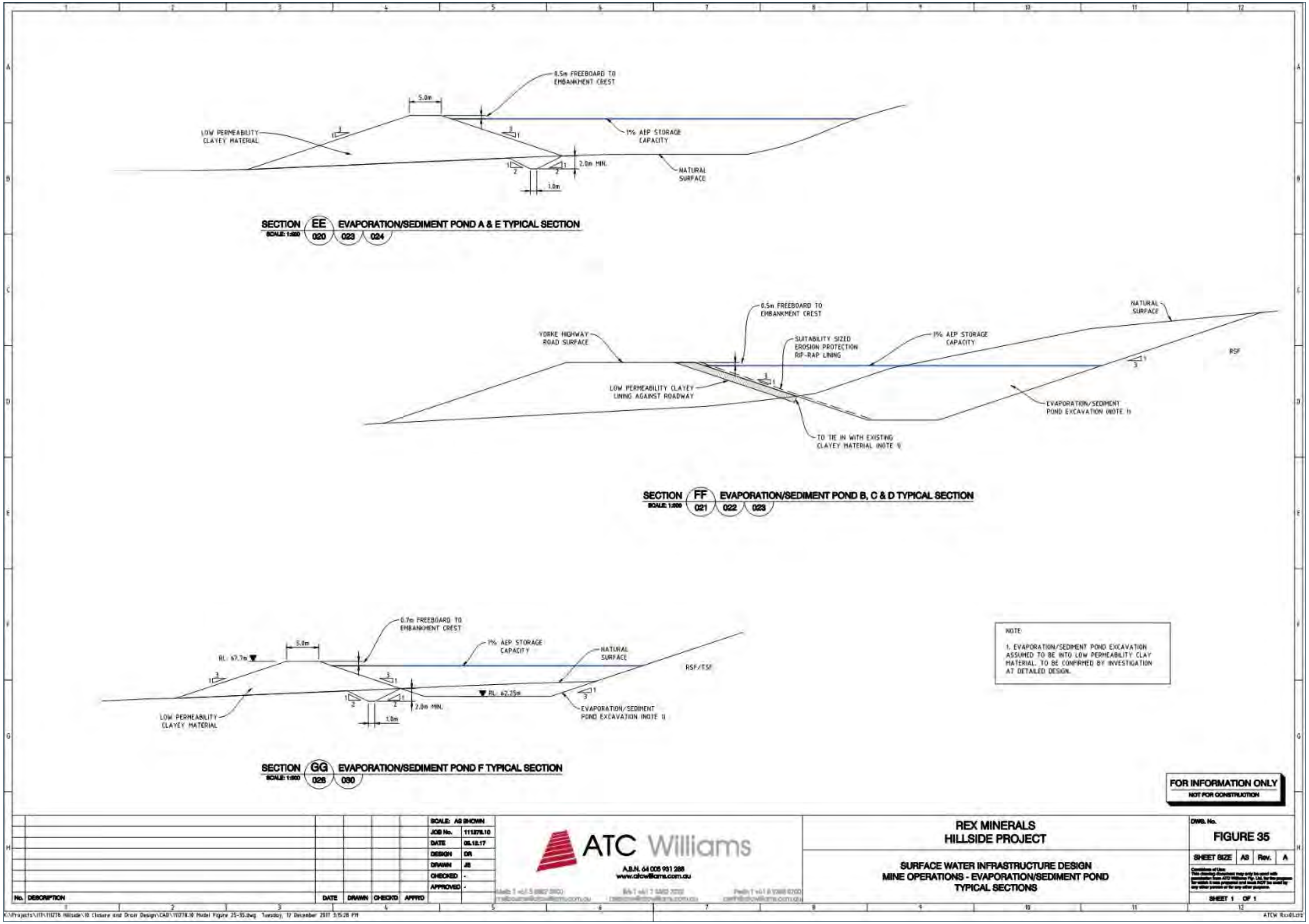


Figure 3-94: Surface drains and spillway design sections

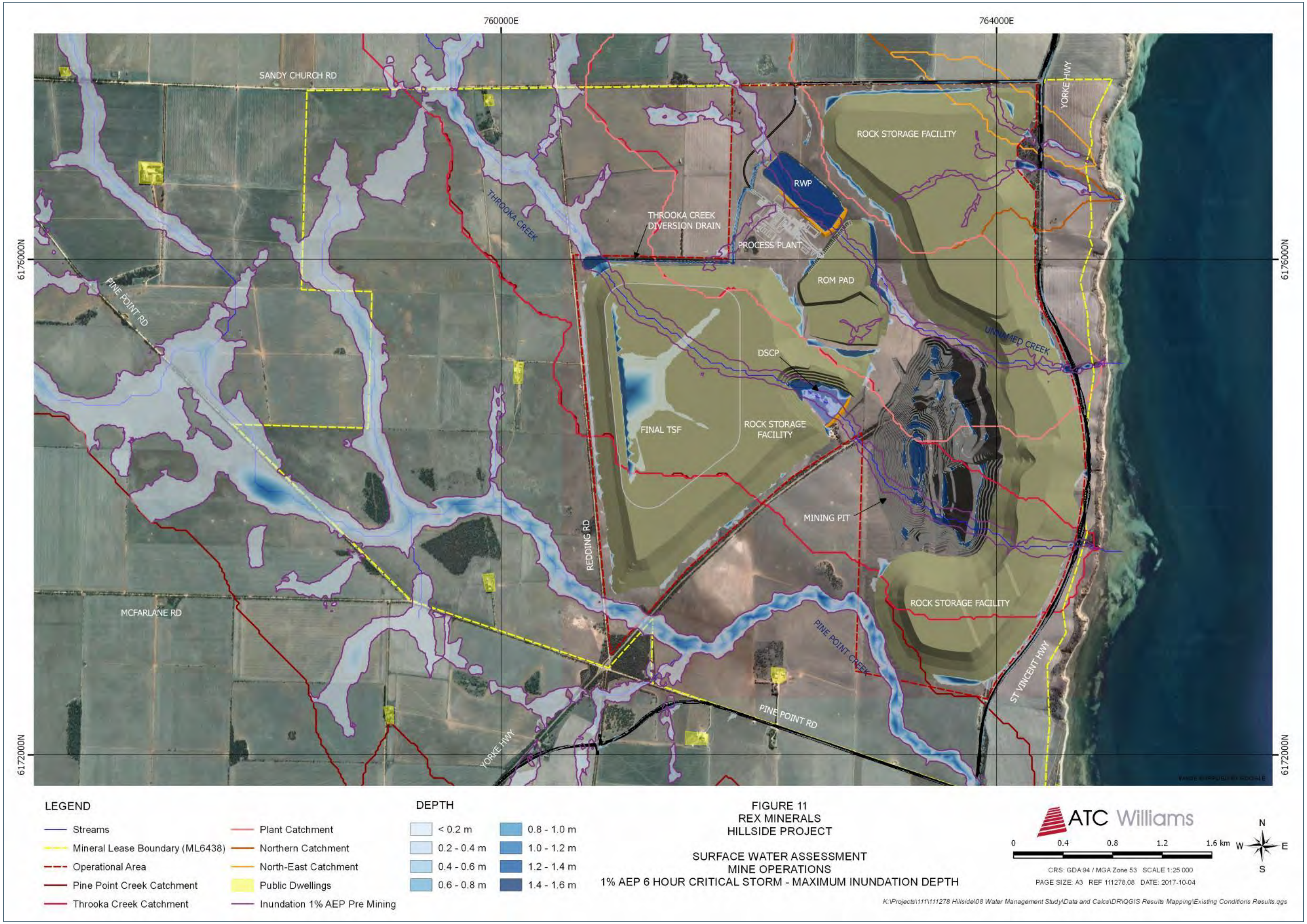


Figure 3-95: Upstream catchments around the mine footprint in a 1-in-100-year ARI storm event with controls

All water that comes in contact with the operational footprint will be retained on site and directed to evaporation/sediment ponds to reduce sediment loads and then either used within the process water system or allowed to evaporate. Overflow from the internal drainage system (including the DSCP) will be directed to the open pit, which will provide temporary storage during major storm events.

Separate catchment areas have been defined for the operational footprint as well as proposed bunds and ponds (detention and retention) estimated for the Project infrastructure layout. The catchment areas and volumes have been estimated for a 1-in-100 ARI event. Using the appropriate run-off coefficient values and safety factors for each catchment area, sufficient pond volume storages for each catchment area has been determined (see Table 3-61). Figure 3-92 shows the location of the evaporation/sediment ponds and their related catchment areas.

Hydrological modelling presented in Figure 3-95 indicates that run-off impacts are potentially most significant at the north-western wall of the TSF. A drainage channel (Throoka Creek diversion drain) will be constructed along the northern toe of the TSF so that there is no increased build-up of water against the TSF during storm events due to the placement of the mine infrastructure. The south-western toe of the eastern RSF has been designed so that it does not interact with the modelled 1-in-100 ARI floodline. This will ensure that the natural run-off characteristics of the pre-mining drainage channel are maintained (Figure 3-95). This will be progressively monitored and controlled as the Project progresses from construction through to the operations phase.

Table 3-61: Quantities from 1% AEP event to evaporation/sediment ponds

Sediment Pond	Catchment Area (ha)	Excess Rainfall 1% AEP 6-hour event (m)	Volume (m^3)
A	56	0.0385	21,623
B	40	0.0385	15,254
C	25	0.0385	9,652
D	46	0.0385	17,741
E	128	0.0385	49,350
F	68	0.0385	26,205

Plant Stormwater Management

All runoff generated in the process plant area will be directed to the return water pond (RWP) for use as process water. The RWP has been sized based on the water balance to contain TSF decant water as well as stormwater from a 1:100 AEP, 72-hour storm event. The TCDP has been designed to retain water from the processing plant area for a 1:100 ARI (1% AEP six-hour) storm event (see Figure 3-96).

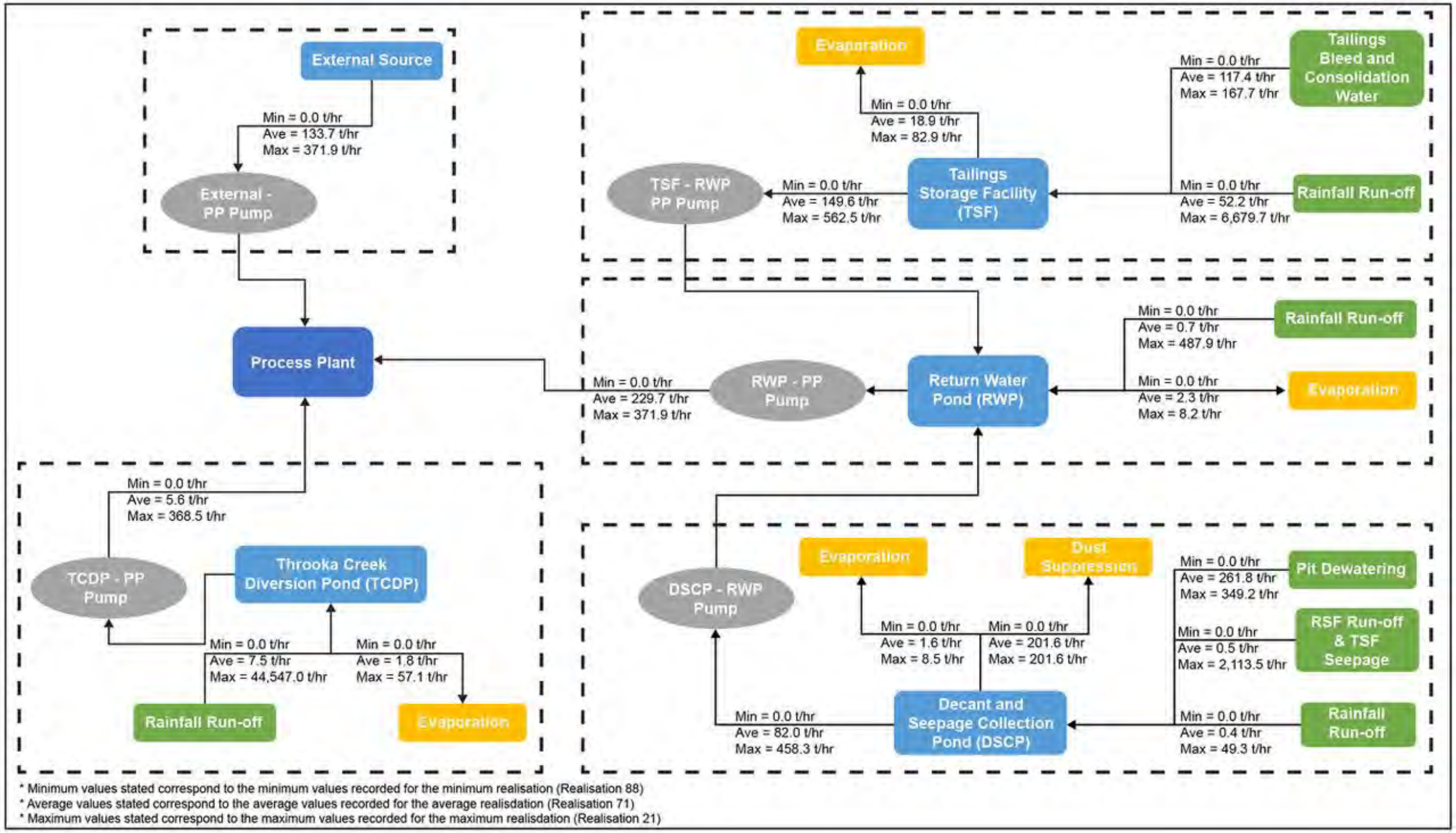


Figure 3-96: Hillside Project water balance flow diagram (ATC Williams February 2018)

The 2-D modelling of the operational case resulted in the following observations:

- Upper Throoka Creek is completely obstructed by the TSF and requires a diversion;
- the RSFs have been designed not to impede flow within Pine Point Creek; and
- the TSF, RSFs and ROM pad all shed contact water from batter slopes.

Throoka Creek Diversion

The Throoka Creek diversion was designed as an open channel excavated along the northern toe of the TSF and then north east to the TCDP. The open channel was sized to convey the peak flow from the upper portion of the Throoka Creek catchment prior to development from a 1% AEP storm event corrected for potential climate change in 2050 of 34.7m^3/s. The general arrangements of the open channels are presented in Table 3-62.

The excavation for the Throoka Creek diversion drain will be up to 15m deep. The area is to be barricaded as an exclusion zone for safety reasons. The downstream slope of the RSF surrounding the northern side of the TSF will be shaped to tie in with the diversion drain.

An inlet basin to the diversion has been allowed for (depth of 2.5m) to prevent backwater from inundating third party properties and Redding Road upstream of the project area. It will also assist in dissipation of both energy and velocity of surface water flows. The basin has been designed as an evaporation/sediment pond and is to be excavated with maximum slopes of 4:1 (H:V).

Table 3-62: Throoka Creek diversion culvert parameters

Parameter	North TSF Toe	TSF Toe to RWP
Base width	4m	15m
Side slopes (H:V)	2:1	3:
Grade	0.33%	0.50%
Design flow depth	2.m	0.95m

Erosion protection material will be required within the Throoka Creek diversion and the TSF embankment toe and a portion of the embankment slope in the immediate area.

The TCDP has subsequently required re-design to accommodate additional runoff from the Throoka Creek catchment. Sizing has been undertaken allowing for storage of a 1% AEP critical event on top of the previously designed capacity. This corresponds to an approximate volume of approximately 1,000ML.

The material to be contained within the topsoil and subsoil stockpiles is as found naturally and assumed to be benign, therefore any movement of water through these stockpiles will not contain any contamination pollutants other than silt.

The operational control measures consist of the following:

- surface water collection drains;
- surface water evaporation/sedimentation ponds;
- Throoka Creek diversion;
- increased RWP;
- RSF management;
- water level and quality monitoring; and
- design and location of TSF, RSF and stockpiles are surveyed regularly during operation to be consistent with mine plan.

See Figure 3-97 Surface water management during operations.

Surface Water Management Methodology

The overall strategy is to prevent discharge of any water that comes into contact with the mine footprint, and to keep surface water, from the upstream catchment area, away from the mining activities. This will be achieved by the following design concepts and management strategies:

- Construct perimeter bunds to separate upstream surface water from water coming into contact with exposed areas on the mine footprint;
- Install detention ponds which are terminating structures to stop and hold all inflow to allow for evaporation and infiltration as well as controlling and removing silts and/or pollutants;
- Install retention ponds which are non-terminating structures and are designed to temporarily store inflow, to control sedimentation and mitigate flood; and
- Contain on-site water recycling which aims to capture and use all available water that occurs within the mining footprint, via internal drainage circuits and detention ponds, for processing purposes and reducing the potential for contaminated run-off from exiting the site.

At mine closure the following design concepts and management strategies will be implemented.

- All disturbed surfaces will be shaped to direct run-off into the disused open pit. Agricultural topsoil and subsoil used for building the water diversion bunds at the toe of the RSF will be respread over the final landforms to provide a cover for mine rehabilitation;
- The surface water drains as detailed for operations, are to be left in place. The water quality of the runoff collected by each drain is considered to be clean as water will be collected from stabilised rehabilitated surfaces;
- The evaporation/sediment pond walls are to be removed and the area rehabilitated during the progressive rehabilitation of the RSF when the catchment to them is considered to have water representative of background. In some areas these structures may stay to naturally reintegrate with the surrounding environment; and

- The Throoka Creek diversion drain shall remain in place to naturally reintegrate with the surrounding environment after closure to permanently divert stormwater around the rehabilitated TSF. Stormwater will be diverted through the diversion drain and into the TCDP. Under extreme rainfall conditions, allowance for a closure TCDP spillway channel has been included to safely transfer any overflows from the TCDP into the open pit, should the pond not be breached to allow Throoka Creek to return to natural drainage.

The design of the surface water control system has been considered effective given the infrequent nature of high peak flow events and the capacity to store and retain excess water on site.

3.8.7.2 Silt control

Erosion and Silt Control

Surface water will be diverted around site infrastructure where practical, minimising the need for erosion and sediment control structures.

Disturbed areas, stockpiles and RSF on the site may generate an increase in the volume of sediment reporting to the downstream receiving environment, with a potential consequent decrease in ambient water quality compared with the pre-development site. Treatment will include retention ponds to allow suspended sediment loads to be reduced prior to discharge, and/or water reclaim infrastructure for re-use in the process.

Design volumes for sediment control structures have been finalised (see Figure 3-97 below) and erosion will be minimised by stabilising landforms using the following techniques:

- placement of artificial stabilising material, such as geofabric, as new landforms are constructed and established, particularly on exposed faces;
- progressive rehabilitation of exposed surfaces will be completed as soon as possible. Revegetation is the most cost-effective method of minimising sediment transport during the life of mine and post-closure; and
- where culverts, embankments or other drainage control devices are installed, consideration will be given to the use of energy dissipation structures such as rock spalls. These structures reduce flow velocity and the potential for erosion.

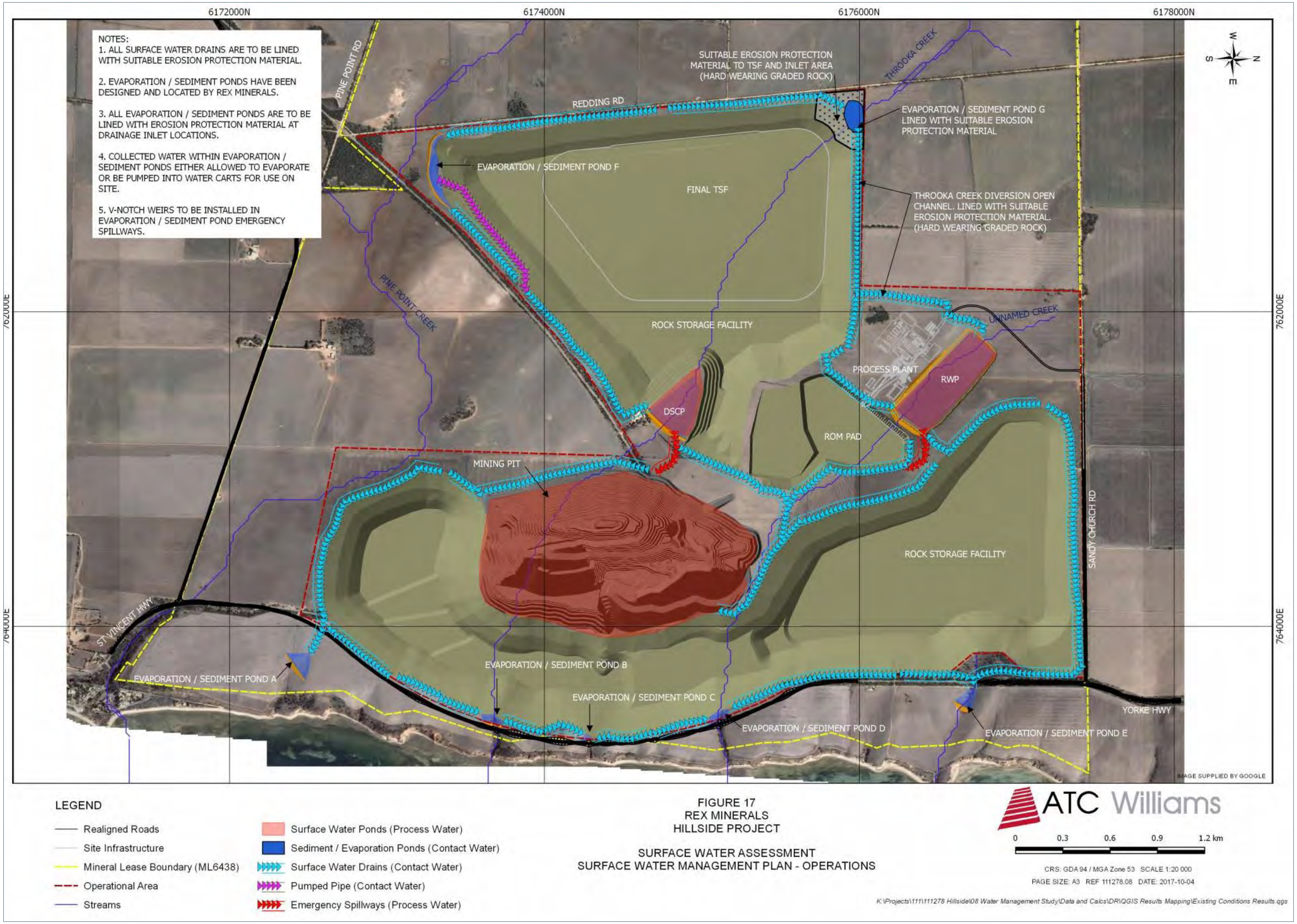


Figure 3-97: Surface water management during operations

3.8.8 Care and Maintenance

Detail all activities and strategies required for care and maintenance of supporting surface infrastructure, should the mine suspend production, but not progress immediately to closure.

Several key strategies will be implemented to enable the supporting infrastructure to be placed in a care and maintenance operation should unforeseen circumstances dictate this course of action.

Specifically, the care and maintenance requirements for the supporting infrastructure are to enable them to be maintained in a state that ensures environmental outcomes are still achieved, mine closure strategies are not compromised, and economic extraction of ore to recommence, should the circumstances change. These requirements are listed below.

Rex will notify the Director of Mines in writing within 30 days (and prior to cessation) of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than seven days.

3.8.8.1 Access

The single site entrance road of approximately 1.7km in length from the public Sandy Church Road will be maintained and access will be restricted with the closure of the site security access gates when site personnel are absent. Site internal roads which are still required during care and maintenance will be maintained in an operational condition.

3.8.8.2 Accommodation and offices

There is no onsite accommodation. Offices will be cleaned prior to cessation of operations and maintained in operable order during the period of the cessation.

3.8.8.3 Public Service and utilities used by the operation

Power, water, data and telecommunications infrastructure will be maintained during the period of cessation

3.8.8.4 Visual screening

Rex has undertaken to progressively rehabilitate the site. Depending on the timing of the cessation, Rex undertakes to maintain those areas that have been progressively rehabilitated to that point in accordance with the rehabilitation plan.

3.8.8.5 Fuel and chemical storage

Process plant reagent chemical storage has been discussed in Section 3.8.5. The volume of diesel fuel that is stored on site will be minimised to accommodate care and maintenance operations. The diesel fuel storage, which is in self-bunded tanks, will be maintained in operational condition.

3.8.8.6 Site security

The site fencing and signage to prevent unauthorised entry will be maintained at all times while the ML is in place.

3.8.8.7 Stormwater, silt control and drainage

All stormwater, silt control and drainage structures in place during the operation will be maintained in good working order during any period of cessation of operations and a check list will be developed to record compliance on a regular basis.

3.8.8.8 Site maintenance and security resources

A team of trained site maintenance and security personnel will be engaged to undertake ongoing site maintenance and security work. The size of the team will be adequate to undertake the anticipated work load at the time of cessation of operations.

3.8.9 Rehabilitation Strategies and Timing

Detail all activities, strategies and designs relating to mine closure for rehabilitation of supporting surface infrastructure.

Provide details for timing of closure activities, including all opportunities for progressive rehabilitation.

Rehabilitation strategies and designs relating to mine supporting infrastructure have been addressed throughout this document and summarised in Table 3-63 below;

Table 3-63: Mine supporting infrastructure rehabilitation strategy

Aspect	Section Reference
Access	3.6.9 Rehabilitation Strategies and Timing 3.10.2.8 Non-domain specific completion aspects
Accommodation and offices	3.6.9 Rehabilitation Strategies and Timing
Public services and utilities used by the operation	3.8.3 Public Services and Utilities Used by the Operation
Fuel and chemical storage	3.10.2.8 Non-domain specific completion aspects
Site security	3.8.6 Site Security
Storm, silt control and drainage	3.8.7 Stormwater, Silt Control and Drainage

The rehabilitation timing has been detailed in Section 3.5.9.1 and Table 3-67.

3.9 Vegetation Clearance

Description of vegetation clearance

If clearing of native vegetation is to be undertaken, a plan and description of the vegetation present in the tenement area must be provided, showing:

- *the extent of any vegetation clearance; and*
- *the likelihood of the presence of threatened flora.*

3.9.1 Extent of any Vegetation Clearance

To fulfil the requirements of the *Native Vegetation Act 1991* (SA), Rex will undertake clearance of any native vegetation in accordance with a native vegetation management plan, which will include the requirement to realise a significant environmental benefit (SEB).

The disturbance footprint will require approximately 45.01ha of remnant patches and roadside native vegetation to be cleared (see Figure 3-104). In accordance with the SEB ratios based on vegetation condition as calculated in accordance with the then Department of Water, Land and Biodiversity Conservation guidance for mine-related clearing (2005), approximately 145.57ha is required to be offset.

Rex will ensure that the Project has significant benefits for the ecology and native vegetation of the mining tenement areas and surrounds through the following actions:

- contributing to the ongoing protection and management of remnant native vegetation;
- ensuring that upon Project start-up, prior to clearing, $515,244 will be paid into a native vegetation fund;
  - the 2005 SEB policy guidelines applies to this project as the ML was obtained prior to 1 July 2017. The SEB calculations are as follows:
    - 145.57ha of SEB x $3,292 (Yorke Peninsula Council non-residential land value) = $479,216.44 plus management cost $800x45.01 (area to be cleared) = $36,008;
    - *Total: $479,216.44+$36,008= $515,224.44;*
  - payment must be prior or at the time of clearance. If staged clearance is to occur, a program detailing when the clearance stages needs to be submitted. SEB payments can be made at the time of the staged clearances. At this stage, Rex would pay the full amount into the fund prior to clearance and not seek reduction for ecological restoration; and
  - The Native Vegetation Council (NVC) can set up a reconciliation point with Rex that will hold the SEB payment in the native vegetation fund for a limited amount of time. The NVC advised that the holding period is normally about a year, possibly stretched out to two years. The NVC will need to approve a SEB management plan for the use of these funds;
- Rehabilitating the RSF areas; and
- Implementing a strategy for the reduction in weeds within the Project site.

3.9.2 Threatened Flora

Although much of the native vegetation has been lost across the Yorke Peninsula region, some valuable remnants remain that support national, state and regional listed threatened species. Using the Protected Matters Search Tool (SEWPaC 2011) and the Biological Databases of South Australia (DEWNR 2012), national and state listed threatened flora species were identified as potentially occurring within the Hillside area.

Surveys have been conducted in the Hillside area by Bates in 2011 and 2012, (see MLP August 2013), showing where some of those threatened species (including *Acacia rhetinocarpa* – refer to Section 2.7.1) were identified and others were deemed unlikely to occur in the area, principally due to the condition of the native vegetation (see Figure 3-98). A referral under the EPBC Act 1999 to the Department of the Environment (DEE, formally SEWPaC) was submitted in June 2012. In advice received from the DEE in September 2012 (see Appendix 3.8-A), the proposed action to construct and operate the Hillside Project, including all associated road works based on the larger Stage 2 Project, was deemed not a controlled action if undertaken in a particular manner.

As a result of the additional occurrences of *Acacia rhetinocarpa* identified (refer to Section 2.7.1), Rex provided the DEE with initial information of the updated mine plan (i.e., Stage 1 (EFS)) in November 2015 and additional detailed information in May 2016, which identified:

- the Project's mine plan will not require the clearance of any of the subsequently identified *Acacia rhetinocarpa* located within the roadside vegetation on Redding Road north of the six-way intersection.;
- Redding Road and the associated road corridor will now remain open and will be unaffected by the Project, as will any roadside vegetation; and
- the mining operations described in the PEPR will not require any alterations to the planned highway diversion as specified in the referral in June 2012.

Rex understands that the activities associated with the mining operations described in the PEPR will be in accordance with the NCAPM decision for the Project made in September 2012 (see Appendix 3.8-A).

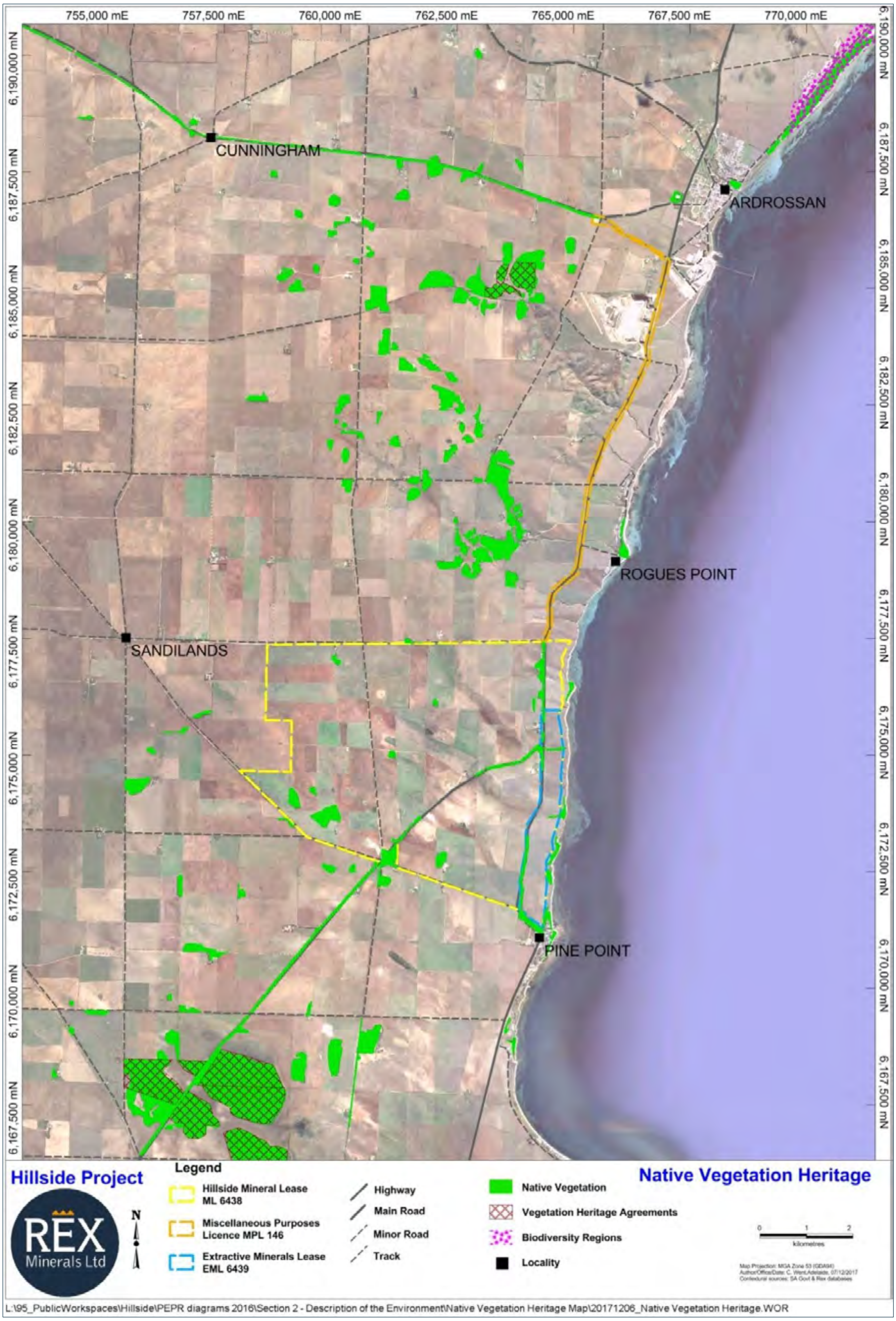


Figure 3-98: Native vegetation map

3.10 Mine Completion

3.10.1 Description of Mine Site at Completion

Provide a description of the mine site as it will be at completion after all rehabilitation and closure activities have been completed, including:

- *final post-completion land use;*
- *landforms;*
- *vegetation covers (including native vegetation that will not be disturbed due to mining operations);*
- *natural contours of land not to be disturbed by mining operations;*
- *any mining infrastructure that will remain on site and will become the responsibility of the landowner;*
- *location, description and management of waste disposal areas;*
- *location of reshaped and rehabilitated areas showing surface contours and revegetation;*
- *mine voids (open pit and/or underground);*
- *location of stored and/or exposed PAF material and/or other hazardous materials;*
- *expected final water level and time to reach this level, and water quality of mine voids;*
- *location of surface water infrastructure including ponds and diversions; and*
- *representative plans and cross-sections that show: pre-mining natural surface, emplacement areas, waste disposal areas and disturbed areas, final rehabilitated surface, where relevant, backfilled and remaining underground workings, predicted final groundwater levels and interpreted geology including all rock types.*

Provide a description of the mechanism for transferring responsibility for any potential residual liability (i.e. ongoing maintenance or monitoring) subsequent to surrender of the tenement.

3.10.1.1 Final post-completion land use

The 2013 MLP included a description of the results of surveys of community expectations of the post-closure land use of the ML, EML and MPL. The preferred options are to minimise the disturbance footprint with higher landforms and to return as much as the disturbed land by mining activities within the ML, EML and MPL to a mixed agriculture and native vegetation use as soon as practical. The ML area is 2997.84ha and only 12% will not be rehabilitated at mine completion. Current and future proposed land use options and the areas of disturbance to be rehabilitated are shown in Figure 3-99 and the area displayed in Table 3-64.

The RSF and TSF are shaped to 10, 15 and 20 degree slopes. The flat to 10 slopes will generally be returned to cropping unless otherwise agreed. The steeper 15 to 20 degree slopes will be returned to other agriculture pursuits or native vegetation. The areas within the pit bund exclusion zones will be replanted with native vegetation to stabilise the soil and provide minimal maintenance.

The top of the TSF will be planted with native saltbush and may be used for livestock grazing, depending on the final closure design. The surface water drainage on the ML will stay in place and have erosion protection installed as applicable.

Table 3-64: Indicative cover type as a percentage of proposed disturbed final landform at mine closure

Total Cover Type	Area (ha)	Percentage of Final Landform
Native grasses/salt bush/salt tolerant species	168.4	16%
Agricultural (cropping)	770.1	60%
Native vegetation	129.9	13%
Agricultural (other)	57.0	5%
Land that will not be rehabilitated (remaining open pit void, retained roads)	157.3	12%
Total	**1,282.7***	**100%**

* Noting that this is 13.2ha greater than the area of disturbance identified in Table 3-3 due to the greater area of RSF slopes than disturbance footprint.

The post-completion land uses proposed in this PEPR will be reviewed regularly over the life of mine to identify whether there is a change in technology, stakeholder requirements or surrounding and regional land uses which may result in alternative post-completion land uses adding more value. Should a more optimal post-completion land use be identified and deemed feasible, amendment to approvals may be required, along with stakeholder consultation.

Within 30 days of any decision to permanently cease the mining operations, Rex will provide a Decommissioning and Rehabilitation Plan to the Director of Mines, which will:

- be prepared in accordance with any relevant guidelines;
- identify progressive rehabilitation and closure activities already implemented; and
- set out the remaining rehabilitation and closure activities required.

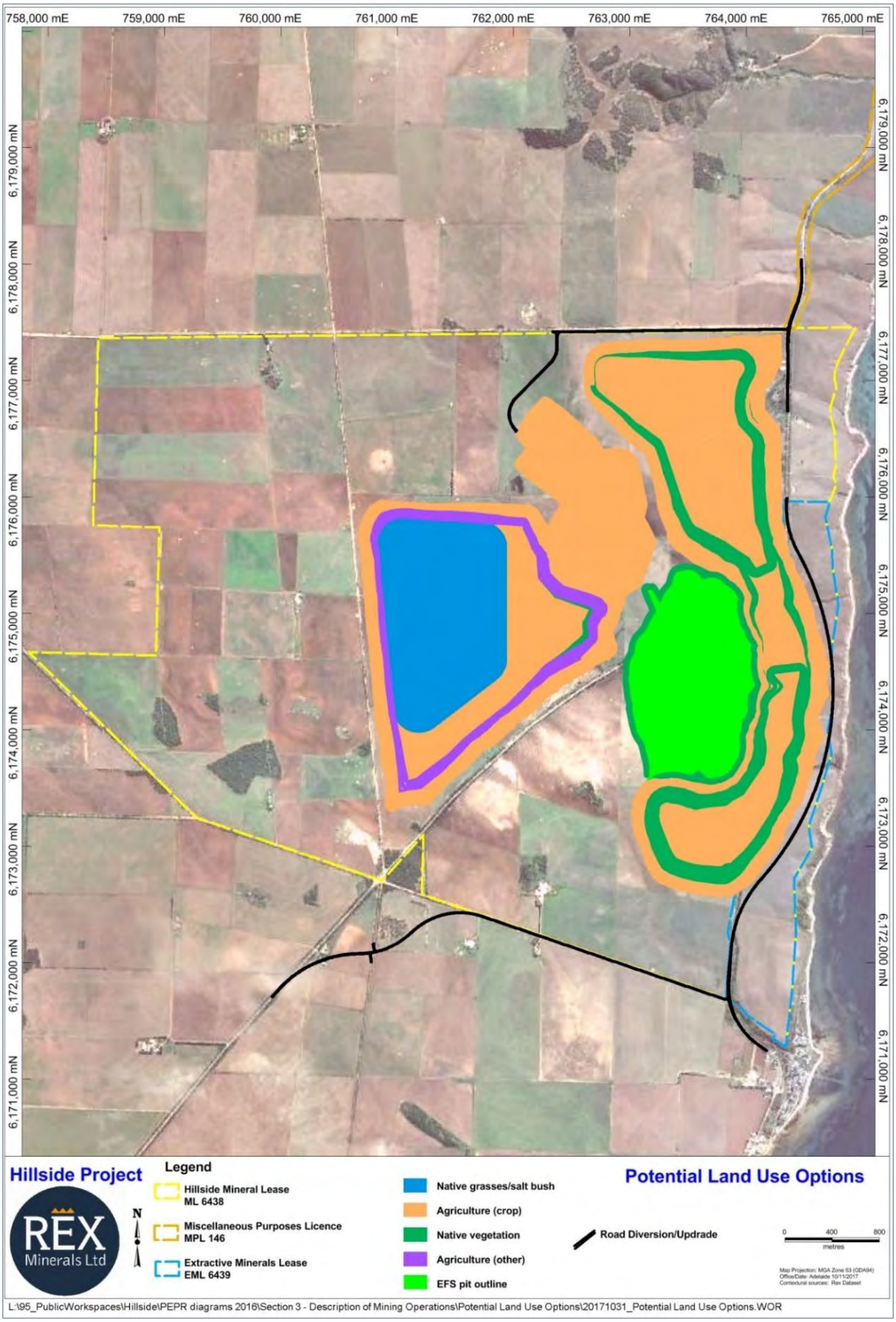


Figure 3-99: Potential post-closure land use options within the ML

3.10.1.2 Landforms

Unless otherwise agreed between the Company, suppliers and the SA Government, the MPL will have no visible change in landform at mine completion. It is likely that the small buried SA Water pipeline will be retained, however this will be at the discretion of SA Water, as will the power poles.

The landforms on the ML and EML will consist of:

- RSF – North;
- RSF – South;
- integrated waste management system (IWMS) landform comprising the TSF, DSCP and RSF – West and oxide stockpile (if not processed);
- ROM and stockpile pad;
- open pit;
- remaining surface water infrastructure;
- abandonment bunds;
- Project access road; and
- internal mine haul roads.

The Project RSFs and TSF are designed to ensure:

- encapsulation of any PAF material;
- long-term stability;
- maximise agricultural land use after mine completion; and
- no significant impact from shading on agricultural productivity for third party land users on or off the Land.

The contours of final landform for the ML and EML are given in Figure 3-100. The shape of the high relief landforms such as the TSF and RSF are consistent with other relief along the coastal with gentle concave shape with flat top.

Rex conducted a shading simulation of the additional shading due to mine design topography at mine completion. The variation of shading duration month to month was a few minutes. August was chosen as the base case because it is mid-growing season for cereals and pulses as well as presenting a worst-case scenario for shorter winter days (Figure 3-101). The simulation was conducted for sunrise and sunset to present the maximum shading. There was a maximum of 40 minutes shading adjacent to the high relief. This equates to a loss of direct sunlight time of between 7% and 4% during the growing season in line with the increase of daylight hours towards the summer months. The average loss of direct sunlight in shaded areas is less than 20 minutes which equates to a loss 3.5% and 2% of daily sunshine between winter and summer respectively.

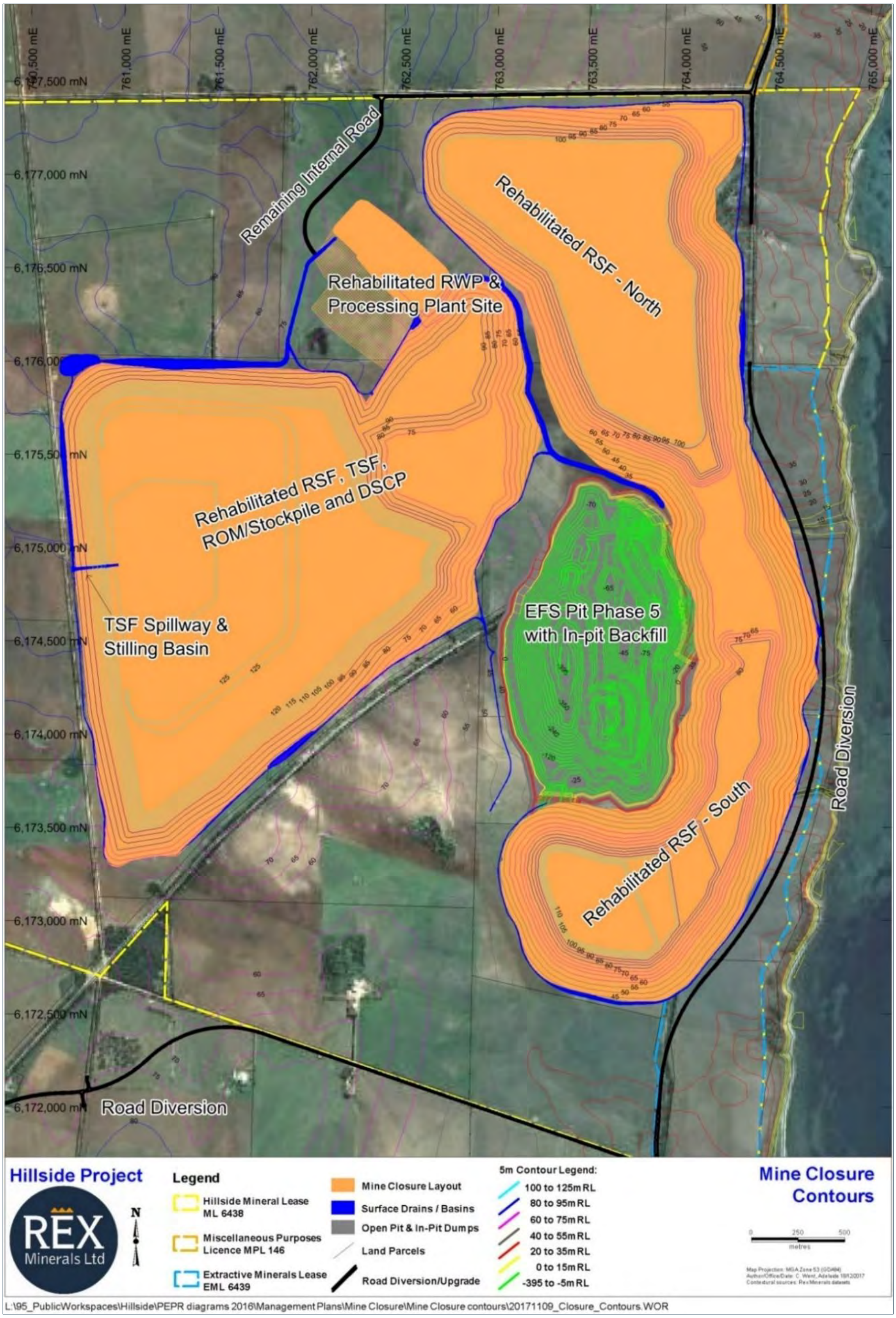


Figure 3-100: Mine contours at completion

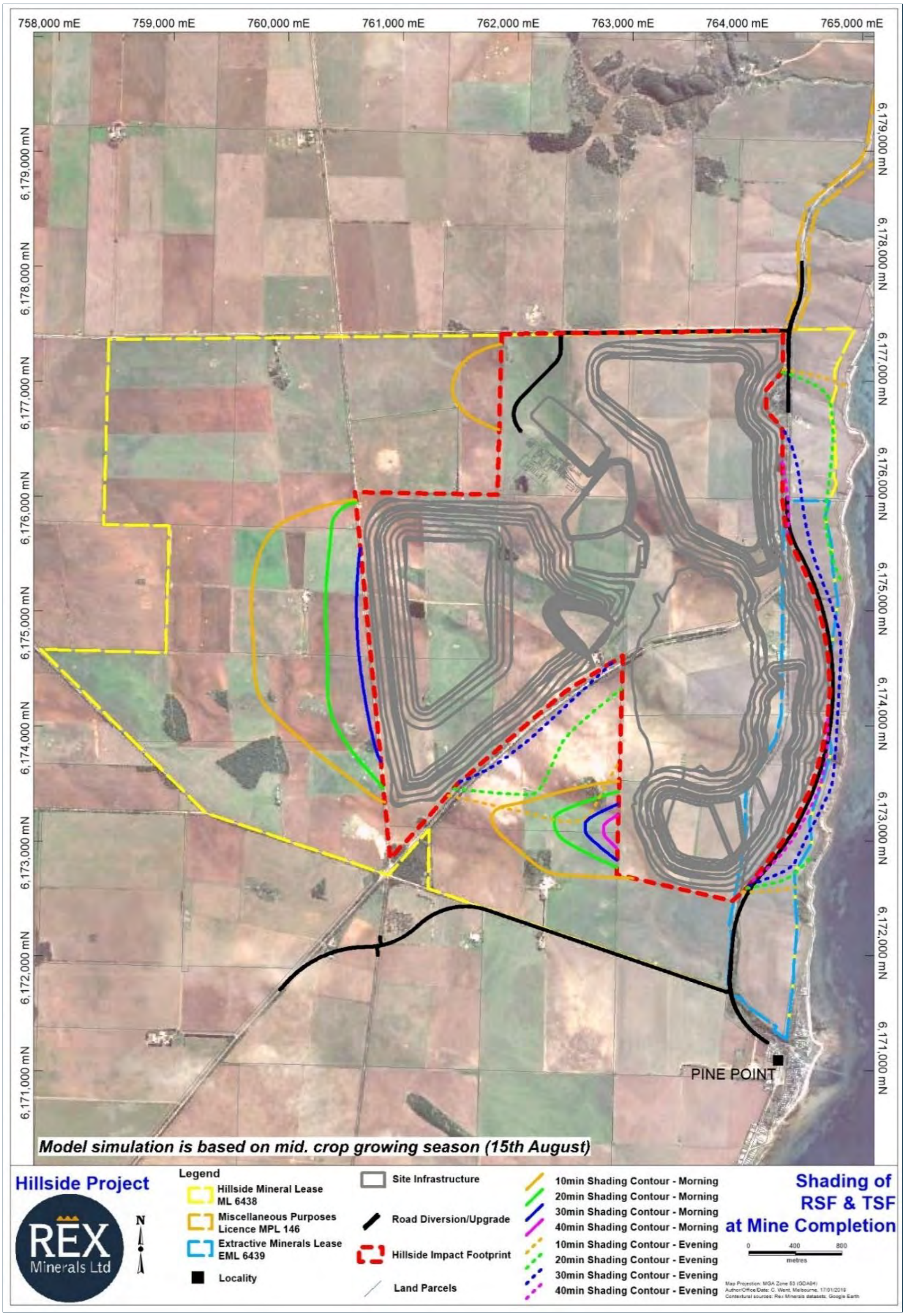


Figure 3-101: Shading of RSF and TSF at mine completion

To put this into perspective the 2m high tree line on the east side of the Redding Road reserve already casts a shadow onto the opposite third party property on the west side of Redding Road during sunrise resulting in shading up to 25 minutes during August (winter) days.

The open pit contours and wall angles by pit phase from inception to cessation have previously been described in detail in Section 3.5.2.

Surface water structures remaining at completion are described in Section 3.8.7 Stormwater, Silt Control and Drainage. The general layout of the surface water infrastructure at completion is shown in Figure 3-102.

The detailed designs are presented in Appendix 5.14-A and Appendix 3.9-A.

The abandonment bunds for the open pit and deep surface water infrastructure will be implemented to prevent inadvertent access. The pit abandonment bund height follows the WA guidelines (DIRS 1997). The bund distance is approximately 50m from the pit edge at closure based on the geotechnical stability assessment (Appendix 7.3-I). The parameters for the abandonment bunds are described below in Table 3-65 and their location shown in Figure 3-103.

Table 3-65: Abandonment bund parameters

Bund Type	Perimeter (km)	Bund Height (m)	Cross-section Area (m^2)	Bulk Density (t/m^3)	Construction Material (t)	Method of Placement
Pit (50m from pit crest)	5.19	2.0	5.31	2.0	55,133	Paddock dumped
Ramp (coincident with pit bund)	0.13	2.0	5.31	2.0	1,355	Paddock dumped
Surface water drains and ponds	41.30	1.0	1.33	2.0	109,530	Dozed

The sealed mine access road (see Figure 3-103) will remain post-mine completion and will be maintained by the landowner. The length is approximately 1,000m has two lanes totalling 10m wide including the verge. The main internal haul road to access the pit will remain to act as the main drainage into the pit.

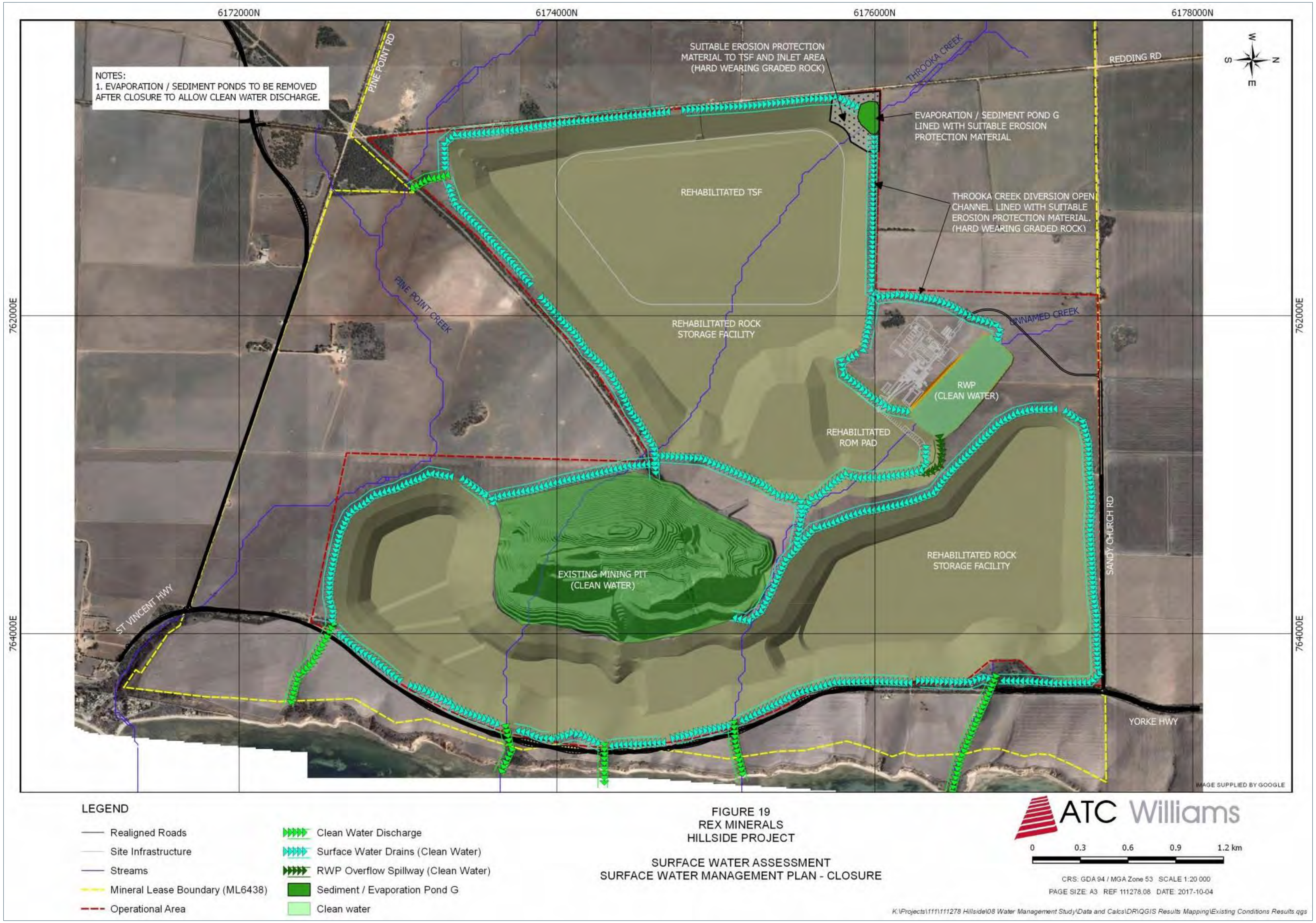


Figure 3-102: Surface water infrastructure at mine completion

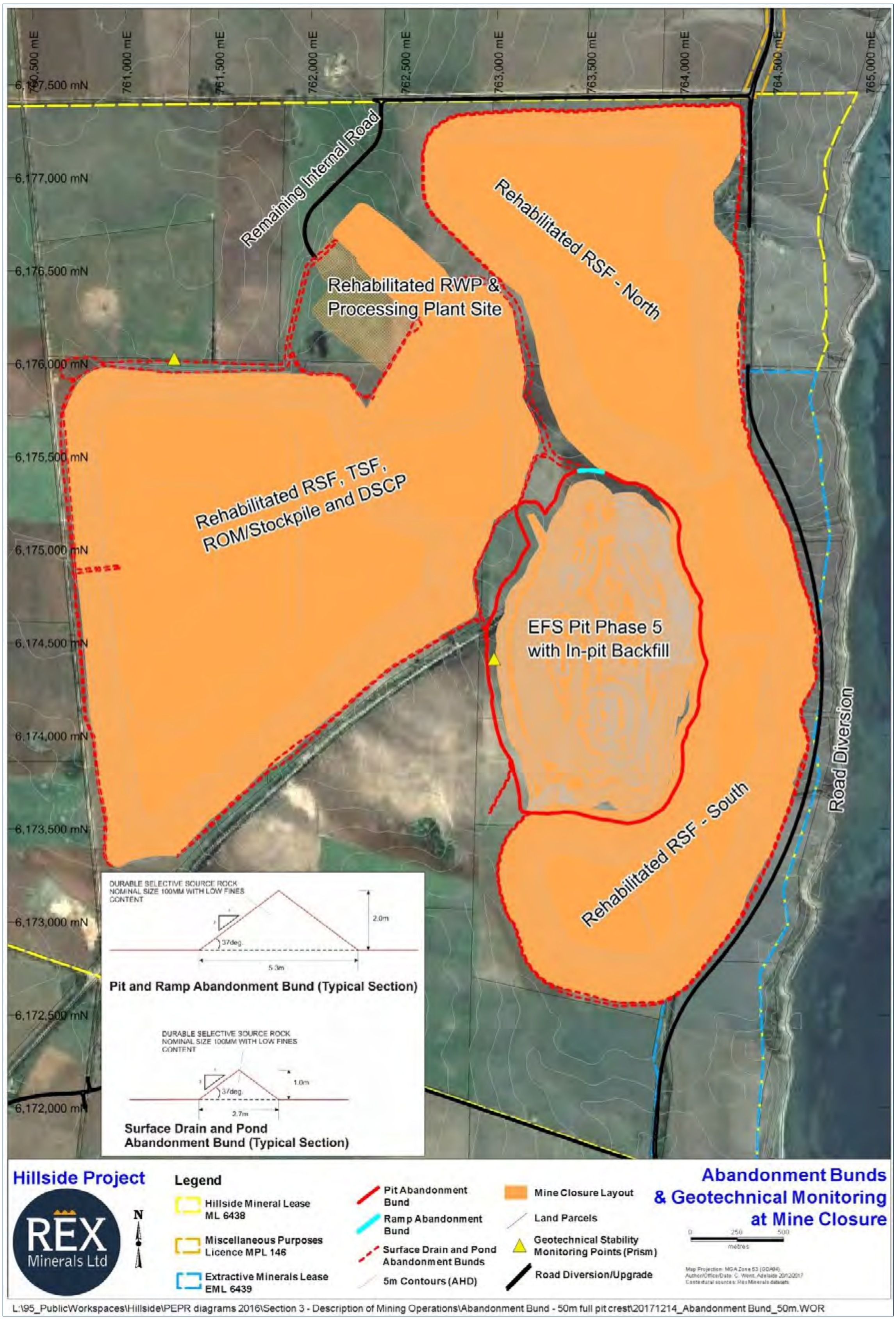


Figure 3-103: Abandonment bunds at mine closure

3.10.1.3 Vegetation covers

Closure vegetation covers proposed for the ML are shown in Figure 3-99. Areas of native vegetation not disturbed by mining activities are shown in Figure 3-104.

Rex will consult with seed collection and revegetation specialists, local community groups and South Australian Government agencies to determine the best mix of species to be selected for native revegetation. Species listed in Table 3-66 were identified as suitable for Hillside Project revegetation. Revegetation trials on the RSF and TSF batters and other areas of the site will be conducted to evaluate the most effective revegetation techniques. Revegetation will be undertaken using mechanical direct-seeding and/or via hand planting with tube stock. Site-specific rates of native seed application will be determined through the trial process.

Table 3-66: Potential native vegetation species for Hillside Project rehabilitation

Acacia rhetinocarpa	*Eucalyptus leptophylla*
Allocasuarina verticillata	*Exocarpos sparteus*
Alyxia buxifolia	*Halgania andromedifolia*
Austrostipa sp.	*Isolepis (Ficinia) nodosa*
Boronia inornata	*Gahnia lanigera*
Callitris gracilis	*Geijera linearifolia*
Casuarina pauper	*Grevillea ilicifolia*
Chrysocephalum semipapposum	*Lepidosperma viscidium*
Chrysocephalum semipapposum	*Lepidosperma viscidium*
Dianella brevicaulis.	*Melaleuca acuminata*
Dodonaea viscosa ssp. angustissima	*Myoporum platycarpum*
Eremophila glabra	*Olearia brachyphylla*
Eucalyptus diversifolia	*Olearia pannosa*
Eucalyptus gracilis	*Pittosporum angustifolium*
Eucalyptus phenax	*Westringia rigida*
Eucalyptus porosa	

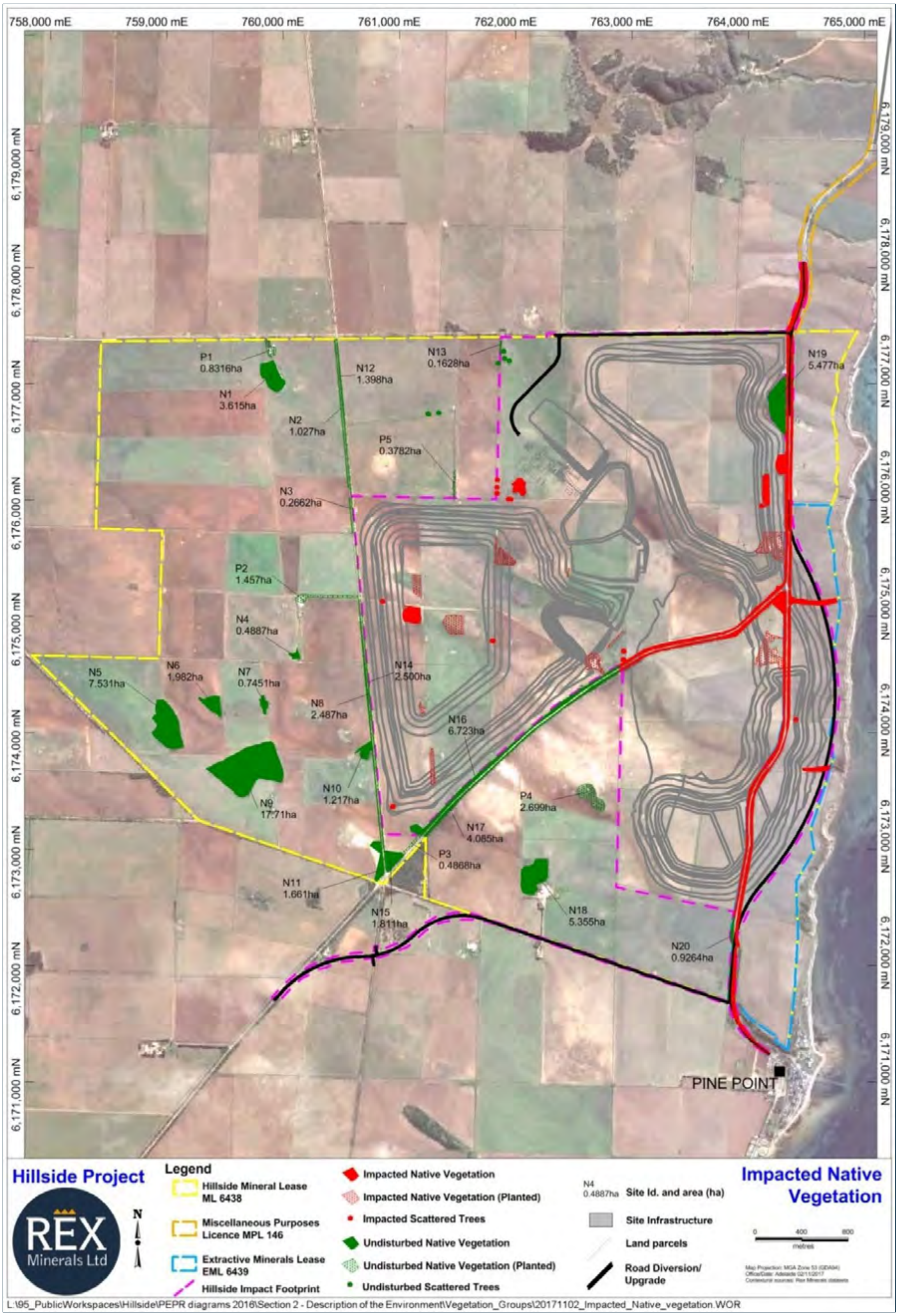


Figure 3-104: Impacted and undisturbed native vegetation

Rehabilitation of the TSF will occur at mine completion, once processing is completed. Until a more optimal design is defined over the LOM (see Section 5.17), the tailings surface will be closed using a low water flux cover system consisting of a suitable overburden layer covered with topsoil and revegetated with Saltbush (*Atriplex nummularia*) or similar.

The types of crops to be planted will be dependent on the landowner but typically comprise wheat, barley, and lentils. Other suitable agricultural pursuits may include livestock farming.

Natural contours of land not disturbed by mining are shown in Figure 3-100.

3.10.1.4 Mining infrastructure

All infrastructure on the ML will be removed unless agree to by landowner, and in some cases the service provider, including offices, sheds, access roads, power lines, water lines.

The surface water infrastructure associated with the diversion of the Throoka Creek will remain in place as previously described.

3.10.1.5 Waste disposal area

Other than already described TSF and RSFs there will be no waste stored on site. It will all be removed from site and be disposed of in an appropriate manner.

3.10.1.6 Location of reshaped and rehabilitation areas

The location of reshaped and rehabilitation areas is shown in Figure 3-100. Revegetation areas are shown on Figure 3-99.

3.10.1.7 Mine void

The open pit mine void at completion is described in Section 3.5.2. Plan and section images of the pit are provided in Figure 3-22 and Figure 3-26. The final pit void including backfill is approximately 244Mm^3, measuring 1,760m long and 1,000m wide.

With respect to final void stability, the accepted industry standard for long term pit wall geotechnical stability requires a FoS of 1.5. The modelled pit wall geotechnical stability has a FoS of 1.66 at the crest of the western pit wall and FoS of 1.74 along the western Hillside property boundary with third party property, which is well above the industry standard.

The geotechnical modelling on the western pit wall is modelled using the geotechnical information accrued during exploration and the feasibility studies. It includes data on geology, hydrology, rock types, strengths and failure modes based on the design parameters, including blasting practices and bench heights. These parameters will be calibrated against actual information recorded during the life of mine to ensure that the predicted FoS is validated and the abandonment bund is located beyond the predicted break back zone on closure.

3.10.1.8 Location of PAF cells and NMD

There are four PAF encapsulation cells post-completion containing 21Mt of PAF. The location of the PAF cells is shown in Figure 3-67. Figure 3-68 shows the typical PAF encapsulation cell construction within the RSFs.

3.10.1.9 Final pit water level

No groundwater from the pit lake will move off site as the open pit will act as a sink in perpetuity due to the high level of evaporation. Accordingly, all groundwater will always flow towards the open pit. Typical sections and plan showing the pit water levels is shown in Figure 3-105. An assessment of the pit lake water chemistry post-closure was prepared by a consultant (Logsdon 2014) and the key findings from the assessment were as follows.

- The primary source of soluble material is from the final pit walls. The amount of the pit walls that are available for oxidation declines with time as the pit walls are inundated with water during filling. As only a small amount of pit-wall rock remains when the pit lake reaches equilibrium. Sulphide oxidation and subsequent water-rock reactions effectively ceases when the rocks are inundated, so the submerged portions of the pit walls are treated as un-reactive.
- Water quality is near neutral pH (7.7 – 7.8) as the wall rock in the ultimate pit shell will be very low in sulphides (~15%).
- Water quality reaches the chlorinity typical of sea / saline water sometime between 80 and 320 years, however remains in the vicinity of sea / saline water chlorinity for several hundred years, rising to the steady-state system value only after about 500 years.
- The low predicted levels of dissolved metals are unlikely to be available to ecological receptors. Any value adding final land uses for the open pit void identified during the LOM will be considered in consultation with stakeholders and will form part of the detailed final mine closure plan.

It is also noted that the borefield will not influence the post-completion groundwater sink of the open pit as it is tidally influenced saline water, i.e., more influenced by the coast than the inland groundwater.

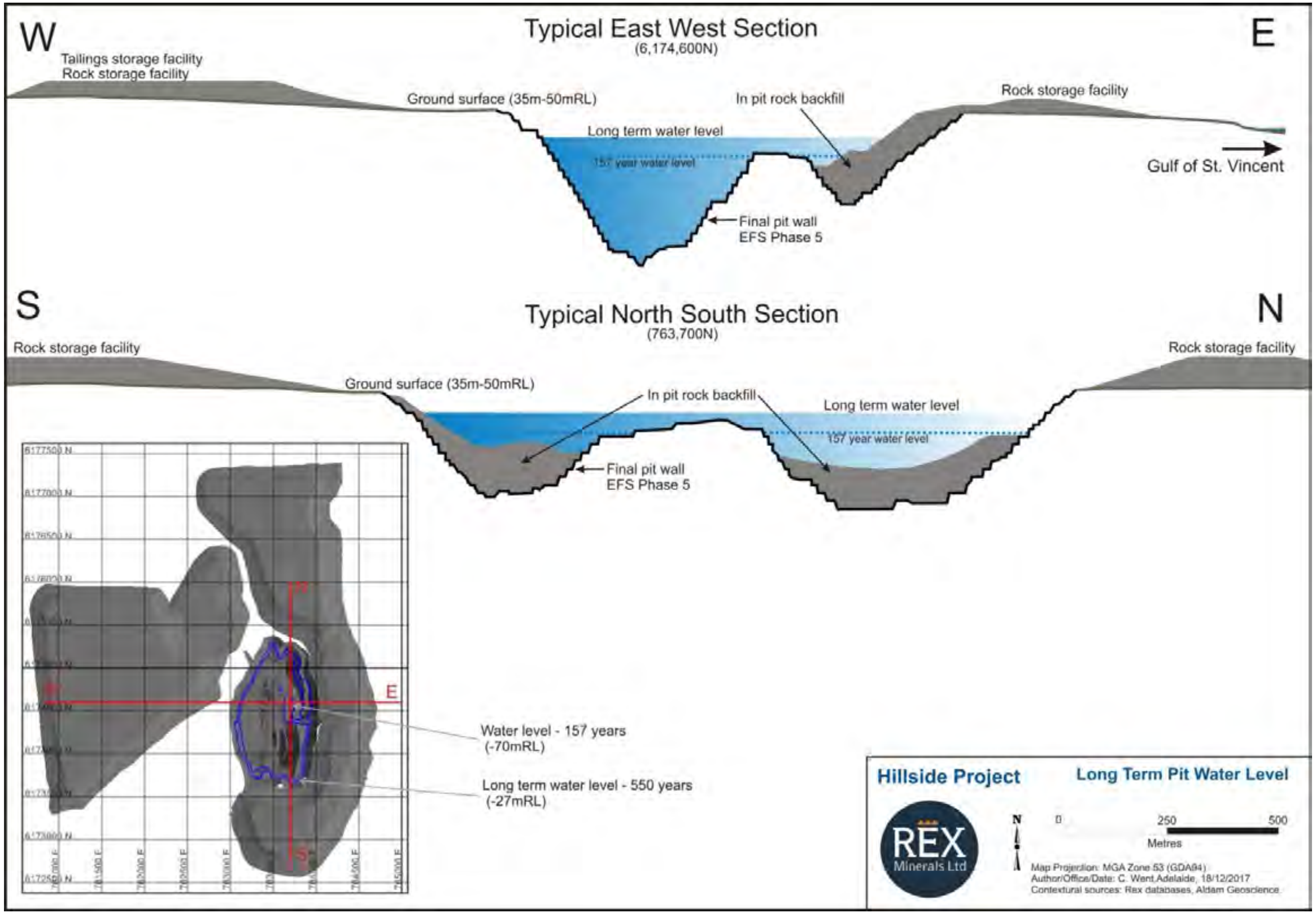


Figure 3-105: Long-term (post-closure) pit lake water level

3.10.1.10 Pre-mining natural surface

Pre-mining natural surface is shown in Figure 2-4 in Section 2.

3.10.1.11 Location of all surface water during operation and post-completion

The location of all surface water during operations is described in Section 3.8.7. Surface water post-completion is described in Section 3.10.1.1.

3.10.1.12 Interpreted geology cross-sections and long sections with pit outline

Representative plans and sections of the interpreted geology are presented in Figure 2-5 to Figure 2-11 in Section 2.

3.10.1.13 Ground water table level and aquifers, any interactions or perched aquifers at mine completion

See Appendix 3.4-B for ground water levels and information.

3.10.1.14 All remaining structures at mine completion

All remaining structures at mine completion are shown above in Figure 3-100 to Figure 3-103.

3.10.1.15 Potential sources pathways and receptors at mine completion

The potential, sources, pathways and receptors for groundwater and surface water are shown below in Figure 3-106 and Figure 3-107 respectively.

Air quality (dust) may also be a source post-mine completion. As identified in Figure 2-3 in Section 2, the wind can occur from all directions and as such, no source-pathway-receptor figure for dust is provided. Rather all receptors in the vicinity may be subject to air quality impact. Given the progressive rehabilitation that will occur over the life of mine and on closure and the lack of exposed areas to be retained that could create wind generated dust, any potential air quality source post-closure is expected to be related to agricultural activities on the land and hence similar to surrounding sources.

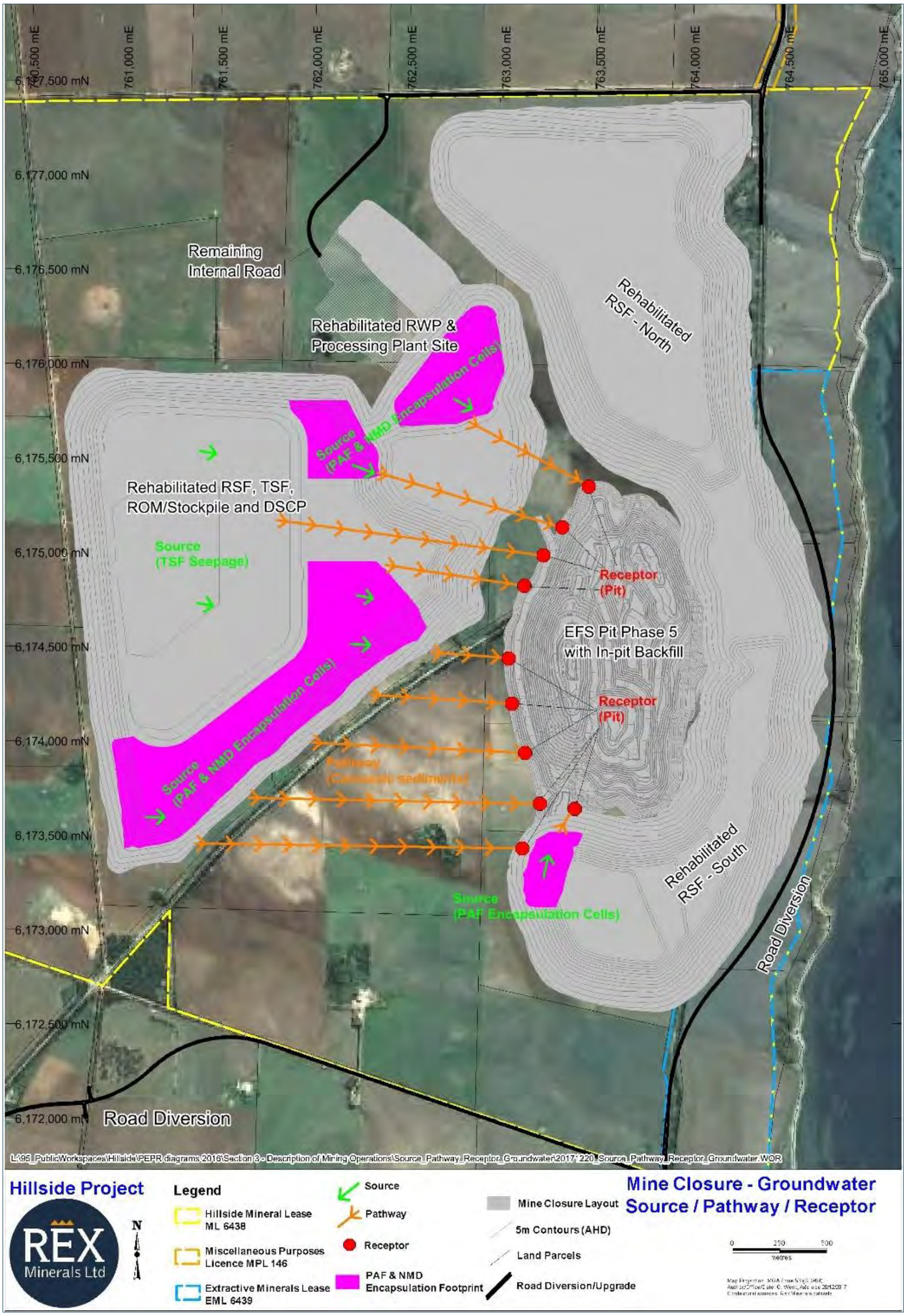


Figure 3-106: Potential sources, pathways and receptors – Groundwater

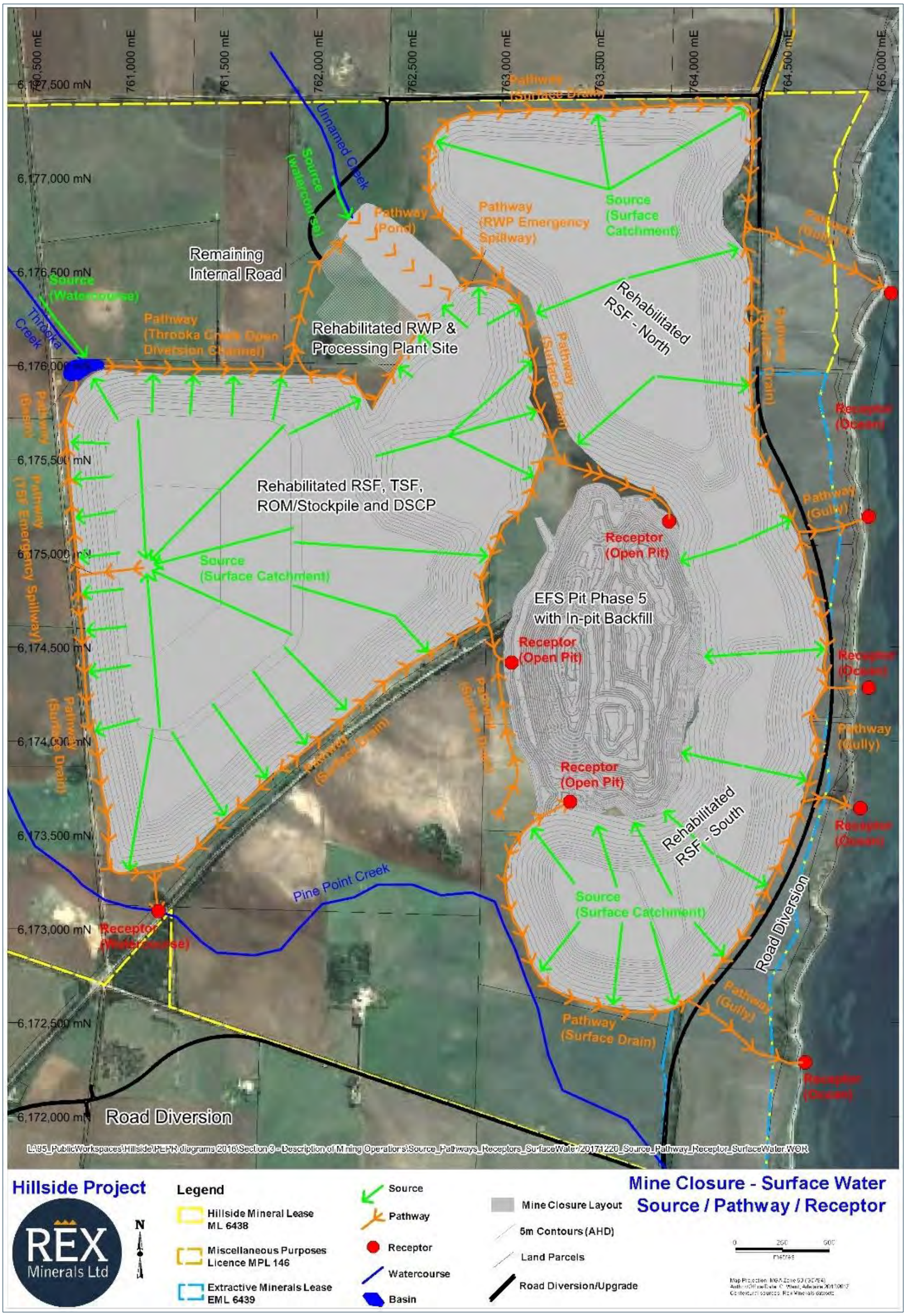


Figure 3-107: Potential sources, pathways and receptors – Surface water

3.10.1.16 Mechanism for transferring responsibility of residual liability

The main objective of this section is to provide a clear picture of the condition of the mine at completion when all the rehabilitation is complete. This section outlines the processes associated with infrastructure dismantling, rehabilitation and maintenance during the period until lease relinquishment is achieved.

Relinquishment of the ML, EML and MPL will require a formal certification from the relevant regulators that all obligations associated with the tenements have been addressed. This will include achievement of completion criteria, which are presented throughout Section 5 and any arrangements for future management and maintenance that have been agreed to by the subsequent landowners or land managers. Ongoing liability may include monitoring and maintenance of surface water infrastructure including Throoka Creek diversion, the mine access road and potentially a fence to prevent access to specific areas by people or fauna. This will be managed by inspections as part of the duties of the landowner or delegated representative when conducting agricultural pursuits within the land. Where relinquishment requires the transfer of ownership of infrastructure and/or land to other parties, Rex will be required to demonstrate to the regulators that these parties have been involved in the process and understand their responsibilities and liabilities associated with the transfer. This is proposed to be enforced by including a caveat on the land titles (which Rex currently owns) or a land management agreement.

Planning for mine closure will be progressively refined and adapted as the Project develops. Successful closure of the mine will be achieved by the life of mine (LoM) objectives and outcomes being integrated into the overall environmental management system throughout all stages of the mine project. The iterative process of developing detailed closure strategies are intended to progressively remove uncertainties and assumptions prior to implementation.

3.10.2 Closure Domains

For management purposes, the Hillside Project has been divided into closure domains based on the type of closure activity required. The components of each domain are described below in Table 3-67 and Figure 3-108 illustrates closure domains within the ML. The Sustainability Manager is responsible for facilitating mine closure until a dedicated Closure position is appointed during the later stages of mine life.

Table 3-67: Closure domains and proposed final land use at closure

Closure Domain	Components	Potential Land Use Options	Timing
Process plant	Process plant and supporting infrastructure (crushing plant, conveyors, stockpiles, SAG mill, tailings pumping system, flotation/concentrate plant, pipelines including the tailings pipeline, ponds/dams, bunds and tanks) Mine buildings (administrative offices, workshops sheds, fuel storage, stores shed) Hardstand areas (truck park bay, lay-down area, fuel bay, stores shed, car park and perimeter of processing plant) Water and process water ponds including the raw water pond Internal power lines Explosives magazine area Waste transfer areas Sewage and wastewater treatment plant Fuel farm	Agricultural pursuits. If oxide or low grade ore stockpiles remain these will be sown with salt tolerant native grasses.	From cessation of production, the rehabilitation is anticipated to take approximately 12 months to establish the future land use.
Tailings storage facility (TSF)	TSF Blanket drainage system Decant and seepage collection pond (DSCP)	Native vegetation (native grasses/salt tolerant species to provide erosion protection dependant on the requirements specified in the detailed design).	The rehabilitation activities is anticipated to take approximately 6 months from cessation of production to establish future land use.
Rock storage facilities	RSF – North (262ha) RSF – South (237ha noting 21.3ha of the cleared pit surface area will be backfilled and incorporated into the RSF – South) RSF – West RSF (391ha including TSF reprofiled ROM, ore stockpile and DSCP)	Slopes suitable for agricultural pursuits (0 to 10°). Agricultural pursuits for a portion of 10 to 15° slopes on the west RSF is proposed. Slopes suitable for native vegetation (greater than 15°).	The rehabilitation will occur soon with in the first year of mining operations and continue to approximately 6 months post-cessation of production. In some areas the future land use may take 12 months to establish post-mine closure.
Open pit (147ha)	Pit walls Pit lake Pit rim bunding and fencing	Potential flora and fauna refuge. The open pit could be made available for ecotourism or aquaculture uses. Currently being workshopped with stakeholders.	The rehabilitation activities will take approximately 12 months from open pit mine closure.

Closure Domain	Components	Potential Land Use Options	Timing
Utility and pipeline corridors (1ha)	Overhead power line SA Water pipeline	Returned original state; agricultural pursuits, access tracks or native vegetation. SA Water pipeline remains at the discretion of SA Water within the road reserve.	The rehabilitation activities will take approximately 6 months from cessation of production unless SA Water and Electricity Provider and Rex negotiate with the SA Government to allow it to remain in place.
Borefield (0.3ha)	Saline water borefield and pipelines	All surface infrastructure will be removed and the pre-mining land use of agriculture re-established. Buried pipeline will remain in place.	The rehabilitation activities will take approximately 6 months from cessation of production.
Undisturbed land (buffer area)	Monitoring sites Fences and bores Remnant native vegetation (73ha) Road underpass	Monitoring sites, fences and bores will be decommissioned and removed unless approved for future use. Agricultural pursuits/remnant native vegetation to remain. The road diversion, including the underpass on both the main highway and Pine point road, has been approved under Section 49 of the Development Act (with the sponsorship of Department of Planning, Transport and Industry (DPTI)) see Appendix 3.9-B. Once the Road corridor and road works has been completed to DPTIs satisfaction, road opening and closing activities will be completed and the title will vest immediately with DPTI.	The rehabilitation activities will take approximately 12 months from cessation of production to establish future land use.
Non-domain specific closure aspects	Waste disposal Internal haul roads (unsealed) (16.6ha) Site drainage infrastructure	All waste removed from site and recycled were possible. Strategic haul roads and pads will be retained as firebreaks others will be revegetated to blend in with surrounds. Site drainage lines removed where appropriate and drainage returned to natural drainage system or where necessary directed into open pit.	The rehabilitation activities will take approximately 6 months from cessation of production to establish future land use.

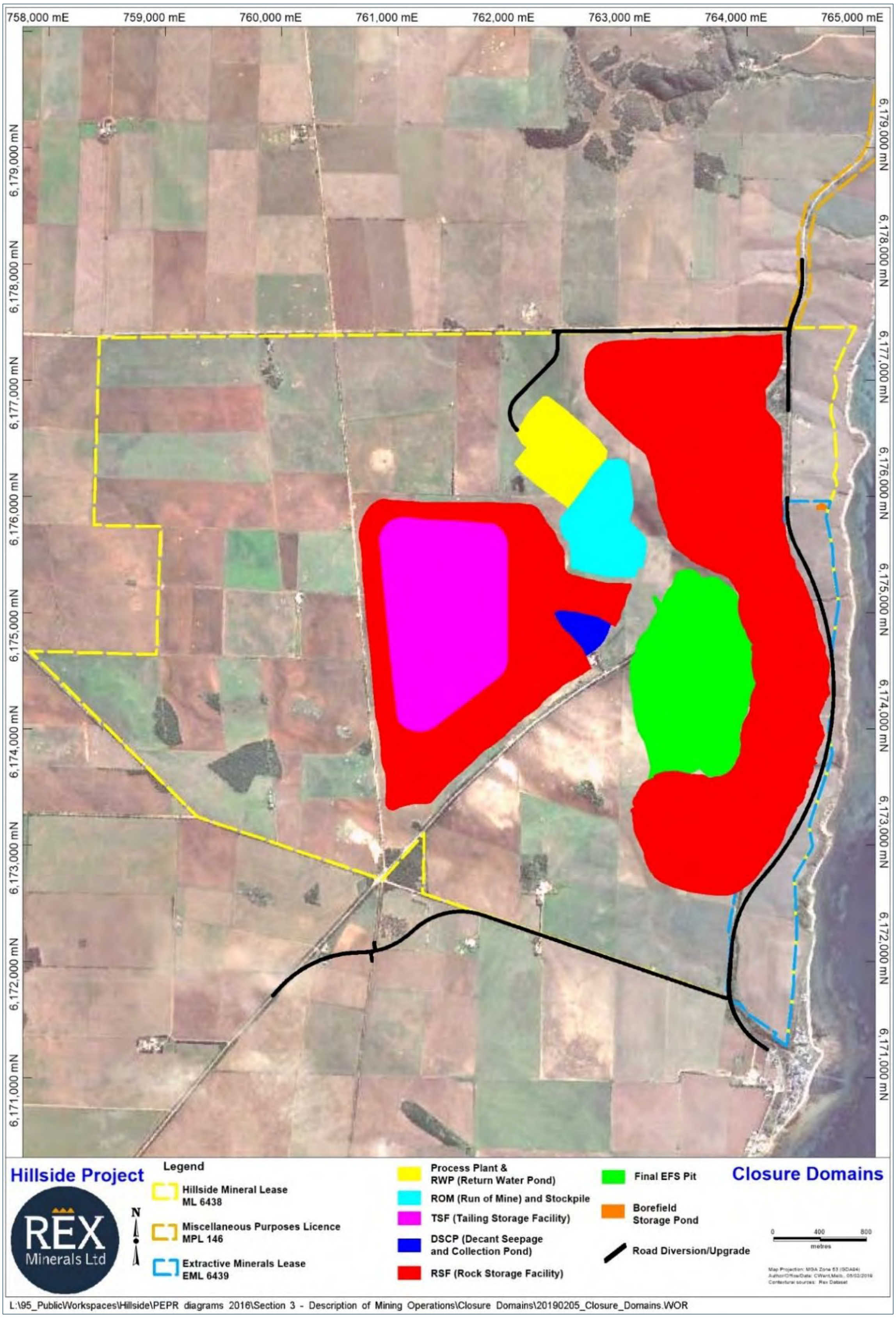


Figure 3-108: Location of the closure domains in the ML

The following sections outline the description of the process for mine closure for each closure domain.

3.10.2.1 Process plant

The process plant and all above ground infrastructure and buildings will be dismantled and sold, recycled or disposed of in an appropriate manner. All tarmac and compacted road base material from sealed roads in and around the processes plant will be ripped up, disposed of in an approved manner and reinstated with topsoil. All sedimentation dams, drains and costeans, that are not required following closure, will be filled in and rehabilitated. Unwanted concrete pads and footings will be removed down to an appropriate depth ~1m below ground level compatible with the proposed agricultural land use.

All concrete within approximately 1m of the surface and clean building rubble will be disposed in the RSFs or open pit. All rubbish will be removed and recycled or disposed in an approved landfill. In general, any concrete, compacted clay, asphalt, plastic liners or any materials used to cover or seal the ground will be removed and recycled or disposed in an approved manner

The magazine compounds, sheds and shipping containers will be dismantled and all infrastructure removed from site for reuse or recycling. All fittings, pipes, lining and pumps, etc. will be disposed in accordance with the EPA requirements and the waste management plan operating at the time of mine closure.

Once the buildings and concrete pads are removed the site will be ripped and covered with topsoil were necessary and returned to land suitable for agricultural pursuits.

If there is a downstream benefit to the local community that can add value to any subsequent land use, for example storage sheds, dams and associated water and power reticulation, these structures will be left in place and handed over to the new owner on relinquishment who will be responsible for any future maintenance and liability.

The ROM pad high wall will remain and the base of the walls will be filled in and contoured to blend into the surrounding pre-mining landform. The drainage from within the plant will report to the RWP during the operational stage. The RWP embankment consists of the same materials as the TSF embankment (i.e., waste rock and selected low permeability upstream facing). The RWP embankment and base will be lined with low permeability clay material which will be removed at closure and if suitable, the material will be used as fill during rehabilitation or placed in an RSF. Once the RWP is decommissioned the surface water run-off will drain into the open pit at closure.

HDPE lined process water dams will be drained and pumped into the open pit or TSF depending on water quality. The dam walls will be removed and if suitable the material will be used as fill during rehabilitation or placed in an RSF. The exposed ground will be tested for potential contaminants. If the soil is contaminated it will be remediated in situ or removed and disposed in an appropriate manner. After contamination clearance, the subsoil will be treated (may involve ripping due to compaction) and covered with 0.1m to 0.3m of topsoil and stabilised with appropriate vegetation applicable to agricultural production.

Approximately 18.5Mt of oxide ore unsuitable for treatment through the flotation plant will be stockpiled in the first six years of pit operations. This material could be suitable for alternative treatment later in the life of the Project. If it should remain at closure it is recognised that it is a potential source of soluble copper and will be treated to ensure encapsulation. The stockpile will be either rounded or pushed back into the RSF – West and re-profiled. The oxide will be covered (top to bottom) by the following, unless otherwise agreed:

- cover layer 1–0.2m of topsoil;
- cover layer 2–1m of rockfill (ROM waste rock material);
- oxide ore; and
- foundation clay pad.

The 1.0m of rockfill layer to be placed over the oxide ore will be sourced from NAF material placed directly from ex-pit waste. There is no requirement for selective sourcing. The topsoil material will be sourced from the topsoil stockpiles located around the site and maintained during the LOM for the purpose of mine closure. The topsoil will be respread to approximately 0.2m and revegetated according to the potential land use which is a combination of cropping, native vegetation and other agriculture uses. This will minimise any potential for soluble copper generation and keep the resource available for later exploitation should that prove economic.

3.10.2.2 Tailings storage facility

At mine completion the TSF closure design will mimic the proposed deposited tailings surface which is a concave surface that slopes towards the spillway location to the west. The overall closure shape will tie in with the overall RSF – West closure surface as shown below in Figure 3-100.

A typical section of the TSF at closure is shown in Figure 3-109.

All surface stormwater run-off will be collected and removed from the facility via the central outlet drain. At this stage, the tailings surface will be covered with a low water flux cover system consisting of a waste rock layer (to be recovered from RSF – West) covered with topsoil and revegetated. Topsoil stripped from within the impoundment area at the time of construction will have been stockpiled for this purpose.

Allowance has also been made at this stage for a suitably sized spillway and outlet channel (designed to cater of a PMP flood event) between the TSF western embankment crest and the RSF, which flows to the east (TSF spillway configuration is presented in Figure 3-110). In the event that a store and release cover or similar is constructed, this may not be required. The process to be implemented to optimise the closure requirements for the TSF are detailed in Section 5.17.

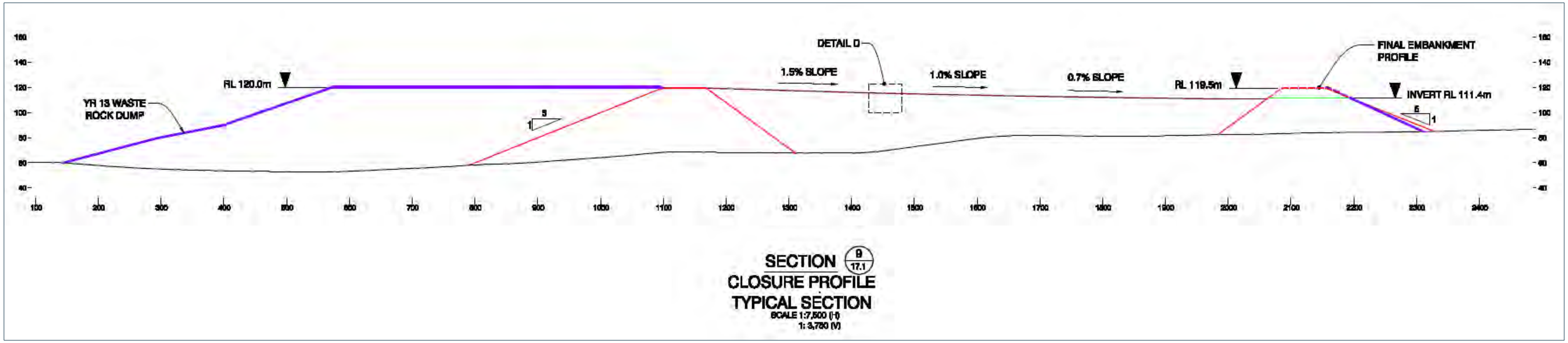


Figure 3-109: TSF closure section

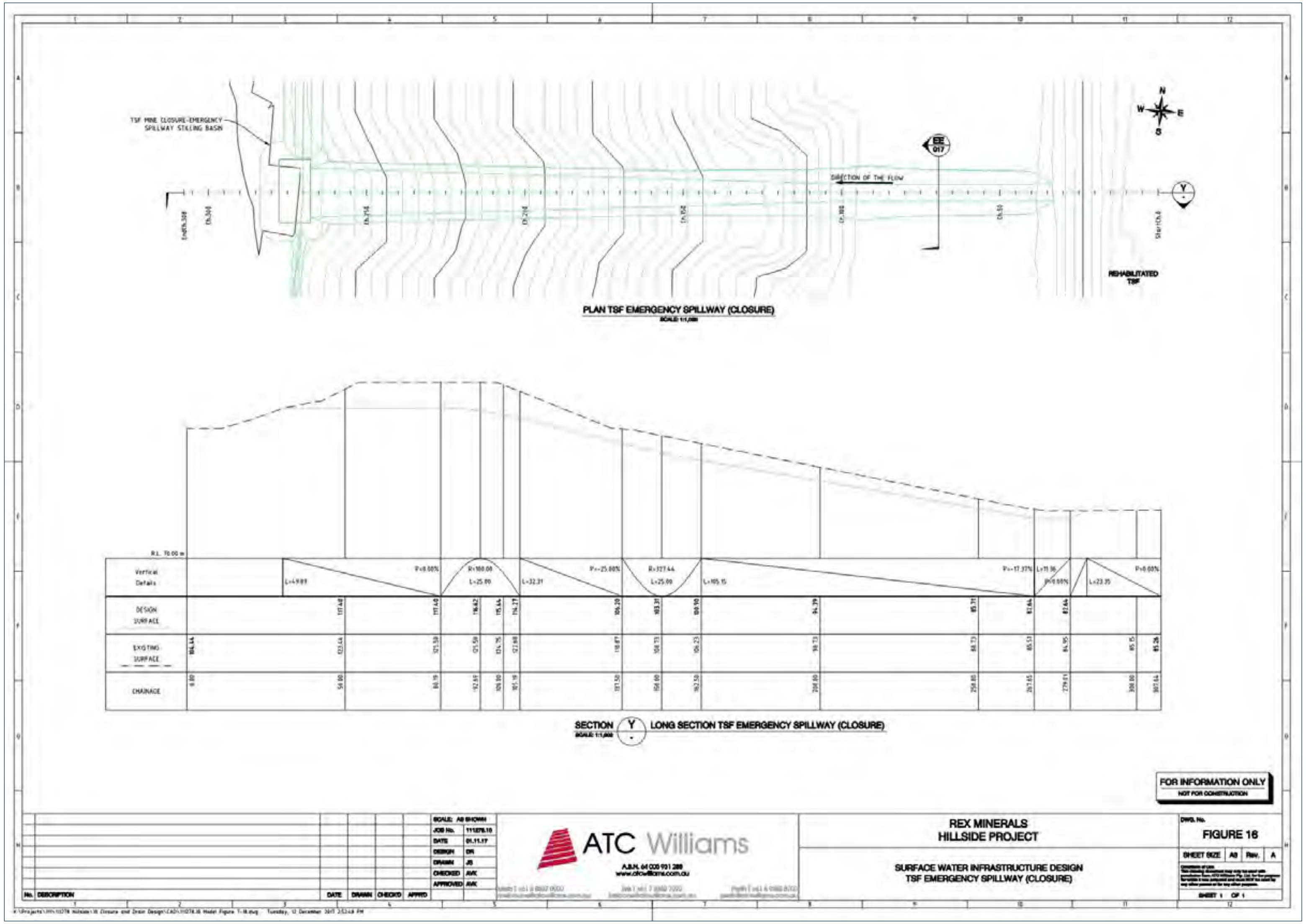


Figure 3-110: TSF closure spillway configuration

The purpose of a soil cover above the tailings in the current closure design is to minimise ingress of surface water and reduce the development of downwards flow through the tailings which may carry contaminants to the underlying strata and the ground water. The design of the TSF closure will result in the flattening of the embankment profile to an average overall slope of approximately 1:50 (vertical: horizontal). Infiltration will reduce due to the placement of the cover and revegetation requirements. The cover layer will act as a store and release cover that will assist to capture stormwater runoff (i.e., store and release) thereby reducing erosion. The overall TSF closure has been designed to take into account incident rainfall.

The cover assessment has been carried out using typical representative soil characteristics and has not included detailed soil testing therefore the expected specific performance of the cover is beyond the scope of the current design.

Closure will incorporate a conceptual cover strategy based on current available guidelines and mine sites in similar climates and includes the following general configuration and nominal thicknesses, in sequence from the TSF base layer surface (top to bottom):

- cover layer 1–0.2m of topsoil;
- cover layer 2–0.4m of weathered rock fill;
- cover layer 3–0.6m of rock fill;
- deposited tailings 30m;
- foundation clay 3m; and
- sandstone/siltstone 40m.

Based on the current closure design, the first 0.6m of rockfill layer to be placed over the tailings will be sourced from NAF material located within the RSF – West. There is no requirement for selective sourcing. The 0.4m of weathered rock fill material will also be sourced from NAF material within the RSF – West. However, this should be selectively sourced to consist of mainly granular material (i.e., finer than the underlying rock fill material). The topsoil material will be sourced from the topsoil stockpiles located around the site and maintained during the LOM for the purpose of mine closure. Figure 3-111 below shows the indicative cover profile of the TSF at closure. See Section 5.17 for assessments that will be conducted during the life of mine to refine the most appropriate closure method for the TSF, once actual data is available for input into models.

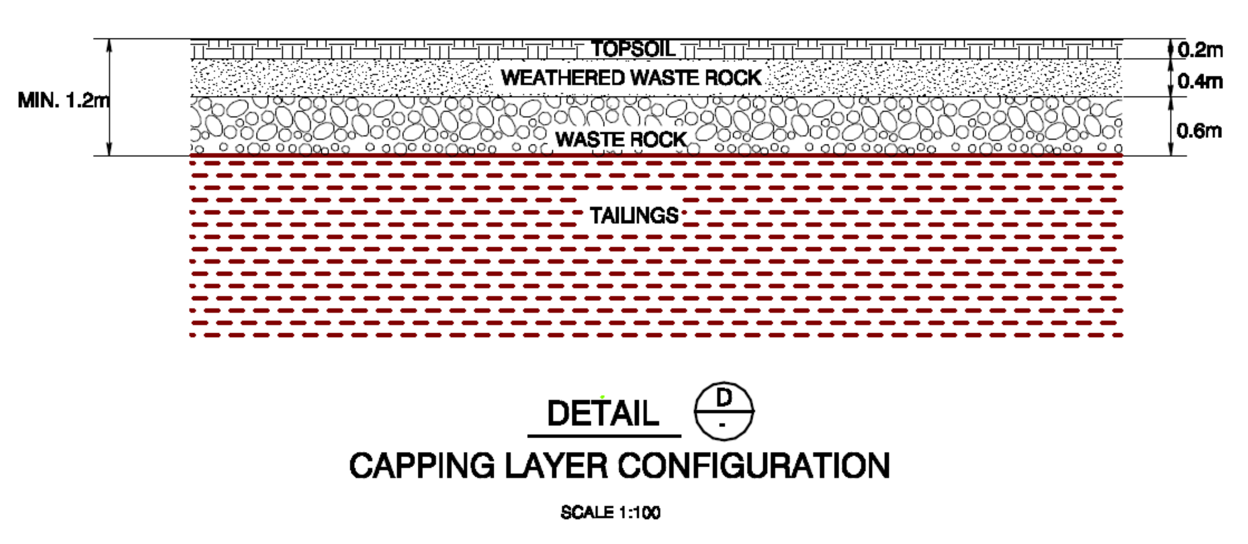


Figure 3-111: Indicative closure cover profile of the TSF

The tailings contained in the TSF have an ANC/MPA ratio of 2.16 indicating there is a high probability that all of the tailings material will remain pH circum-neutral. Accordingly, decant water is unlikely to require treatment. It is anticipated that water quality in the TSF will be suitable to be pumped to the pit to accelerate the drying process once processing has ceased and excess water is no longer fed back into the process water stream. The water quality in the TSF will be checked to ensure that it is similar or better than that in the open pit receiving environment prior to any water being pumped. If necessary, this water will be pumped to the DSCP.

At mine completion, the TSF will drain through the underdrainage blanket system to the DSCP. This water will be retained in the DSCP until the water quality meets water quality levels occurring in the open pit and then discharged to the pit. If the water does not meet the open pit water quality, the water will be treated prior to discharge.

Run-off from the rehabilitated TSF will be directed via the emergency spillway and surface drains to the RWP. Capture of this runoff within the RWP will ensure that run-off water is of an acceptable quality to discharge into the mine pit.

The DSCP embankment and base will be lined with low permeability clay material and the embankment will have a crest width of 15m with a 2:1 upstream and 3:1 downstream slope. Prior to rehabilitation, any sediment occurring in the dam will be tested and if the SA EPA standards (2013) are met it will remain in situ. Should the sediment not meet the appropriate standards it will be stabilised or disposed of as required.

The TCDP may be retained as a dam for future land use and to maintain the drainage system established during the life of mine. If this is determined of no use to the post-closure land use, the embankment will be breached and rehabilitated and the Throoka Creek flow returned to the natural drainage after the diversion.

See Appendix 3.9-C for additional commentary from specialists ATC Williams on TSF closure and Appendix 3-4A for TSF design details.

3.10.2.3 Rock storage facilities (RSFs)

At mine closure, the three RSFs will extend from the main mine site access point to the south-eastern end of the open pit, forming a bund around the processing plant, pit and Yorke Highway. The RSF – West incorporates the TSF along with the DSCP and oxide stockpile, see Figure 3-108.

The RSFs will be rehabilitated progressively as soon as practicable in the mine scheduling. The North and South RSFs will reach their maximum height in Years 8 and 9 respectively. However, progressive rehabilitation will commence soon after the lower batters are completed in Years 2 and 4 respectively. Progressive rehabilitation significantly reduces mine closure costs by using mine equipment opportunistically and taking advantage of available run of the mine materials. Progressive rehabilitation will also provide an opportunity during the operational phase of mine life to confirm that the rehabilitation planned for the Hillside Project will work as intended.

Geochemical studies found less than <6% of the waste rock material is classified as PAF. All such material will be contained within the RSF - West or in the in-pit RSF.

Rehabilitation of the RSFs will consist of pushing back the batters to achieve a concave slope following best practice erosion stability practice, by utilising three slope angles of 20 degrees, 15 degrees and 10 degrees with the flattest slope placed at the toe of each RSF (see Figure 3-61, Figure 3-62 and Figure 3-63).

The RSFs will be covered with subsoil and topsoil to a depth dependant on their proposed final slope and land uses. The RSF – North, RSF – South and RSF – West will be vegetated as per Figure 3-99.

The steeper slopes (20 degrees) will be covered with a mix of topsoil and rock to minimise erosion and stabilised with a dominant native shrub vegetation or other agriculture uses. The desired outcome at relinquishment is to hand over a physically and chemically stable landform with native vegetation trending towards self-sustainability and rehabilitated pastures where the new landowner can continue agricultural pursuits in-line with local practices and minimal inputs to the remnant and replanted native vegetation.

3.10.2.4 Open pit

Once partial backfill is completed (on mine closure) the remaining mine pit will be oval in shape, approximately 1,760m long and 1,000m wide with steep slopes reaching the pit base at RL -395m. A surface area of approximately 30ha of the south-eastern area of the open pit will be backfilled and rehabilitated for agriculture as shown in Figure 3-99.

Following mine closure access to the open cut pit will be restricted by the construction of a stock proof fence and abandonment bund. The abandonment bund will be constructed and positioned in accordance with WA abandonment bund guidelines document (DIRS 1997). The bunds will be 2m high and 5m wide with location determined by a geotechnical engineer before mine closure, to ensure the bunds remain in perpetuity. The bund will be vegetated with native species (see Figure 3-112). The two 35m wide haul roads will remain in the pit to divert runoff water to the pit lake. The pit haul roads will link up to haul roads from the RSFs forming an internal drainage system to divert run-off. The runoff may initially contain sediment while landscapes are stabilising however is not expected to have any other pollutants.

Post-closure modelling of pit water level recovery shows that the pit will fill very slowly to around RL -300m by year 62, RL -120m 110 years after mine closure and to RL -70m 157 years after mine closure. It will reach long term equilibrium level after 550 years at RL -27m. See sections and plan views of long term water levels in Figure 3-105.

Pit lake information is provided in Section 3.10.1.9.

Final land uses for the open pit void are still being considered in consultation with stakeholders and will form part of the detailed final mine closure plan.

3.10.2.5 Utility and pipeline corridors

The SA Water pipeline may remain (see Appendix 3.9-D), as it will be the property of SA Water.

An above ground power line from the Ardrossan West power substation will be constructed along Silo Road and south to the mine site on the western side of the Yorke Highway. There will be a power off take to the Port of Ardrossan near the Yorke Highway and Silo Road intersection.

On closure, the power supply lines will be considered a valuable asset and are likely to be handed over to the state power utilities, as will the responsibility for maintaining the power lines. If an arrangement for the handover of the power line is not able to be made, the power lines will be removed at closure. As much as possible the waste will be recycled, with the remainder disposed of in accordance with EPA requirements.

3.10.2.6 Borefield

An above ground power line from the existing SA Power Networks coastal power line will be installed to the Project borefield (a distance of approximately 1km).

All related surface infrastructure will be removed and the pre-mining land use of agriculture re-established. The buried section of the borefield pipeline will remain in place.

3.10.2.7 Undisturbed land

This domain includes the majority of the EML and will contain the temporary stockpiles of excess cut from the highway realignment. Prior to EML closure any remaining stockpiled material will be removed and used off-site for the Pine Point Road diversion or placed in an RSF. This portion of land will be transferred to DPTI/YPC to take over responsibility of the care, control and management of the highway.

During the operational, closure and post-closure phases through to relinquishment, the native vegetation in the area will be upgraded through a combination of weed management, pest control and selective plantings of native vegetation endemic to the coastal zones of this region.

The vegetation selected for planting will be from seeds or propagating material from Yorke Peninsula based on advice from local environmental groups such as the Threatened Plant Action Group (TPAG). Rehabilitation techniques and procedures will be refined over the mine life to ensure that at relinquishment the vegetation communities are established to the point that they will be self-sustaining.

The ML will include agricultural land that will be held as a buffer for the mining activities. During the operational stage, this land will be managed in a manner compatible with local agricultural pursuits. No mining vehicles, personnel or equipment will need to access these areas and it will generally be delineated by stock fences.

As mine completion nears, any unnecessary fences separating the undisturbed land from the mining operations will be removed or relocated. A weeds and pest inspection will be conducted and any remedial action required will be undertaken. Any degraded pasture will be fertilised and sown if required to ensure that the pasture species mix and density is compatible with local practice.

3.10.2.8 Non-domain specific completion aspects

The non-domain specific aspects during mine completion consist of waste disposal, unsealed internal haul roads and pads, site drainage and maintaining access to future mining as far as practicable. These have been addressed separately in the following sections.

Waste Disposal

Mine closure waste will consist of concrete, scrap metal, plastics (mostly HDPE), batteries, tyres, wood, putrescibles and domestic waste sewage, reagent containers and packaging materials.

Concrete waste will be disposed in the pit, TSF or RSFs depending on the location and availability at the time of removal. All metals, plastics and cardboard/wood and containers will be recycled where possible, some non-recyclable materials will be sent to the nearest available EPA approved landfill.

A program for separating domestic rubbish into bottles and cans, recyclables and organic waste established during the operational phase will be continued through to mine closure.

The above practices will ensure that no chemically unstable waste will remain at mine closure after all the rehabilitation works have been complete.

Sewage will continue to be processed through the treatment plant at the processing site and it will remain in place until all other rehabilitation works have been completed. After completion of the bulk earthworks rehabilitation activities on the Project site, the sewerage treatment plant will be removed.

Internal Haul Roads and Pads

At the EOM life several internal haul roads, access tracks, pond liners, concrete pads, borrow pits and hard stands will remain and these will be removed and revegetated. All non-essential internal haul roads, access tracks, concrete pads, borrow pits and hard stands will be dismantled, or broken up and disposed as outlined above. Any compacted ground will be ripped and sown to pastures or planted with native vegetation on the steeper slopes. Any roads required to be removed will be dozed into piles loaded onto trucks and disposed of into the pit.

Site Drainage

During operations, run-off generated from RSF’s and other infrastructure will be separated from the natural drainage systems, where possible, apart from Throoka Creek. The RSF runoff has the potential to carry contaminants (particularly sediment) and will be directed into evaporation/sediment ponds and then reused where appropriate for process water or allowed to evaporate. Diversion drains and stilling basins will remain post-closure and will naturally reintegrate to the environment. The sediment ponds will be either be backfilled with topsoil and revegetated or retained to naturally reintegrate with the surrounding environment. Where ponds and water containments are to be removed, Dam embankments will be removed when the mine runoff water from the mine created landforms is considered not contaminated compared to the established baseline of water flowing into them. If a representative baseline cannot be established due to lack of rain, erosion assessment will be used as justification to retain or rehabilitate the sediment ponds.

Run-off from the TSF and RSFs will potentially have a high sediment load prior to rehabilitation stabilising the structures. During the operational phase, this water will be diverted to the process water management system or a system of sediment settlement dams and sumps to settle the sediment. Only clean run-off will be allowed to return to the natural drainage channels. See Figure 3-92 and Figure 3-94 for sediment ponds and surface water drain designs.

Access for future mining

The South Australian government requires that access for any future mining or reprocessing is maintained. The majority of the access haul road to the open pit will remain open and be used as drainage channels. However, a complete geotechnical and hydrological risk assessment will be required before any future mining was to take place.

A low-grade ore stockpile will be accumulated up until Year 13 of operations. At closure, it is anticipated that no low-grade ore will remain. Approximately 10 million tonnes of oxide ore unsuitable for treatment through the flotation plant will be stockpiled in the first four years of operation. This material could be suitable for alternative treatment later in the life of the Project. If it should remain at closure, it is recognised that it is a potential source of soluble copper and will be encapsulated on closure as per the following description. The stockpile will be either rounded or pushed back into the North RSF and re-profiled. Drainage from this stockpile will be directed to the mine pit. The oxide will be treated in a similar way to the TSF by:

- sealing layer of non-acid forming, low permeability compacted earth fill (0.5m depth);
- mine spoil cover of non-acid forming rockfill (1m depth);
- topsoil cover (0.1–0.3m depth); and
- stabilised by pasture species and low shrubs.

This will minimise any potential for soluble copper generation and keep the resource available for later exploitation should that prove economic.

3.10.3 Rehabilitation Strategies and Timing

A description of the process for closure activities have been provided above for each closure domain. The description included broad strategies to be applied as part of mine closure for rehabilitation for the components of each closure domain. As the stages of mining progress, the mine closure plan will provide greater detail regarding the timing of the associated closure activities. At this stage, the following timelines provide a conceptual outline for the closure timing of the major mine and infrastructure components in relation to each other.

Mine scheduling will allow the South and North RSFs to be completed in Years 8 and 9 respectively. Progressive rehabilitation will commence soon after the lower batters are completed in Years 2 and 4 respectively. Rehabilitation of these RSFs is scheduled to be completed within two years to leverage optimal seasonal timing.

Progressive rehabilitation of completed portions of the western RSF is a priority and will occur as soon as practicable in the mine scheduling. All topsoil and subsoil stockpiles are stabilised with pasture species on an on-going basis and any opportunity for a one-shift policy will be implemented. An assessment of the proportion of material available to backfill the open pit will occur on an ongoing basis.

Oxides may be processed during or after mining operations have ceased. Placement of cover materials over the TSF can commence during the final months of operations, working from the perimeter inwards as quickly as the TSF surface dries to a condition allowing machinery access. The final TSF closure, dismantling of the processing plant components at the mine will be undertaken once processing is completed. Ongoing waste management throughout the life of mine will ensure that minimal additional waste is required to be removed for closure. A cross-section of the proposed final landform and capping profile is presented in Figure 3-105.

3.10.4 Rehabilitation Liability Estimate

Provide the maximum third party cost of rehabilitation at any time over the life of mine covered by the PEPR. The estimate must be based on reasonable third party costs of undertaking the rehabilitation strategies as outlined in Section 3 and include costs for project management, inflation, normal project variation, and contingency provision for risk associated with the strategies and uncertainty in the cost estimates.

AECOM Australia Pty Ltd have provided Rex with a report (Appendix 3.9-E) outlining the maximum third-party cost of rehabilitation at any time over the life of mine covered by the PEPR. The estimate is based on reasonable third-party costs of undertaking the rehabilitation strategies as outlined in the document and include costs for project management, inflation, normal project variation, and contingency provision for risk associated with the strategies and uncertainty in the cost estimates. See Table 3-68 below.

Table 3-68: Rehabilitation liability review

Domain Name	Rehabilitation Liability Estimate ($M)			Percentage of Overall Rehabilitation Liability Estimate
	Year 2	Year 8	EOM	
1 – ROM and roads	$2,264,710	$2,264,710	$2,264,710	9.9%
2 – Infrastructure	$3,206,122	$3,206,122	$3,206,122	14.0%
3 – TSF	$3,388,490	$3,514,151	$6,208,139	27.1%
4 – RSF – West	$0	$4,296,039	$379,803	1.7%
5 – RSF– South	$1,801,149	$4,234,271	$1,494,263	6.5%
6 – RSF – North	$1,393,231	$3,714,796	$2,918,610	12.8%
7 – Pit	$753,077	$753,077	$753,077	3.3%
8 – Other	$380,200	$380,200	$380,200	1.7%
Sub-total of Domains	**$13,186,979**	**$22,363,366**	**$17,604,924**	
Management and contingencies	$3956,094	$6,709,010	$5,281,477	23.1%
TOTAL	**$17,143,073**	**$29,072,376**	**$22,886,401**	100%

As shown above the highest estimated rehabilitation liability is approximately $29,073,400 this is based on the Year 8 calculation. The rehabilitation liability estimate is higher at Year 8 as the areas which have not been rehabilitated are highest then: progressive rehabilitation increases from Year 8 until the EOM.

3.11 Resource Inputs

3.11.1 Workforce

For the workforce for all mining operations (mining, processing, waste management and supporting surface infrastructure), describe:

- *how operations on the site will be managed;*
- *number and workforce breakdown by job type; and*
- *source of employees.*

3.11.1.1 Organisation structure

All personnel will be located at the Project site and considered to be full-time employees. The proposed Rex senior management organisation structure is shown in Figure 3-112. The majority of the workforce is expected to be residential owner operator and managed by Rex senior management who will reside locally.

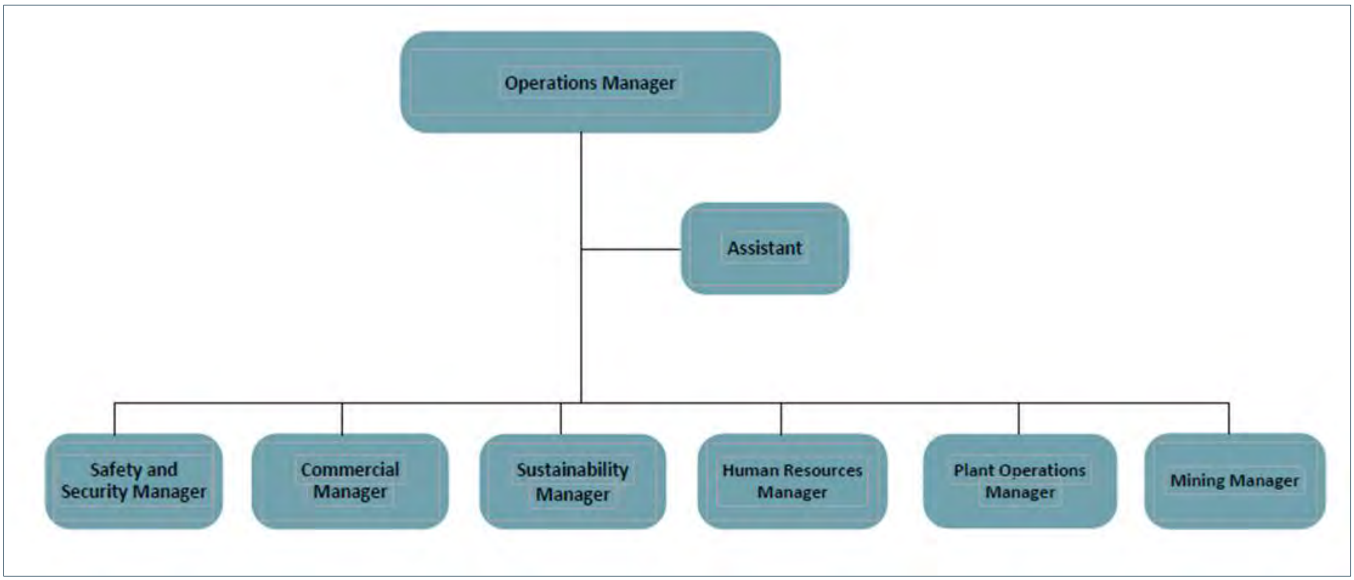


Figure 3-112: Senior management organisational structure

3.11.1.2 Number and workforce breakdown by job type

The Project is expected to employ approximately 500 people at its peak in Year 9 of the Project. During the construction phase the employment numbers are expected to range from 380 to 550 depending on the stage of construction. An estimate for the number and breakdown of the workforce for main stages of the mining operation (construction, operation, maintenance and closure) is provided in Table 3-69.

Table 3-69: Indicative workforce breakdown for main stages

Activity	Construction	Operation	Closure
Mining			
Drill and blast	27	67	
Load and haul	81	116	12
Ancillary and pumping	36	38	
Management and administration	13	17	3
Technical services	26	55	2
Maintenance and MARC	46	60	6
Processing			
Management and administration		11	
Operators		38	
Maintenance		29	
General and Administrative	**30**	**48**	**8**
Infrastructure Construction	**270**		
Total	**529**	**479**	**31**

* Maintenance and repair contracts (MARC).

The percentage target for Aboriginal and local employment is 80% for the operational phase.

3.11.1.3 Source of employees

One of the key attributes of the Project is its location in that it is not remote and therefore can be integrated in the existing community.

Social infrastructure within the primary and regional study areas are adequate to service the current population and would have sufficient capacity to cater for an increased workforce associated with the development of the Project.

It is anticipated that the workforce to undertake the Project will be derived from either the local pool of available potential workers, those choosing to move to the region for work, and those who may want to commute from further afield. Rex does and will recognise the importance of local employment as a key benefit to communities impacted by the Project and will prioritise local employment wherever possible.

It is assumed that there would be various accommodation options available for the workforce including existing residences for local employees and new accommodation developments for purchase or rent. Evaluation of this will be undertaken as part of the PEPR process.

3.11.1.4 Potential social impacts in the region

The benefits that will be associated with the development of the Project will include a significant impetus to the regional economy, a diversification of its current agricultural and tourism industry base, increased employment opportunities and associated stimuli for population growth. Growth on the Yorke Peninsula is currently limited by factors which include water and power supply. The Project will result in significant benefits to the region including an increase in local and regional water and power supply capacity, in particular beyond mine life.

The following benefits illustrate Rex's commitment to the community:

- continue community engagement to ensure optimal outcomes are achieved from the Project;
- ensure regional employment and training opportunities are integrated into workforce planning;
- ensure regional businesses opportunities are maximised;
- integration of workforce living within nearby communities;
- infrastructure improvements to be of long term benefit (where possible) beyond the life of the mine;
- increased knowledge and protection of Aboriginal cultural heritage; and
- closure planning to be developed in consultation with community to achieve acceptable outcomes.

Rex recognises that there are potential negative effects from the Project which need to be managed to reduce or eliminate impacts. These include:

- interruption to road travel during highway diversion construction;
- loss of agricultural land during operations, with some permanent loss;
- potential impacts and mitigation of noise, dust, lights, visual amenity;
- social interaction within the local and regional community, particularly during construction phase; and
- some increased traffic and activity on local roads.

The ML conditions set by the Department in its approval of the ML recognise these potential impacts, and along with the management strategies being developed by Rex will mitigate these potential negatives and enhance the positive aspects of the Project (see Section 5).

3.11.2 Energy Sources

For the energy sources and usage provide:

- *estimates of total annual energy usage (from all sources, including personnel transport and ore transport to point of sale);*
- *expected sources of energy;*
- *potential for efficiency gains;*
- *amount and percentage of zero emission energy to be utilised;*
- *equivalent annual CO2 generated; and*
- *any carbon offsets proposed.*

3.11.2.1 Energy usage

Energy usage for the Hillside Project will be predominantly diesel consumption to operate trucks and excavation machinery at the mine, and electrical consumption in the ore processing and distribution facilities.

Based upon calculations carried out as part of the plant design, electrical consumption is forecast to remain relatively consistent throughout the life of the Project, requiring an estimated 651 terajoule per annum (TJ/a) at the optimum throughput of 6Mtpa.

It is projected that diesel usage will vary throughout the life of the Project as a factor of the volume of rock that needs to be excavated to access the ore bodies. Economic modelling of the project has estimated that 934TJ will be consumed in the first year, increasing to an average of 1289TJ/a in Years 2 to 13 and then declining to an average of 209TJ/a for Years 13 to 15. See Figure 3-113 below. Additional diesel fuel will be required to run buses and light vehicles that Rex will operate to transport personnel to and from the site, with demand estimated at 8.9TJ/a.

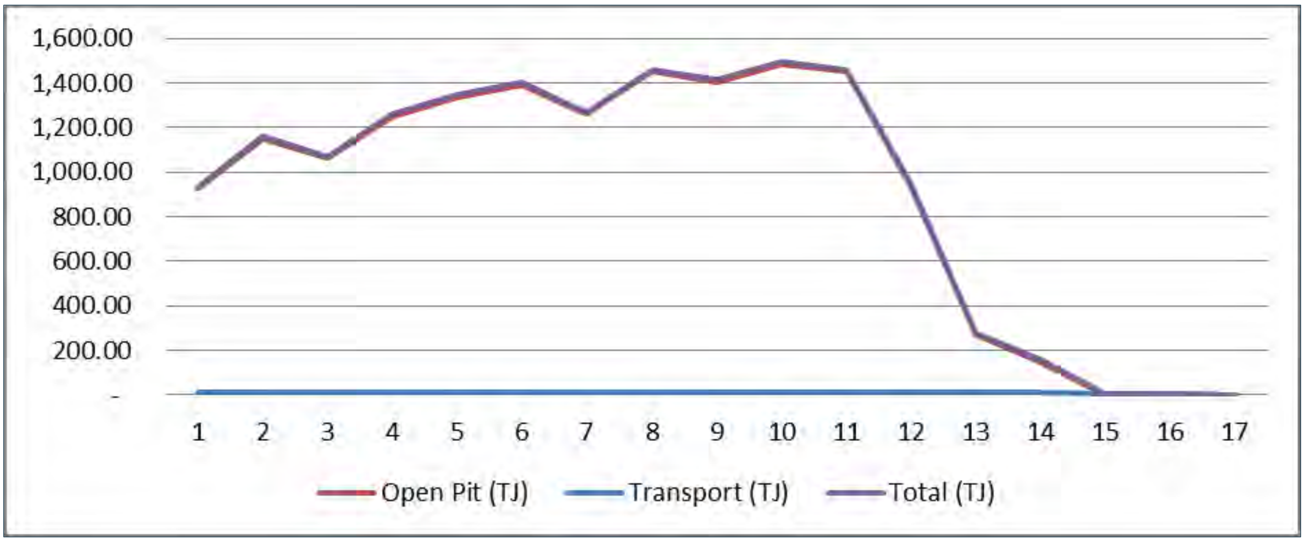


Figure 3-113: Annual diesel consumption (terajoules) throughout the life of the Hillside Project

This variation in diesel consumption will result in total energy requirements increasing from a baseline of 934TJ/a in Year 1 to a peak of 2110TJ/a in year eleven, before declining back to 929TJ/a in Year 13 and holding at approximately this level for the remainder of the Project life (Figure 3-114).

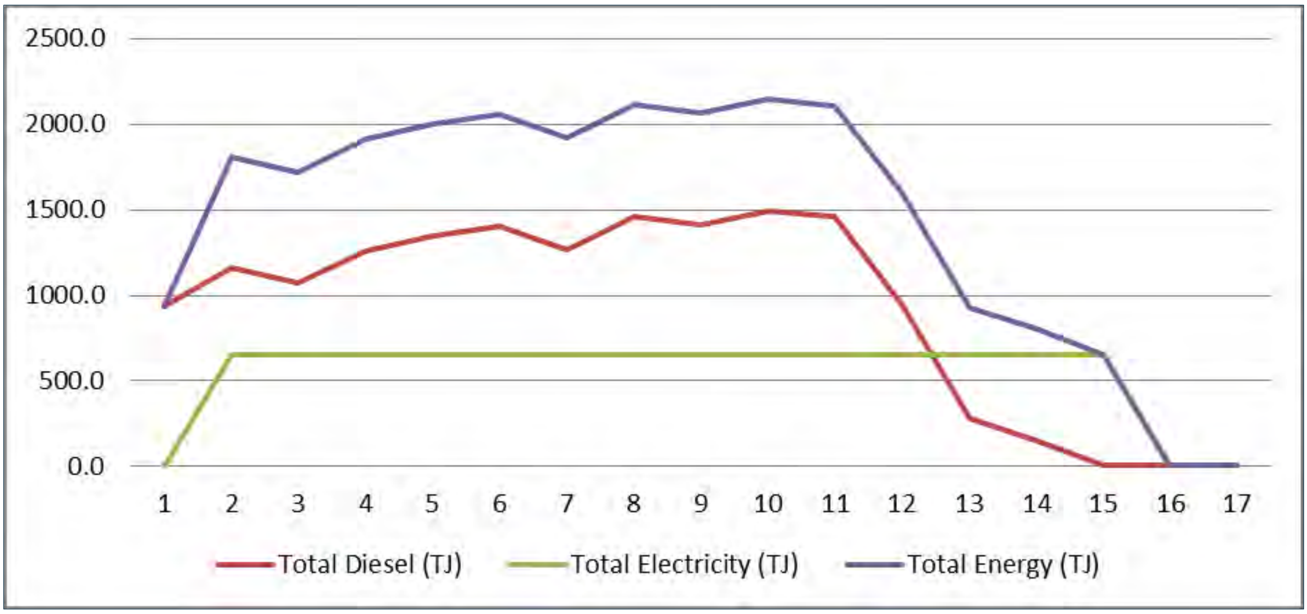


Figure 3-114: Annual energy consumption (terajoules) forecast for the Hillside Project

Diesel Fuel

Liquid fuel requirements will be met predominantly using diesel fuel which will be transported to site via B-Double tanker truck, which at peak operation will require five deliveries per day.

Electricity

Total project load of the process plant and mine services is 34.5MW installed power and an average operating power of 22.6MW (181GWh/a) at unity power factor.

Hillside Electrical Load

The estimated installed and running loads in each area of the process plant and mine are shown in Table 3-70.

The inclusion of plant lighting, small power and uninterrupted power supply (UPS), instrumentation and control equipment results in a total connected load of 34,541kW. The application of relevant utilisation factors results in a total running load of 22,601kW for the process plant and mine. The overall uncorrected power factor for the total plant load is estimated to be 0.8 lagging.

The largest individual load at the Project site is one 18MW SAG mill supplied direct at 3kV. The next significant loads are two regrind mills 3MW and 1,5MW respectively. The largest other drives are the 500kW filters drying air compressor and the tailings transfer pumps. The motors for the regrind mills are supplied at 6.6kV, with the balance of motors in the plant being supplied either at 6.6kV or 400V, depending on their rating.

Table 3-70: Indicative process plant electrical load

Area	Description	Installed Power kW	Draw kW	Total kWh/a
3210	Primary crushing	585.2	397.0	3,174,912
3220	Crushed ore handling	34.0	6.6	53,050
3230	Grinding	17,504.8	13,204.5	105,607,962
3350	Copper rougher flotation	1,483.1	1,119.0	8,949,919
3360	Copper concentrate regrind	2,062.5	1,751.8	14,010,752
3370	Copper cleaner flotation	712.0	536.8	4,293,305
3410	Copper concentrate thickening	37.6	16.7	133,355
3440	Analyser	25.5	21.5	172,035
3850	Tails disposal	2,968.0	1,743.8	13,946,971
3900	Reagents at mine site	152.2	92.5	739,608
3950	Air distribution at mine site	720.2	303.8	2,429,810
3960	Water distribution at mine site	1,328.0	763.1	6,102,915
4030	Plant buildings	660.1	284.9	2,278,754
6440	Concentrate filtration	1,603.5	189.5	1,493,634
6450	Concentrate storage	161.0	98.7	789,476
6960	Saline water handling	610.4	234.5	1,875,414
	Hvac, switch rooms, ups battery, welding outlets	3,893.0	1,836.2	14,685,483
	Base charge			
Total		**34,540.9**	**22,600.9**	**180,737,357**

Power for the process plant site will be supplied by ElectraNet from the 132 kV Yorke Peninsula network from a direct connection to Ardrossan West 132kV substation. This is depicted in Figure 3-91.

Power to the borefield site will be supplied by SA Power Networks (previously ETSA) from the Ardrossan West 33kV substation by a single 33kV overhead power line.

Efficiency Gains

Rex will implement a comprehensive integrated Health, Safety and Environment Management System (see Section 6), which will help to embed energy efficiency into corporate and site management operating practices. This overarching Management System will encourage energy efficiency improvements through the continuous evaluation of site and process performance and the evaluation and implementation of cost effective improvement measures.

Rex has undertaken a detailed geometallurgical analysis of the ore body to optimise mine design and to allow for the selective blasting and processing of higher grade ore to maximise comminution efficiency.

Variable speed drives are specified for electric motors where possible, Power Factor Correction will be installed on all major switchboards to bring load power factor into unity, plant will be operated on a continuous basis at as close to peak throughput as possible to maximise efficiencies.

Zero Emission Energy and Carbon Offsets Opportunities

Rex recognises the importance of utilising zero emission energy and carbon offsetting in reducing greenhouse gas emissions thereby contributing to climate change. Rex will explore the use of existing and potential wind power as appropriate opportunities arise. There are several existing and proposed wind energy developments on Yorke Peninsula, such as the Wattle Point Wind Farm (Edithburgh) which has the capacity to generate 91MW. The Wattle Point Wind Farm is approximately 62km south of the proposed ML. Further wind farm expansion is currently being considered near to the Project site.

The use of biodiesel and purchasing green energy are also being investigated to further reduce the carbon footprint of the Hillside Project.

Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions from the mining operation have been calculated using the most up to date conversion factors available at the time (Department of Climate Change and Energy Efficiency 2012, Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education 2013). Based upon current energy and explosives use forecasts the Hillside Project will generate the equivalent of 2,763,586t of carbon dioxide (tCO2-e) throughout its projected 14-year operational life.

Scope 1 sources will account for 39.6% of mine emissions which will be made up of 1,093,182t from the combustion of diesel fuel in trucks and other machinery on site, and 24,814t from the detonation of explosives. Scope 2 emissions account for 1,644,902t and will result from energy utilised off site to generate electricity for the South Australian electricity grid. See Table 3-71 below.

Table 3-71: Projected GHG emissions throughout the life of the Hillside Project

Year	Liquid Fuels (tCO2e)	Electricity (tCO2e)	Explosives (tCO2e)*	Annual Total (tCO2e)
-1	65,303	0	483	65,786
1	81,082	117,493	2,181	200,756
2	74,712	117,493	1,518	193,723
3	88,049	117,493	1,376	206,918
4	94,072	117,493	2,262	213,827
5	98,027	117,493	2,572	218,092
6	88,712	117,493	2,438	208,644
7	102,068	117,493	2,290	221,851

Year	Liquid Fuels (tCO2e)	Electricity (tCO2e)	Explosives (tCO2e)*	Annual Total (tCO2e)
8	98,731	117,493	2,573	218,797
9	104,477	117,493	2,788	224,758
10	101,957	117,493	2,359	221,809
11	65,960	117,493	1,644	185,097
12	19,456	117,493	262	137,211
13	10,953	117,493	67	128,513
14	312	117,493	0	117,805
Project Total	**1,093,870**	**1,644,902**	**24,814**	**2,763,586**
Percent	39.6%	59.5%	0.9%	100.0%

Note(*); although explosives were used for the above GHG calculation, according to the Australian Greenhouse Office only the use of ANFO which is mixed on site needs to be included. Therefore, explosives will not need to be taken into consideration for reporting under NGER.

3.11.2.2 Power

Total project load of the process plant and mine services is 34.5MW installed power and an average operating power of 22.6MW (180GWh/a) at unity power factor.

Power for the process plant site will be supplied by ElectraNet from the 132kV Yorke Peninsula network from a direct connection to Ardrossan West 132kV substation as show in Figure 3-91 ElectraNet grid – South Australia (existing high-voltage network). The supply to the process plant will be a single 132kV overhead power line from the Ardrossan West 132kV substation. Power to the coastal borefield site will be supplied by SA Power Networks (previously ETSA) from the Ardrossan West 33kV substation by an existing 33kV overhead power line.

3.11.3 Water Sources

Provided details on the source(s) of water to be used at the mine, expected usage and any discharge, including:

- *expected annual water usage by source;*
- *indicate if any water usage by source will be more than 5% of the total annual water withdrawal for that source;*
- *percentage of water that will be recycled; and*
- *water discharge by quality and destination.*

3.11.3.1 Expected annual water usage by source

The expected annual water usage by source can be found in Section 3.6.4 and Table 3-26.

3.11.3.2 Process supply

In order to provide sufficient quantity of water for the Project's operations, saline water from the borefield (equating to approximately 2.42gL/a) is to be combined with the potable water (equating to approximately up to 0.6gL/a) sourced from the SA Water network.

The saline water usage from the borefield will be significantly less than 5% of the total annual water withdrawal for that source's potential.

The mine dewater usage by source will be significantly more than 5% of the total annual water withdrawal for that source. Since the object of open pit mining is to dewater as mining proceeds, 100% of the total annual water withdrawal, i.e., pit dewater, is anticipated.

The majority of water used during processing will come from pit dewatering. To provide sufficient additional water for the Project, saline water from the borefield (equating to approximately 2.42gL/a) is to be combined with the potable water (equating to approximately up to 0.6gL/a) sourced from the SA Water network. This diluted saline water solution is required to make up the plant's process water and maintain a ~17g/L chloride content. The saline water is to be recovered from the borefield at a rate of 311m^3/h, on an intermittent basis. Mine water (as a result of dewatering the open pit) will be used as the principal source for process water make-up.

3.11.3.3 Potable supply

Rex has reached an agreement with SA Water for the development of water infrastructure to meet the needs of both the Hillside Project and provide for additional water capacity for regional development. The potable water supply is sourced from the Upper Wakefield storage facility and piped via Port Wakefield to Ardrossan

Potable water from a SA Water connection supplies the potable water required at the plant site for concentrate washing and in the safety showers and ablutions. The water from the potable connection is discharged in two separate tanks, one for each of these uses.

The potable water for process uses is stored in a tank sized to provide four hours storage capacity. From this tank, one pump is used to provide water to the filters, and to the process water pumping pond. A second pump is used to maintain and control the chloride levels in the process water, to a level that allows the production of a saleable final concentrate, through washing.

The potable water usage by source will be significantly less than 5% of the total annual water withdrawal for that source (i.e., the SA Water supply), however will be at least 30% of the pipeline capacity from Year 8 of the mine operations.

3.11.3.4 Process water

The make-up of water required at the plant site is a mix of water extracted from progressive dewatering of the open pit mining operation supplemented by saline water, potable water and water recovered from the filters. These waters are mixed in the process water pond which has a capacity of 2,850m^3 and lined with a 2mm HDPE liner.

3.11.3.5 Process plant water sources

Sufficient sources of process water required to meet the full demand of the process plant, either from SA Water or water extracted from bores in the surrounding areas of the mine site, could not be identified during the Hillside studies. Accordingly, and due to the proximity of the project to the coast, the use of saline water sourced from the Project borefield is considered the most practical approach for the plant.

The use of seawater or high saline water in concentrator plants around the world has already been adopted successfully as the main process water supply.

3.11.3.6 Saline water analysis

Saline water composition from measurements performed in the Ardrossan area in April 2012 is presented in Table 3-72.

Table 3-72: Saline water at Ardrossan

Description	Unit	Value
Chloride	mg/L	22,000
Conductivity	µS/cm	66,000
Total dissolved solids (TDS)	mg/L	40,000
pH		8.3

3.11.3.7 Scheme water analysis

Potable (fresh) water is to be supplied by SA Water to the Hillside site via a 2GL water pipeline. Stage 1 (46km) of this pipeline has been completed in September 2013 and terms for Stages 2 to 4 from Port Wakefield to Hillside (56km) have been negotiated with SA Water. Water quality, in terms of chloride content, was supplied to AMEC by SA Water from seven measurements performed at Maitland (this is the same source water that feeds Ardrossan and will feed the filter washing system). For design, the worst condition of 68mg Cl/L, was used. See Table 3-73 for potable water quality measured at Maitland.

Table 3-73: Potable water quality measured at Maitland

System Name	Zone Name	SP ID	Sampling Point Description	Sampled Date	Component	Result	Unit
Morgan/Swan Reach water treatment plant	Upper Paskeville/Maitland	7672	Maitland CT	09-Aug-10	Chloride	59	mg/L
	Upper Paskeville/Maitland	7672	Maitland CT	01-Nov-10	Chloride	46	mg/L
	Upper Paskeville/Maitland	7672	Maitland CT	24-Jan-11	Chloride	60	mg/L
	Upper Paskeville/Maitland	7672	Maitland CT	18-Apr-11	Chloride	64	mg/L

System Name	Zone Name	SP ID	Sampling Point Description	Sampled Date	Component	Result	Unit
	Upper Paskeville/Maitland	7672	Maitland CT	08-Aug-11	Chloride	68	mg/L
	Upper Paskeville/Maitland	7672	Maitland CT	23-Jan-12	Chloride	64	mg/L
	Upper Paskeville/Maitland	7672	Maitland CT	16-Apr-12	Chloride	48	mg/L

3.11.3.8 Process water chloride content

The chloride levels (or proportion of saline water to potable water) to use in process water were calculated based on the assumed maximum levels of chloride acceptable in final concentrate product, before possible penalties are incurred. The calculations assumed efficiency of the cake washing during filtration, cake wash water requirements (scheme water per tonne of concentrate), cake residual moisture and the increase of chloride level due to the recirculation of water. The data used to establish the proportion of saline water to potable water in the process water is summarised in Table 3-74.

An automatic pressure filter was selected for filtration of both concentrates, based on the preliminary mass balance and process design criteria. The pressure filter is a proven technology in dewatering fine particle size copper concentrates similar to the anticipated Hillside copper concentrate (P80 of 22µm particle size). Additionally, this filter type has the option to include a high efficiency washing stage. A current example of an operating plant is at Minera Esperanza (Chile), which also uses saline water and as with Hillside, requires washing of the concentrate in the filtration stage. The amount of potable water required for the washing of the cake has been based on information provided by the filter supplier and on the required concentrate quality with respect to chloride content.

Table 3-74: Process water design basis

Description	Unit	Value	Source
Ore Moisture	%	3.0	Assumed
Chloride, mg/L			
Chlorides in saline water	mg/L	22,000	As per Amdel analysis
Chlorides in potable water	mg/L	68	As per SA Water
Chlorides in process water	mg/L	16,700	Calculated value from mass balance
Chlorides in ore	ppm	0	Assumed
Copper Concentrate Filtration			
Water to concentrate wash	t_{H2O} /t con (dry)	0.4	Assumed based on vendor and other sites data
Washing efficiency			
Calculated	%	97.7	Calculated value from mass balance
Target (maximum)	%	97.7	Assumed based on vendor and other site data
Chloride content in the concentrate (target)	Ppm	200	As per AMEC study parameters

Note that the water and chlorine balances are also dependant on the performance of the thickeners, evaporation from the tailings dam and the final consolidated tails solids water content (this defines the water return from the dam). These factors will determine recycled water, including impurities, to the process water circuit. A critical feature is evaporation as this will tend to concentrate the salt levels in the tailings return water.

3.11.3.9 Percentage of water that will be recycled

Process water is recycled from both the tailings storage facility and the tailings thickener overflow within the process and this represents 86.4% of the process water being recycled.

3.11.3.10 Water discharge by quality and destination

No process or mine water will be discharged. Losses occur due to evaporation and water entrained within the consolidating tailings and concentrate (as outlined in Table 3-29).

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Section 4

Consultation

4. Consultation

4.1 Introduction

Rex Minerals Ltd (Rex) has committed to providing communities, including Indigenous communities, sustained benefits as a result of our project activities. Our community engagement policy is based on understanding and respecting these communities.

Rex was granted a Mineral Lease (ML6438), Miscellaneous Purposes Licence (MPL146) and Extractive Minerals Lease (EML6439) in September 2014 by the Minister for Mineral Resources and Energy under the *Mining Act 1971* (SA) (Mining Act). The granted tenements include several conditions specific to consultation including the development of:

- a Social Management Plan (SMP) (ML Schedule 2 Conditions 40 and 41);
- a Community Engagement Plan (CEP) (ML Schedule 2 Condition 42, MPL Conditions 14 and 15);
- a Communications Protocol (ML Schedule 2 Conditions 43 and 44, MPL Schedule 2 Conditions 16 and 17, EML Schedule 2 Conditions 8 and 9); and
- a Complaints Register (ML Schedule 2 Conditions 45 to 49, MPL Schedule 2 Conditions 18 to 22, EML Schedule 2 Conditions 10 to 14).

The CEP and SMP will be regularly reviewed to reflect changes in the mining operation and community. The SMP and CEP are public documents and the current versions have been made available on the Company's website <http://www.rexminerals.com.au>.

4.1.1 Social Management Plan

The Social Management Plan (SMP) outlines Rex Minerals' commitment to the local community and other stakeholders and provides a description of the measures to be implemented to manage the social impacts and enhance social benefits from the Hillside Project. The SMP focuses on potential impacts and benefits within communities in the Hillside Project's area of influence in four key areas of importance as identified in the Mining Lease Proposal 2013 (MLP) and subsequent lease conditions. These are:

1. communication;
2. local employment;
3. local business; and
4. community relations.

As detailed in the SMP, the structure of the documents relating to these key areas is shown below in Figure 4-1.

The SMP is presented in Appendix 4.1-A.

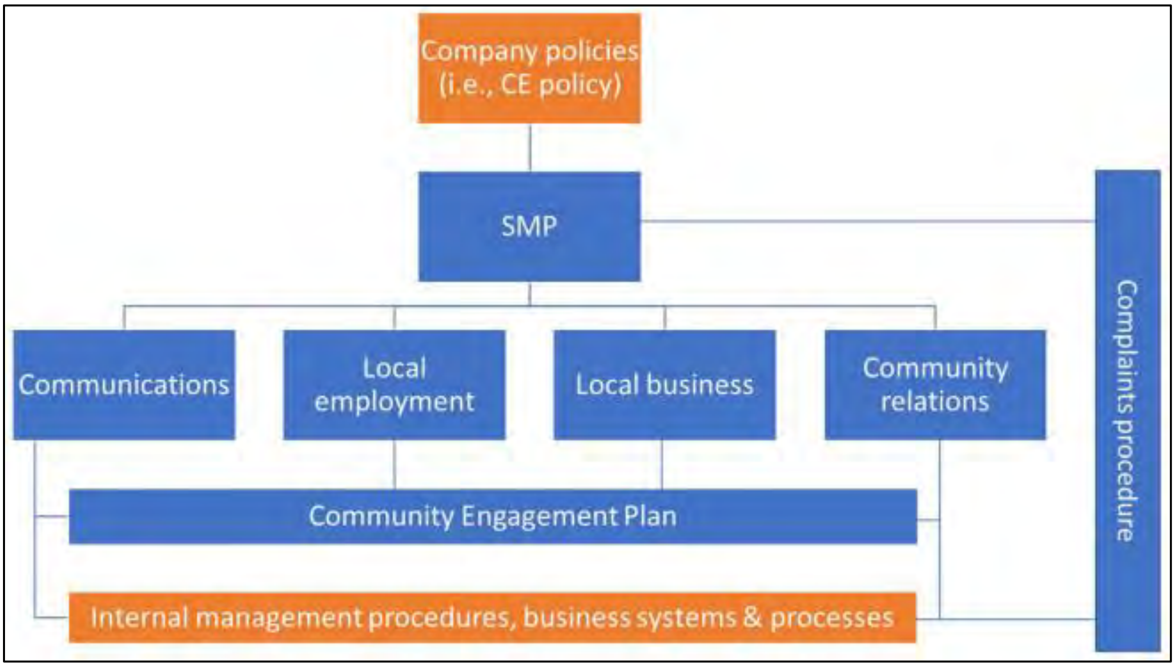

Figure 4-1: SMP structure

Note: This figure has been updated since being published in Rex's CEP. The CEP will be updated prior to the commencement of ground disturbance to reflect these changes.

4.1.2 Community Engagement Plan

Community engagement is an ongoing process that requires continual review to allow for adaptive strategic planning to reflect changing community needs and aspirations, government requirements and company objectives.

Rex's Community Engagement Plan (CEP) was approved on 12 June 2015 by the Resources and Energy Group of the then Department of State Development (DSD), now the Department for Energy and Mining (DEM). The CEP is a document that clearly identifies the community stakeholders and outlines the framework for how Rex will engage with the community during all stages of the development of the Hillside Project. The CEP outlines a range of engagement tools for communicating and consulting with the community and provides a guideline as to when these tools will be utilised. Rex Minerals CEP includes:

- the purpose of engagement;
- a description of the community and key stakeholder groups;
- a range of engagement tools for communicating and consulting with the community and when the tools will be used;
- the level of engagement and any commitments to the community;
- a timetable of proposed actions and events;
- clearly defined roles and responsibilities for implementation of the CEP; and
- methods of evaluating, measuring and reporting the effectiveness of the CEP.

Using this CEP, Rex will develop ‘action plans’ for each phase of the Hillside Project. The action plans set out what community engagement activities will be undertaken. The action plans outline the reason for undertaking the engagement activity, such as organising communications, letters and meetings and the resources required, and who from Rex will be responsible. A timeframe is provided for each engagement activity as an indication of when it will be undertaken, noting this may be dependent on the timing of key Hillside Project decisions/milestones.

As an example, an initial action plan was developed for engagement work around the development of the operational approval document, the PEPR. This proactive approach has enabled Rex to:

- draw on local knowledge held by the community and stakeholders;
- identify and address issues of concern or importance; and
- optimise the benefits of the Hillside Project to the region and its community.

This has provided the basis for the development of the PEPR.

The CEP is presented in Appendix 4.1-B.

4.1.3 Communications Protocol

The Hillside Landholder Communication and Operating Protocol EC PRO 323 (Appendix 4.1-C) sets out the protocol between Rex and the owners of the land adjacent to and on the ML, MPL and EML as per the tenement conditions identified in Section 4.1. The protocol will be used as a basis of engagement with landowners on and adjacent to the leases and licence.

4.1.4 Complaints Register

The Complaints Management Procedure EC PRO 320 details the obligations of the Hillside Project regarding receiving, handling, responding to, and recording details of all community complaints as per the tenement conditions identified in Section 4.1. The Complaints Management Procedure is the definitive procedure to be used by Rex in responding to grievances.

4.2 Stakeholder Groups

Stakeholder mapping to describe the community, identify key stakeholder groups, regional attributes, assets and concerns or issues is a continuous process as stakeholder groups and their levels of interest are anticipated to change over the life of the Project.

Rex’s initial stakeholder mapping was undertaken in 2009 during the exploration phase of the Hillside Project to identify the stakeholders with an interest in, or likely to be directly affected by exploration activity and/or a potential mining operation. The process included an internal workshop session which considered detailed information on local communities including demographics, attitudes, key community groups, community leaders, current regional issues (employment, environmental, water, services etc.). The profile enabled the identification of stakeholders which formed the basis of Rex’s CEP for the exploration phase of the Hillside Project.

The stakeholders for the Hillside Project were reviewed in 2014 after submission of the Rex’s MLP. This process involved three open public workshops with the Community Consultative Group (CCG), community members and Rex representatives chaired by an external facilitator. The series of workshops was undertaken to develop a new charter for the CCG (note the new group became the Hillside Mine Community Voice as discussed below in 4.2.1) and stakeholder list for the Project. Rex used this stakeholder mapping information in the development of the CEP. The stakeholder groups as set out in Rex's CEP for the Hillside Project are shown below in Table 4-1.

Table 4-1: Stakeholder groups

Stakeholder Group	Description
Landowners	Landowners within the ML.
Adjoining landowners	Landowners with property adjoining the ML.
Local communities	Local communities/townships within small settlements who are potentially impacted by the Project including progress associations.
Tourists	Those visiting the area for a day or short-term stay at caravan parks, shacks and other holiday accommodation.
Local government	Yorke Peninsula Council – local council members responsible for local roads, planning and approvals.
Government agencies	Agencies including: • Department of the Premier and Cabinet (DPC); • South Australian Environment Protection Agency (EPA); • Department for Environment and Water (DEW); • Department of Planning, Transport and Infrastructure (DPTI); • SA Water; • SA Power Networks; • Department for Energy and Mining (DEM); • SafeWork SA; and • Federal Department of the Environment and Energy (DEE), with direct regulatory roles and associated departments that need to be consulted identified.
Indigenous	Indigenous peoples of the area (Narungga).
Local agencies	Stakeholders who play a role in regional development, education, training, emergency services and law enforcement.
Members of government	Elected members of government at federal, state and local levels.
Interest groups	Groups including: • environmental groups (Natural Resource Management (NRM); • Conservation of Our Threatened Species (COOTS); • Threatened Plant Action Group (TPAG); • land care groups; • farm and agricultural groups (Yorke Peninsula (YP) Farmers Group); • soils groups and the like; and • landowners' groups (Yorke Peninsula Landowners Group (YPLOG)).
Business	Tourism and other regional businesses including town-based and agricultural businesses.

Stakeholder Group	Description
Regional community	Landowners (farmers and shack owners) in the surrounding region not included in the above categories, i.e., Port Vincent, Maitland etc.
Media	Local, state and national media.
Industry bodies	Bodies with potentially impacted members including: • Grain Producers of SA (GPSA); • SA Chamber of Minerals and Energy (SACOME); • Minerals Council of Australia (MCA); and • Primary Producers SA (PPSA). This extends to other exploration and mining companies operating in the region.
Key internal stakeholders	Employees and project contractors.

The following stakeholder groups have been engaged with during the development of the PEPR.

4.2.1 Hillside Community Consultation Groups

The CCG commenced in 2012 during the exploration stage and concluded following the approval of the MLP. The members, and in particular the Chair, of the CCG were very generous in volunteering their time and expertise for over two years.

After a series of workshops with community members and CCG members along with extensive consultation, a new group was formed which held their first meeting in November 2014 under the name Hillside Mine Community Voice (HMCV).

The HMCV continually assesses its membership, structure, communication network and functions to ensure that the ideas and voice of the community are clearly articulated and actioned in preparation for the next stage of the development of the Hillside Project. One of the first key actions was to improve on the transparency between the HMCV and the wider community. This was launched by establishing a link on the Yorke Peninsula Council's (YPC) website where the HMCV Charter, minutes of meetings and other updates are posted at: <http://www.yorke.sa.gov.au>.

The following stakeholder groups are represented on the HMCV:

- Rex Minerals Ltd;
- local government (YPC);
- Regional Development Australia (Yorke and Mid North) (RDA);
- local progress associations (Pine Point, Ardrossan, Black Point, James Well/Rogues Point);
- farmer groups (e.g., Agricultural Bureaus of South Kilkerran and Petersville);
- Yorke Peninsula Landowners Group (YPLOG);
- local traders;

- Narungga Nations Aboriginal Corporation (NNAC);
- YP Tourism; and
- community members – who had expressed an interest in the Hillside Project and were self-nominated.

4.2.2 Landowners

Rex held a number of one-on-one or small group meetings with those landowners located both within and surrounding the ML. Information was provided regarding the revised Hillside Project (Stage 1(EFS)), with its smaller footprint area, potential impacts during mining and other potential impacts, e.g., the existing approved main Yorke Highway road diversion. An outline of the PEPR process, including engagement during development of the associated management plans, was provided.

Rex communicated individually with key landowners through meetings and by email with significant information provided, e.g., the release of Rex's revised Project information, the DSD Assessment Report, outcomes of the revised Stage 1 Hillside Project, Rex's intent to continue with development of the PEPR under the ML, and the staged release of management plans, the content of which is now integrated into this PEPR, where the Company was seeking community input. Rex sought input into the plan for monitoring (e.g., for air quality and noise) particularly regarding any agreed additional monitoring with immediately adjacent landowners. Some landowners met directly with Rex representatives, and others preferred to attend the HMCV community meetings around these topics.

4.2.3 Local Communities and Tourists

Rex engaged with the local community Progress Associations both directly and through their representative membership on the HMCV. These included the Pine Point Progress Association, Rogues Point/James Well Progress Association, Black Point Progress Association, and Ardrossan Progress Association.

These Progress Associations represent the interests of residents, tourists through caravan parks and 'holiday home' owners. The HMCV also has a member from the RDA who represents YP Tourism, a local business owner who is a travel agent, and a local business owner who deals in real estate and holiday home leasing. Many members of these associations, along with some transient tourists, attended the various community meetings coordinated by the HMCV to discuss and provided feedback on Rex's management plans. Individual meetings with residents and 'holiday home' owners also occurred as opportunities arose.

4.2.4 Local Government – Yorke Peninsula Council

Rex met several times with the CEO and staff of the YPC after approval of the MLP and during the release of information on the revised Project, and development of the PEPR. The Company presented to the full Council at a workshop on the project planning and PEPR, including management plans and road changes. A meeting was held with YPC directors (management team) where detail of the key PEPR management plans were covered and the fact that Redding Road will remain open during the planned Stage 1 of the Project was discussed. A detailed outline of the surface water drainage system proposed and the revised flood lines was also covered.

Rex also volunteered its own site personnel and equipment in assisting the YPC, Greening Australia and relevant government departments regarding conservation and native planting work on the coastal land adjacent to the Hillside Project site. This work was greatly appreciated by the groups and recognised in the local media.

4.2.5 Government Agencies

Rex has been meeting frequently with the DEM (which was formally part of DSD) regarding the Project information, and the PEPR process and community engagement. The EPA and DEW have provided advice on aspects of technical information (e.g., noise, air, surface water and groundwater), and the Company has also met and updated DPTI, SafeWork SA, SA Water and others on the Project's status. This engagement will increase as the project progresses and operational permits are required.

4.2.6 Indigenous Group – Narungga

Representatives of the Narungga local Indigenous group have met with Rex several times, discussing opportunities for training and employment, and potential use of locally owned Indigenous businesses on the future Project. A Narungga representative is also a member of the HMCV group.

4.2.7 Local Agencies and Interest Groups

Rex has engaged with various local agencies which work in and around the Yorke and mid north, such as the RDA, schools, and emergency services, along with other nearby local Councils (Copper Coast, Barunga West, and Wakefield Regional). Rex's on-site Farm and Land Care Supervisor has engaged on an ongoing basis with various agricultural agencies. Rex has also interacted with the NRM and other land care groups on the Yorke Peninsula.

The YPLOG has been active in opposing the Hillside Project, and since early 2015 has been represented on the HMCV.

4.2.8 Members of Government

Rex has engaged with elected members at federal, state and local levels to provide updates about the status of the Hillside Project. In particular, the previous local Member of Parliament (MP) (Narungga electorate – previously Goyder) attended all public meetings held by Rex or the HMCV. Also one of the electoral candidates for the March 2018 State election attended most of these meetings. Rex has also briefed various other State MPs, in particular the previous Government Minister for Resources and MPs, and the new State Government's current Minister for Energy and Mining, the Premier, and other MPs.

4.2.9 Business and Regional Community

Some tourism and other regional businesses including town based and agricultural businesses have met with Rex allowing it to introduce and discuss the status of the Hillside Project along with potential business opportunities. Rex has reviewed the previous work of BHP (Olympic Dam) and OZ Minerals in regard to their local business readiness workshops and intends to develop a similar approach once Hillside Project development has commenced (see Section 4.4).

4.2.10 Other Regional Groups

4.2.10.1 SACOME and various committees

Through its membership on SACOME and representation on its Council, Rex has ensured that its peers and resource industry groups are aware of the Hillside Project status and progress.

Rex personnel have also been involved with key SACOME committees, including:

- the Sustainable Development Committee (SD Committee) with members consisting of industry representatives from the mining, oil and gas industry. The SD Committee assists to develop policy and facilitate the improvement of the resources industry in the areas of environmental management and legislation, community and stakeholder engagement, and industry promotion;
- the Energy Committee, involved with reviewing and advising on energy policy matters within the state, along with an ACCC authorised electricity buying group of which Rex is a member; and
- the Mining and Extractives Committee, involved with current mining operations policy matters.

4.2.10.2 Yorke Peninsula Industry Leaders Group and Yorke and Mid North Regional Development Australia

The Yorke Peninsula Industry Leaders Group (ILG) was formed in August 2014, an initiative of the former Department of Further Education, Employment, Science and Technology (DFEEST) (which is now part of the DSD) in partnership with the Regional Development Australia (RDA). There are 15 ILGs across South Australia. ILGs are chaired by industry and made up of high profile leaders who have strong links to industry and the community. Using local connections and knowledge, ILGs assist the DSD and Government to understand and respond to the workforce challenges experienced by industry and employers within and across regions. They are the vehicle at the regional level by which industry and employers can influence, promote and support State Government skills, training and employment priorities.

ILGs provide advice on:

- likely jobs growth and decline;
- skills shortages;
- occupational shortages;
- recruitment and retention difficulties;
- good practice and local successes;
- government policy, programs and services;
- training providers and qualifications; and
- specific issues identified by DSD and the ILG.

This advice informs policy development and results in targeted local initiatives that respond effectively to local industry and regional needs.

A Rex representative undertook the role of Chairperson from mid-2014 to mid-2016. In addition to chairing ILG meetings, the Chairperson is the representative of the ILG in dealings with the Minister for Employment, Higher Education and Skills and the Chief Executive, DSD. Rex maintains an active membership on the Yorke ILG.

The members of the Yorke ILG include the following enterprises:

- Balco Australia (agriculture);
- Primo Quality Meats (food processing);

- Barunga Village Inc. (aged care);
- Anna Binna Pty Ltd (agriculture);
- Australian Milling Group (agriculture);
- Kadina Chamber of Commerce;
- Joleta Pty Ltd (poultry);
- B and M Butson (aquaculture);
- Rex Minerals Ltd (exploration and mining);
- RDA Yorke and Mid North; and
- Department for Energy and Mining.

Since early 2018, funding structures for the ILGs has changed, and the local Yorke and Mid North RDA has taken over the role of actively getting business and industry representatives in the region together to discuss business matters and develop ideas for new opportunities for the RDA and Government to consider. Rex has continued to attend these meetings.

4.2.10.3 Conservation Action Planning Group

Rex is an ongoing member of the Southern Yorke Peninsula Conservation Action Planning (CAP) group. The CAP group is made up of participants with a diverse range of skills and experience including conservationists, scientists, the DEW, local stakeholders and the like (Greening Australia and YPC included).

The role of the CAP group is to look at an area or region and determine its natural assets, the threats to those assets and then prioritise what the most urgent actions are to increase, restore or protect those assets. Members of the group then conduct the groundwork necessary to develop a project that is suitable for a grant application. Applications involving scientific, government, community and stakeholder input are strongly favoured and most likely to be successful.

4.3 Results of Consultation

A consultation action plan was developed for the PEPR. The PEPR action plan details the commitments and engagement that Rex has made to the community during the development of the PEPR document. The PEPR action plan from the CEP is presented below in Table 4-2 with the updated ‘status’ (right hand column) (note the CEP was last published on 7 September 2016 (Appendix 4.1-B).

Table 4-2: PEPR Action Plan (updated from Table 1 of the CEP)

PEPR Engagement Activity	Objective	Task	Target Stakeholder Group	Team Members Responsible	Timing	Status
Community Consultation Committee – Hillside Mine Community Voice (HMCV)	• Provide detailed information about the project to HMCV; • Seek feedback about PEPR through HMCV working groups; and • Discern key PEPR information gaps from HMCV to develop key messaging for community.	• Be an active member of the HMCV; • Prepare PEPR information for working groups; • Working groups to be formed around CCG Issues Register and the social and environmental management plans; and • Recording input from working groups against issue register to document the HMCV expectations and recommendations.	• HMCV (broad community representation).	Environmental Supervisor and Project Director.	12 months for the development of the PEPR (including future works, control and monitoring information from the management plans), including presentations of plans and review of feedback.	• Ongoing monthly HMCV meetings with minutes published on Yorke Peninsula Council website (<https://yorke.sa.gov.au/community-services/engagement/hillside-mine-community-voice/>); • Key actions from meetings undertaken by Rex; • Presentations by CEO/technical staff/consultants/ DPC outlining PEPR process, management plans inclusive of monitoring, overview of revised project, other key areas; • HMCV Chair appointed March 2016; and • Working groups commenced in March 2016 to coordinate and gain detailed feedback to be used in the PEPR.

PEPR Engagement Activity	Objective	Task	Target Stakeholder Group	Team Members Responsible	Timing	Status
One on one meetings	• Provide detailed information; and • Work through the development of the PEPR to ensure that all legislative requirements are fulfilled.	• Regular meetings with regulators on draft PEPR materials and key aspects of environmental management plans i.e., types of monitors; and • Discuss PEPR environmental monitoring requirements with key landowners.	• Landowners; • Adjoining landowners; • Yorke Peninsula Council; • Government agencies; • Indigenous, local agencies; • Members of Government; • Industry bodies; and • Internal stakeholders.	Environmental and Stakeholder Management Supervisor with support from CEO/MD and Project Director.	During development of the PEPR (including future works, control and monitoring information from the management plans).	Meetings commenced end of 2015/start of 2016 with landowners within the ML and adjacent landowners, local community members, representatives from YPC, Members of Parliament, State and Federal governments (DPC, RDA, Department of the Environment). Meetings ongoing.
Community updates, newsletters, brochures, discussion papers	• Provide the location of where to access detailed information about approvals process, timings and key documents.	• Prepare clear communication materials for REXpress regarding PEPR updates.	• All.	Environmental and Stakeholder Management Supervisor. Project Director.	REXpress Winter 2015 and Summer 2015/16 editions.	REXpress Summer 2015/2016 published, REXpress Summer 2015 published. Regular articles submitted to Ardrossan Antics local paper (bi-monthly), briefings to The YP Country Times newspaper, specific community updates.

PEPR Engagement Activity	Objective	Task	Target Stakeholder Group	Team Members Responsible	Timing	Status
Email distribution list	• Provide detailed information; and • Seek feedback.	• Prepare clear communication materials for PEPR regarding approvals process, timelines and role of the community, regulator and company; • Continually add to distribution list from information sessions, HMCV networks etc., with an opt-out function; and • PEPR information in the HMCV minutes published on the YPC website.	• All.	Training and Systems Coordinator.	Key milestones in the PEPR development and after each HMCV meeting (monthly).	• Various emails sent out providing updates and outcomes from HMCV meetings; • Emails used by HMCV to raise awareness of community meetings from Sept 2015 onwards, including PEPR management plan presentations to community; • All HMCV minutes have been published on Yorke Peninsula Council website <https://yorke.sa.gov.au/community-services/engagement/hillside-mine-community-voice/>; and • PEPR management plans also emailed directly to landowners within the ML and adjacent landowners by Rex. Note that all future works, control and monitoring information from the agreed management plans is now including in the PEPR Section 5.

PEPR Engagement Activity	Objective	Task	Target Stakeholder Group	Team Members Responsible	Timing	Status
Workshops and focus groups	• Seek feedback; and • Incorporate feedback into management plans.	• Support HMCV working groups to source outside expertise; and • Discuss management plans with special interest groups.	• All interested parties.	Environmental and Stakeholder Management Supervisor.	During development of PEPR.	Although set up with some exchange of questions and feedback during 2016, Working Groups commenced key activities after the 2017 DPC Assessment report. As draft PEPR Management Plans were released, Working Groups coordinated, advertised and chaired community presentations on these plans. Rex provided technical and consulting expertise for presentations and to answer specific questions. Working groups coordinated feedback from these meetings, along with providing other specific feedback. Rex reviewed feedback, responded to all, and maintained a register of all community, DPC and other Govt feedback and responses (see Appendix 4.3). Incorporation of feedback into management plans occurred where sensible and reasonable, otherwise detailed responses to questions were provided. Note that all future works, control and monitoring information from the agreed management plans is now including in the PEPR Section 5.

PEPR Engagement Activity	Objective	Task	Target Stakeholder Group	Team Members Responsible	Timing	Status
Questionnaires/ surveys	• Seek feedback; and • Obtain information to allow the analysis of community feedback and considering community concerns or expectations.	• In consultation with the HMCV, develop a survey to ascertain community values during the PEPR.	• Landowners; • Adjoining landowners; • Local communities; • Local agencies; • Interest groups; • Business; and • Regional community.	Environmental and Stakeholder Management Supervisor.	During development of PEPR.	HMCV coordinated a communication survey questionnaire, seeking the preferred way that community members wished to be contacted. Although there was not a large response, this helped result in the use of emails, flyers delivered to mailboxes, advertisements in the local paper, and notices on local Progress Assoc. boards being used. Public community meetings delivered responses to management plan presentations.
Project Websites	• Provide detailed information.	• Publish approved PEPR and associated information; and • Respond to all questions and provide any additional information or assist in finding information.	• All.	Environmental and Stakeholder Management Supervisor.	Post-PEPR approval.	• Rex website used to publish key documents (e.g., Project documents in 2016); • Initial flyer on rainwater tank testing posted on Rex website; • Updated ‘uranium information sheet’ posted on Rex’s website (June 2016); and • All HMCV minutes, draft Management Plans, and community meeting notices were put onto the HMCV site under the YPC website.

PEPR Engagement Activity	Objective	Task	Target Stakeholder Group	Team Members Responsible	Timing	Status
Open house, exhibitions, displays	• Provide the opportunity for community members to seek face-to-face discussion with Rex Staff.	• Prepare clear communication materials; and • Booth at Yorke Peninsula Field Days.	Local Communities, Local Agencies, Interest Groups, Regional Community.	Environmental and Stakeholder Management Supervisor.	Post-PEPR approval.	Strong preference by HMCV working groups for coordinated public meetings on specific topics and management plans rather than 'open days'. Does not preclude these being used in the future. Resulted in five dedicated community meetings.
Community information sessions	• Provide detailed information on stage of the PEPR and timings.	• Prepare clear communication materials.	All.	Environmental and Stakeholder Management Supervisor.	On request of the HMCV.	Presentation by Rex at two general update meetings to community in 2015 and 2016. In all eight public community meetings held over 2.5 years, with numerous one on one and small group meetings. Refer also to the specific PEPR management plan community update sessions mentioned above.
Community correspondence in relation to PEPR	• Register and document all community correspondence; and • Respond to all community correspondence.	• All correspondence is logged and responded to; and • Key issues are able to be identified and tracked through the designated correspondence register.	All.	Environmental and Stakeholder Management Supervisor.	As required – acknowledgment of receipt within one working day and response (if required) within 5 working days.	HMCV Working Groups commenced in March 2016, with initial email and other correspondence to community seeking interest to participate in groups. Emails and phone calls direct to Rex from community were responded to in a timely manner. Several requests for information from local MP, other members of Govt, some external bodies were responded to. See Appendix 4.2, 4.3 and 4.4.

Based on the PEPR action plan as presented in Table 4-2, a summary of the consultation undertaken during the development of the PEPR and supporting management plans with the various stakeholders is presented in Appendix 4.2. This consultation summary identifies the stakeholder group, number of engagement, the general topics of discussion and the outcome of the discussion and including feedback that informed the PEPR.

All specific feedback provided by stakeholders on the PEPR (including the management plans which are now directly incorporated into the PEPR Section 5) has been recorded along with Rex's response. This feedback is presented in Appendix 4.3. This approach ensures that all feedback has been considered and that feedback which results in a change to the PEPR and/or supporting management plans is actioned and finalised. Feedback received specifically on the SMP during its development is presented separately in Appendix 4.4.

A summary of the monthly meetings of the HMCV is presented in Appendix 4.5 (note, the summary of the consultation and the HMCV monthly meetings commence from July 2013 to follow on from the consultation information presented in the MLP). The minutes from the HMCV monthly meetings are published on the YPC website.

The HMCV set up working groups to seek feedback on the key areas of the PEPR which require community input, as outlined in the PEPR action plan (Table 4-2). The initial working group structure was based upon the grouped issues from the Issues Register as developed by the CCG. HMCV members nominated for working groups based on their areas of community expertise or interest. Each working group had an assigned HMCV leader who was responsible for coordinating further community input, information from Rex and providing the feedback to HMCV. This feedback was used to develop key sections of the PEPR. Working groups are active/inactive based on the development stage of the PEPR. Some working groups will continue to operate throughout the life of the mine to continue to provide community feedback and input, i.e., environmental monitoring and performance (for example, air quality, noise, water), progressive rehabilitation (for example, agricultural trials, native revegetation), mine closure planning.

The active working groups cover the following topics:

- air quality, noise, light and blasting;
- rehabilitation and EOM life;
- water quality and marine environment;
- agriculture;
- transport;
- communication; and
- social management.

A summary of each of the active working groups is provided in Appendix 4.6.

4.4 Ongoing Stakeholder Engagement Plan

Based on the tools presented in the CEP, an action plan will be developed in consultation with stakeholders of the Hillside Project, including the HMCV, for the construction phase of the Project. Development of the 'construction phase' action plan will commence once the PEPR is finalised. This action plan will set out what community engagement activities will be undertaken, including the engagement activities in the SMP along with the resources that will be required and who from Rex will be responsible.

This action plan will include activities such as a business road show for businesses interested in being involved in the Hillside Project, workshops on the process of supply and tender as a business operator to the Project, consultation processes for road opening and closures, environmental monitoring and reporting processes and information on the Complaints Management Procedure. As per the review process, the CEP will also be updated to reflect the construction phase of the Project.

4.5 Process for Managing Complaints

All complaints received in relation to the Hillside Project will be responded to in accordance with Rex's established Complaints Management Procedure EC PRO 320 (Appendix 4.7). Rex will operate a 24-hour per day, seven-day per week free call telephone complaints line for the purpose of receiving complaints from members of the public in relation to mining operations. The number will be available on Rex's website and will also be included on any communications with the public and community. The Complaints Management Procedure is designed to be used throughout the life of the mine.

The Complaints Management Procedure details the obligations of the Project regarding receiving, handling, responding to, and recording details of all community complaints as per the tenement conditions identified in Section 4.1. Upon receipt of a complaint from the community, preliminary investigations will commence as soon as practicable to determine the likely cause/s of the complaint using information such as the prevailing meteorological conditions, the nature of activities taking place and recent monitoring results. A response will be provided as soon as practicable, which may include the provision of relevant monitoring data. Every effort will be made to ensure that concerns are addressed in a manner that facilitates a mutually acceptable outcome for both the complainant and Rex.

Rex will record all community complaints into a Complaints Register in accordance with the Complaints Management Procedure. The database will include reporting, incident/event notification, close out action tracking, inspections, and audits. The records of public complaints will be maintained for a period of at least seven years. The public complaints register will be made publicly available each year with the Annual Compliance Report (ACR), with more regular updates provided to the HMCV. The ACR will report the minimum required by the tenement conditions without the name and contact details of each complainant.

Section 5

Environmental Outcomes Strategies Criteria and Monitoring

5. Environmental Outcomes, Strategies, Criteria and Monitoring

5.1 Introduction

This section of the PEPR sets out how Rex Minerals Ltd (Rex) will control the potential for impact and demonstrate compliance with the lease and licence conditions and clauses for ML6438, EML6439 and MPL146 as regulated by the Department for Energy and Mining, South Australia (DEM). Control strategies, criteria and monitoring have been developed to meet all the environmental outcomes identified in Mining Lease Proposal (ML) 6438, Extractive Minerals Lease (EML) 6439 and Miscellaneous Purposes Licence (MPL) 146 for the complete life of mine (LOM); i.e., construction, operations (including any exploration activities), closure and post-closure.

Control strategies are tools and techniques that will be used by Rex to minimise or avoid the potential impacts. The strategies include prevention controls (by eliminating or substituting), to physical control (through engineering or design) and lastly strategies that use management system (procedure) controls.

Any uncertainties relating to existing data, impact assessment or the effectiveness of control strategies have been identified and future works required to address the uncertainties documented, with responsible positions and timing for completion of the works. The ‘future works’ list includes onsite trials, further test work, additional studies and modelling to ensure that uncertainties are adequately addressed.

Measurement criteria include what, how, where and when the monitoring will be undertaken along with what is considered achievement of the outcomes and any data (baseline background, or control data) which may be used as a comparison for monitoring purposes. Measurement criteria, and their relevant outcomes, may be applicable to one or more mine phases, i.e., construction, operation, closure and post-closure until relinquishment of mine tenure. The applicable phase(s) are specified in the frequency for each measurement criteria. These measurement criteria tables form the operator compliance monitoring plan, identifying who is responsible for measuring/ monitoring, record keeping and the how often the results are reported to management and any external parties, including the community.

Additionally, if specified in the lease/licence conditions or if there is a high level of reliance on control strategies to achieve an environmental outcome, a ‘leading indicator criteria’ has been included, giving time to act to ensure that the environmental outcome can still be achieved. Leading indicators are not required for all outcomes, and are not ‘compliance criteria’ under the *Mining Act 1971*.

Stakeholders were engaged by Rex throughout the development of the environmental outcomes, strategies, criteria and monitoring which were originally included in the individual management plans. All relevant information is now included in this PEPR document and has been further refined in consultation with regulators. Ongoing engagement with the community, government and other stakeholders following the PEPR’s submission is set out in Section 4.

5.2 Changes to Environmental Impacts

Due to the changes in operation from the Hillside Project Mining Lease Proposal (MLP) 2013, a number of potential impact events identified in that impact assessment (Section 8 of the 2013 MLP) and associated lease and licence conditions for ML6438, EML6439 and MPL146 are no longer applicable to the Stage 1 Project presented in this PEPR.

5.2.1 Delta Impact Assessment

During 2016 an assessment was undertaken by the Department of the Premier and Cabinet (DPC) to assess the changes to the Hillside Project from the originally submitted MLP to the revised Stage 1 EFS design. This assessment was inclusive of the new environmental impacts and was named the 'delta impact assessment'. These documents along with updated supporting documentation were released to the public on the DPC's website throughout 2016 and early 2017 as the documents were completed. The documents included updated groundwater, noise, dust and odour impact assessments and a revised TSF feasibility report, all conducted by technical specialist consultants.

The impact assessment concluded there are no new or increased risks in Project execution from those previously identified during the assessment process of the MLP.

The documents are also available on the Hillside Project's page on the DEMs website: <http://www.energymining.sa.gov.au/minerals/mining/mines_and_quarries/hillside_project>.

5.2.2 New Environmental Impact Considerations

The primary changes requiring additional impact assessment as a result of the change from the Stage 2 (BFS)to the Stage 1 (EFS) Project are the inclusion of additional residential receptors and the addition of concentrate truck traffic.

5.2.2.1 Three new residential receptors

The MLP stated that excluding the three residential dwellings and associated farm sheds on Rex-owned land, there are five residential dwellings located within the assessed and approved ML. Of these five residential dwellings, one has a relocation agreement in place. The four residential dwellings that were either unoccupied or under negotiation were not considered as sensitive residential dwellings in the ML assessment. Under Stage 1, three of these will now become receptors, being on the land immediately to the west of Redding Road, as there is now no requirement to purchase this land for the footprint of Stage 1 (EFS). The owners of this land have been advised of this outcome.

For the three new receptors, their residential dwellings are expected to remain during the life of the mine and all the lease conditions protecting the closest residential dwelling will be applicable for the residential dwellings not originally included in the ML assessment (i.e., the three new receptors).

All of the potential impact events that were considered for the closest residential dwelling (for the larger Stage 2 mining operation during worst case scenarios as presented in the MLP) are applicable to the three residential dwellings that were not separately assessed in the MLP as there is no change in the source (although less emissions are associated with the EFS mining operations described in the PEPR), pathway (i.e., not in the prevailing wind direction) or the nature of the receptor (residential). The delta impact assessment found that there was no change in the primary risk rating, control measures, residual risk rating and these outcomes and measurement criteria have been communicated to the new receptors.

Based on the information presented, there are no new or increased risks from that identified within the MLP assessment process. Each potential impact associated with the residential dwellings within the ML has been encompassed within the assessment of the closest residential dwelling to the Hillside Project. The modifications as a result of the mining operations described in the PEPR therefore remain consistent with the ML conditions along with the proposed outcomes, proposed measurement criteria and the control and management strategies as set out in the approved MLP.

5.2.2.2 Cultivated land

All the potential impact events that were considered for cultivated land within the ML, and adjacent properties, are applicable to the cultivated land that was not separately assessed in the MLP. As per the 'source-pathway-receptor' model presented in the MLP Minerals Regulatory Guidelines MG2a, there is no change in the 'source' (there are less emissions associated with the mining operations described in the PEPR due to the reduction in the project footprint), 'pathway' (i.e., not in the prevailing wind direction) nor the nature of the 'receptor' (cultivated land) as a result of the move to the EFS project. As such, there is no change in the primary risk rating, control measures, residual risk rating, proposed outcomes or measurement criteria.

Based on the information presented, there are no new or increased risks from those identified within the MLP assessment process. Each potential impact associated with the cultivated land within ML6438 has been encompassed within the assessment of other cultivated land within and surrounding the Project operational footprint. The modifications as a result of the mining operations described in the PEPR therefore remain consistent with the lease conditions along with the proposed outcomes, proposed measurement criteria and the control and management strategies as set out in the approved MLP.

Cultivated land can continue to be farmed by owner and for cultivated land not assessed as a receptor in the MLP, all of the potential impact events that were considered for other cultivated land within the ML, will be applicable to the cultivated land not originally included in the ML assessment (i.e., the three new receptors).

Refer also to Section 2.9.

5.2.2.3 Road trains for concentrate

The copper-gold concentrate will be transported from the mine site to Port Adelaide by road train trucks of 55.7t payload. Each truck will carry two containers, specially designed to transport concentrate and to be emptied by rotating the containers into a carrier vessel.

Impacts associated with 'road damage due to increased traffic' will be consistent with those assessed in the MLP (Section 8.3.18.4 of the MLP) as the number of trucks moving between the mine site and the public road system will be the same. The Traffic and Transport impact assessment for the MLP assessed the movement of 13 concentrate and supply trucks per day (26 movements each way). The operation proposed by the EFS will require seven concentrate trucks although the EFS air quality assessment was modelled on a conservative basis, assuming eight concentrate trucks per day. The overall total number of truck movements in and out of the Project site are the same under the Stage 1 EFS Project as the larger Stage 2 Project presented in the MLP, as there is a reduced number of fuel trucks with the lower mining rate, replaced by the additional concentrate haulage trucks.

5.2.3 Removed Environmental Impacts

As per Table 3-1 in Section 3, the reduction in the Project scope and footprint has resulted in the following changes, which subsequently removes any associated impacts:

- the removal of processing iron ore;
- the removal of the onsite accommodation village during operations;

- Rex no longer require the closure of Redding Road;
- Rex no longer require the land west of Redding Road for the rock storage facility (RSF) or tailings storage facility (TSF);
- the removal of the process concentrate pipeline and return water line from site to the Port of Ardrossan (MPL only required for the power line); and
- the removal of the concentrate filter facility at the Port of Ardrossan, relocating to the process plant at site (MPL application withdrawn).

5.2.4 Environmental Impact Change Summary

The resultant changes to environmental impacts as a result of the reduced project are presented below in Table 5-1.

Table 5-1: Summary of changes of environmental impact of operation from MLP (Stage 2) to PEPR (Stage 1) projects

Project Component	Stage 2 (BFS) Project (MLP2013)	Stage 1 (EFS) Project (PEPR 2018)
Receptors	All receptors considered.	Three additional residences (receptors) to now be considered on the western side of Redding Road (refer to Section 2.9.and Section 5.2.2.)
Native vegetation	Clearing 40ha.	Clearing 45.01ha. The native vegetation estimate of 40ha within the MLP was an approximate estimate. A recalculation within the PEPR has increased that level of accuracy.
Threatened species	EPBC approval granted and highway diversion approved.	Unchanged.
Air quality (dust)	2 to 4 days of exceedances (with no shutdowns or adjustment of operations to reduce emissions at critical times).	No exceedances predicted.
Noise	18 days a year (modelling using Category 6 using winds <3m/s).	No exceedances predicted.
Blasting (average)	600kt per blast.	Less blasting required. Option to have same sized blast (600kt) less frequently or smaller blasts (320kt per blast) on the same frequency.
Visual amenity	Visual amenity monitoring points identified for height, slope of final landform and post-closure land use.	Unchanged.

Due to the changes in operation from the MLP 2013, a number of potential impact events identified in the impact assessment presented in Rex's MLP 2013 (Section 8 of the MLP) have been reduced (e.g., reduction in dust emissions) or are no longer applicable. The associated lease and licence conditions for ML6438, EML6439 and MPL146 that are no longer applicable are presented in Table 5-2. It is noted that these lease conditions will remain and may become applicable to future expansions of the project, however they are no longer applicable to the Stage 1 EFS Project presented in this PEPR and as such, have not been addressed further.

Table 5-2: Lease and licence conditions no longer applicable to activities in the PEPR

Lease /Licence	Reference	Details	Justification
ML6438	Schedule 2 – Condition 31.	30. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder: 30.1 Obtains ownership of CT 5707/273; or 30.2 obtains a registered Waiver of Exemption under the Act or agreement to undertake mining operations (inclusive of future geotechnical subsidence) on CT 5707/273; or 30.3 satisfies the Director of Mines that there is no risk that the proposed mining operations below that plane could impact on third-party property and the Director of Mines has approved the proposed operations in writing (subject to such conditions as he thinks fit).	The removal of underground mining from the Stage 1 EFS Project.
MPL146	Schedule 2 – Condition 8.2.1.	8.2.1 An independent slurry pipeline engineering expert (i.e., for verification of the design of the concentrate slurry pipeline).	The removal of the process concentrate pipeline and return water line from site to the Port of Ardrossan.
MPL146	Schedule 6, Soil and Land Disturbance Strategies – Clause 2.	2. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Soils Outcome Schedule 2 – Condition 2: 2.1. the location and depth below the natural surface of the concentrate and water pipelines must prevent any foreseeable damage due to accidental excavation or surface disturbance.	The removal of the process concentrate pipeline and return water line from site to the Port of Ardrossan. SA Water will own and is responsible for the installation, maintenance and operation of the potable water pipeline from Port Wakefield, inclusive of the portion in the MPL.SA Water will obtain the appropriate approvals for this work.
MPL146	Schedule 6, Groundwater Strategies – Clause 9.	9. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Groundwater Outcome Schedule 2 – Condition 5: 9.1. design and management strategies are to be provided for pipeline leak detection which includes automation of operational controls for the monitoring and control of all pipelines on the related Mineral Lease and this Mining Tenement. This should include (but is not limited to); 9.1.1. continuous and automatic monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment; 9.1.2. continuous and automatic monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities; 9.1.3. the integration of data through a central computer-based control and monitoring system.	

Based on the information presented in the delta impact assessment and presented throughout this PEPR, Rex believes that while the project has been amended from the MLP, there are no new or increased risks in Project execution from those identified during the assessment process of the MLP. The Project modifications made following the EFS remain consistent and compliant with the proposed measurement criteria and control and management strategies set out in the approved MLP and enhanced in this PEPR.

5.3 Aspects of the Environment Addressed

Aspects of the environment that might reasonably be expected to be impacted by the proposed activities were provided in the MLP, the Hillside Assessment Report (July 2014) and were further addressed in the delta impact assessment. These aspects are repeated as the section headings throughout this section. The impact events identified throughout this section are sourced from both the MLP and the delta impact assessment.

Issues raised by stakeholders during the consultations to date, and relevant legislation and associated recognised standards, are also addressed throughout this section of the PEPR. Additionally, the significance that the environmental receptor has to either stakeholders or relevant legislation is noted where appropriate.

The activities associated with the PEPR include exploration, investigative works, infrastructure works, mining, mineral processing, product transport to Port Adelaide, rehabilitation and closure, and other activities ancillary to mining operations. This section addresses the management and monitoring of the potential impacts to the external environment as a result of these activities.

Health and safety risks to workers at the mine have not been included as they are regulated under other legislation, however this section does address managing potential impacts to public health and safety as a result of the project.

Additionally, with respect to the activities to be conducted in the MPL, in accordance with SA Water's cabinet approval, the proposed mains extension between Port Wakefield and Pine Point (including infrastructure up to and including the proposed water meter in Sandy Church Road) will be built, owned and operated by SA Water. Therefore, all approvals necessary to deliver the mains extension will be the responsibility of SA Water and hence, impacts such as native vegetation clearance and the like are at the responsibility of SA Water and are not addressed here.

With respect to the transmission line to be constructed in the MPL, as part of the contractual agreements with ElectraNet, the proposed electricity transmission line will be built, owned and operated by ElectraNet. Therefore, all approvals necessary to deliver the mains extension will be the responsibility of ElectraNet.

5.4 Air Quality

5.4.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.4.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding air quality includes:

- *Environment Protection Act 1993* (SA);
- Environment Protection (Air Quality) Policy 2016 (SA);
- *Native Vegetation Act 1991* (SA);
- *National Environment Protection Council (South Australia) Act 1995* (SA);
- Environment Protection (National Pollutant Inventory) Policy 2008 (SA);
- *Mining Act 1971* (SA);
- Mining Regulations 2011 (SA);
- National Environment Protection (Ambient Air Quality) Measure (NEPM) 2016;
- National Environment Protection Measure (National Pollutant Inventory) – as varied November 2008 (Cth);
- National Environment Protection (Air Toxics) Measure – as varied December 2004 (Cth);
- National Environment Protection (Diesel Vehicle Emissions) Measure – as varied June 2001 (Cth);
- AS/NZS 3580.9.11:2016 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – PM_{10} beta attenuation;
- AS/NZS 3580.10.1:2016 Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method;
- AS/NZS 3580.9.3:2015 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – Total suspended particulate matter (TSP) – High volume sampler gravimetric method;
- AS/NZS 3580.10.2:2013 Methods for sampling and analysis of ambient air – Determination of particulate matter – Impinged matter – Gravimetric method;
- AS/NZS 3580.9.12:2013 Methods for sampling and analysis of ambient air – Determination of suspended particulate matter – $PM_{2.5}$ beta attenuation monitors; and
- AS/NZS 3580.14-2011 Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air.

5.4.3 Air Quality Context

Industry in the region of the Project includes cereal cropping and grazing, with dolomite mining carried out at the SIMEC Ardrossan mine approximately 12km to the north of the Project.

Dust is currently generated in the region of the ML and EML as a result of wind erosion from unsealed roads and cleared land as well as by agricultural activities. Dust is particularly noticeable in the region during summer when soil moisture is low and soil is bared through agricultural activity.

An updated air quality impact assessment was conducted in 2015 to assess the impact of dust emissions, air quality and meteorological modelling based on the proposed Stage 1 (EFS) mining operation (Pacific Environmental Limited (2015) Appendix 2.1-A). This assessment included:

- assessing potential particulate matter (PM) $PM_{2.5}$, PM_{10}, total suspended particulates (TSP) and total deposited dust (TDD) concentrations with emission controls implemented;
- site-specific meteorological data for dispersion modelling; and
- staged assessment for two years: Year 5 and Year 9 considered representative of the peak mining operations and potential worst-case impacts of the operation.

The impact assessment concluded that Project mining operations can meet the requirements of the ML conditions and achieve an acceptable environmental outcome as summarised:

- The largest contributor of dust has been modelled to be from wheel generated dust. The combined source of dust from pit activities (including haul roads within the pit) and haul roads (outside of the pit) was modelled to be 92% (TSP), 89% (PM_{10}) and 86% ($PM_{2.5}$) in Year 5 and 66% (TSP), 67% (PM_{10}) and 65% ($PM_{2.5}$) in Year 9 of operations;
- The predicted dust impacts for PM_{10}, $PM_{2.5}$ and TSP as well as dust deposition demonstrate compliance at all nearest sensitive receptors for both Year 5 and 9, which are considered representative of the peak mining operations and worst-case impacts; and
- The annual average $PM_{2.5}$ impact from the mining operations is predicted as small in relation to this background concentration, which also is conservative considering the rural setting and nature of modelling.

As identified in Section 2.8, the ambient PM_{10} monitoring data currently being collected identifies that the updated air quality impact assessment is still considered applicable and conservative.

5.4.4 Air Quality Impacts and Outcomes

Table 5-3 provides the list of potential air quality impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-3: Air quality – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: No public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. (ML6438 Schedule 6 – Clause 1, EML6439 Schedule 6 – Clause 1.)	
ML-A1	Decrease in air quality resulting in human health impacts at neighbouring sensitive receptors from dust emanating from mining operation.
ML-A2	Human health impacts resulting from the contamination of rainwater tanks with dust from the mining operation.
ML-A3 and EML-A1	Decrease in ambient air quality resulting in public nuisance at neighbouring sensitive receptors from dust emanating from the Hillside Project.

Potential Impact Event ID	Potential Impact Event Description
ML-A4	Decrease in ambient air quality from odour emanating from the site impacting neighbouring sensitive receptors.
ML(C)-A1 and DSD EML(C)A1	Elevated dust emissions from the site post-closure above surrounding background conditions impacting surrounding receptors.
DSD ML-A1	Post-cessation of mineral processing, dust generated from the tailings surface causing increased dust emissions to sensitive receptors.
DSD ML-A2	Health impacts on sensitive receptors from increased $PM_{2.5}$ emissions.
DSD ML-A5	Impacts on the efficiency of solar panels from increased dust deposition.
DSD ML-A6	Impacts on the efficiency of power infrastructure from increased dust deposition.
DSD ML-A7	Impacts to receptors from dust and emissions from underground operations.
DSD ML-A8	Impacts to public health resulting from exposure to asbestos.
DSD ML-A9	Impacts to public health resulting from exposure to diesel fumes and radon gas.
DSD ML-A10	Impacts to public health resulting from toxicological characteristics of dust.
DSD ML-A11	Contamination of dams due to increased dust deposition.
Applicable Outcome: No loss of abundance or diversity of native vegetation on or off the Land through: • clearance; • **dust/contaminant deposition;** • fire; • reduction in water supply; or • other damage, unless prior approval under the relevant legislation. (ML6438 Schedule 6 – Clause 2.)	
ML-A5	Reduced native plant growth or abundance resulting from increased dust deposition resulting from mining operations.
ML-A7	Degradation of marine environment from dust deposition resulting from the mining operations *(the impact relates to coastal and marine and has been addressed in Section 5.9).*
Applicable Outcome: No impacts to agricultural productivity for third-party users on and off the Land as a result of mining operations, including: • reduction on crop yield; • reduction in grain quality; • adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 3.)	
DSD ML-A11	Contamination of dams due to increased dust deposition.
ML-A6	Reduced agricultural crop growth rates/yields from increased dust deposition on leaves.
DSD ML-A3	Reduced grain quality resulting from increased dust emissions.

Potential Impact Event ID	Potential Impact Event Description
DSD ML-A4	Impacts to livestock resulting from increased dust deposition.
DSD ML-A11	Contamination of dams due to increased dust deposition.

5.4.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential air quality impacts are presented below.

Air quality control and management strategies are detailed in Table 5-4. These control strategies are proactive and will be conducted based on predicted weather conditions, review of monitoring data or part of normal operations. Note as all air quality strategies are related to controlling the air emissions generated, all controls apply to all outcomes, as the outcomes are related to different receptors rather than different dust sources.

Table 5-5 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-4: Air quality control and management strategies

Source	Air Quality Control and Management Strategies	Responsibility	Timing
Applicable Outcome: No public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. (ML6438 Schedule 6 – Clause 1, EML6439 Schedule 6 – Clause 1.)			
Design/Engineering Controls			
Areas disturbed by mining operations (C, O, CI)	Disturb only the minimum area necessary for mining.	Mining Manager	Ongoing.
Haul road dust generation (C, O, CI)	Design, construct and maintain haul roads and other heavily trafficked areas to ensure good roadway conditions and minimal build-up of roadway silt loading.	Mining Manager	Ongoing.
Haul road dust generation (C, O, CI)	Restrict non-essential vehicle access to unsealed areas.	Mining Manager	Ongoing.
Vehicle movement areas (C, O, CI)	Apply appropriate variable speed limits depending on unsealed surface area conditions.	Mining Manager	Ongoing.
Haul road dust generation (O, CI)	A wheel wash will be established at the exit of the operational area/plant area and every piece of equipment that has been on unsealed roads within the site will go through this prior to exiting site.	Mining Manager	Ongoing.
Haul road dust generation (C, O, CI)	Speed limit as appropriate. Speed limits will be enforced to ensure excessive vehicle speeds do not contribute to unacceptable dust generation.	Mining Manager	Ongoing.

Source	Air Quality Control and Management Strategies	Responsibility	Timing
Minor roads (C, O, CI)	Development of minor roads will be limited where possible and locations clearly defined.	Mining Manager	Ongoing.
Blasting (O)	Blasting will only occur following an assessment of weather conditions to ensure that wind speed and direction will not result in excess dust and fume emissions from the site. The key mitigation measures to control blast fumes are: • minimise the potential for delayed firing of shots which have been loaded into wet holes within the constraints of prevailing weather conditions; • conduct a pre-blast environmental assessment considering wind speed, direction and shear and the strength of temperature inversions prior to each blast. Whenever practicable, blasts will be fired in suitable weather conditions that minimise the potential for blast generated dust and/or blast fumes to be blown towards neighbouring residential areas (based on the control and impact direction (Table 5-7); and • design and execute blasts to be compliant with Blast Standard AS 2187.2, for the prevention and management of dust in surface blasting.	Mining Manager	Ongoing.
ROM bin and crusher (O)	A dust extraction system will be installed to service the locations in the primary crushing area that generate dust. The collected dust from the dust extraction system is discharged intermittently onto the primary crusher discharge conveyor.	Plant Operations Manager	During construction.
Conveyors (O)	Dust suppression spray systems are installed at relevant transfer points, with water delivery added to the lump and fine product conveyors prior to transferring onto the stackers. Spray nozzles will match particle sizing and hopper hoods will be installed where necessary. Refer to Table 3-22 in Section 3 for processing plant dust suppression.	Plant Operations Manager	During construction.
Management Controls			
Overburden emplacement areas (C, O, CI)	Where practicable, use of cover crops, other temporary revegetation measures or other surface coating measures to form temporary seals on overburden emplacement areas that remain unused and exposed.	Mining Manager, Sustainability Manager	Ongoing.
Overburden dumping (C, O)	Assess current dumping strategy and utilise alternate, less exposed dumps when adverse meteorological conditions are predicted, e.g., consider prevailing wind direction and location of sensitive receptors.	Mining Manager	Ongoing.
Areas disturbed by mining operations (C, O, CI)	Reshape, topsoil and rehabilitate completed overburden emplacement areas as soon as practicable after the completion of an overburden placement stage. (ML6438 Schedule 6 – Clause 4.2.)	Mining Manager, Sustainability Manager	Ongoing during operations.
Areas disturbed by mining operations (C, O, CI)	A visual indicator system for supervisors and operators will enable recognition of potential nuisance dust generating situations.	Plant Operations Manager	Ongoing.

Source	Air Quality Control and Management Strategies	Responsibility	Timing
Areas disturbed by mining operations (C, O, Cl)	Stage the removal of topsoil from mine development areas (mine, waste rock facility, haul roads) to keep the mine disturbance area to a minimum.	Mining Manager, Production Superintendent	Ongoing.
Areas disturbed by mining operations (C, O, Cl)	Dust suppressants to be used where required for temporary dust control of stockpiles and disturbed areas.	Mining Manager	Ongoing.
Tailings surfaces (C, O, Cl)	Saline process water will form a salt crust on dry tailings surfaces that prevents dust generation. If dry tailings surfaces will be at risk of creating dust, then maximisation of wetted surface needs to be undertaken by rotating use of the slurry outlet spigots.	Plant Operations Manager	Ongoing.
Tailings surfaces (Cl)	Capping and revegetation of the TSF will occur after mine closure. Processing plant will be covered with topsoil and returned to pre-mining agricultural activities (cropping) as per closure domains noted in Section 3.	Closure Manager	At closure.
Vehicle movement areas (C, O, Cl)	Keep an adequate number of water trucks on site to allow dust control as required.	Mining Manager	Ongoing.
Haul roads (C, O, Cl)	Promptly remove material that is spilt or tracked-out onto sealed pavements.	Mining Manager	Ongoing.
Roads (C, O, Cl)	Obsolete haul roads and minor roads will be ripped and revegetated, as soon as practicable.	Mining Manager	As required.
Roads and hardstand areas (C, O, Cl)	Speed limit as appropriate. Speed limits will be enforced to ensure excessive vehicle speeds do not contribute to unacceptable dust generation.	Mining Manager	Ongoing.
Minor roads (C, O, Cl)	The use of suitable dust suppressant will be explored, where practicable, for minor roads.	Mining Manager	As required based on trigger frequency.
Hardstand areas (C, O, Cl)	Watering of trafficked hard stand areas with water carts as required to supress dust.	Mining Manager	Ongoing.
Hardstand areas (C, O, Cl)	The use of dust suppressant will be explored, where practicable, for hard stand and industrial areas.	Mining Manager	Ongoing.
Topsoil stripping (C, O)	Tracks used by topsoil stripping scrapers during their loading and unloading cycle will be watered.	Mining Manager, Development Superintendent	As required.
Topsoil stripping (C, O)	Stripping will occur preferably in damp conditions if practicable and during favourable wind conditions.	Mining Manager, Development Superintendent	As required.

Source	Air Quality Control and Management Strategies	Responsibility	Timing
Topsoil stockpiling (C, O)	Long-term topsoil stockpiles will be sown with cover crops or otherwise revegetated as required.	Sustainability Manager	As required.
Drilling (C, O)	Air pollution control equipment will be operated and maintained on all drilling rigs to prevent fines generated during drilling being discharged to the atmosphere.	Development Superintendent	Ongoing.
Drilling (C, O)	Apply water to drill patterns post-drilling to minimise dust generation from the fine material collected during drilling.	Mining Manager	Ongoing.
TSF embankment construction (C, O)	Water trucks used to suppress dust on haul roads and during placement spreading and compaction of fill on embankment.	Mining Manager, Development Superintendent	During embankment construction operations.
TSF embankment construction (C, O)	Construction at boundaries to the extent possible at time of year with prevailing wind directions away from receptors.	Mining Manager, Development Superintendent	During embankment construction operations.
ROM stockpile area (O)	Use water sprays (automated where possible and feasible), windbreak fences and/or water trucks on the ROM stockpile traffic area as required.	Mining Manager	Ongoing.
ROM bin and crusher (O)	Sprays to be used as appropriate to weather and material conditions.	Plant Operations Manager	During tipping operations.
Hard stand areas around processing area (C, O, Cl)	Use of street sweeps on sealed hard stand areas, as required.	Plant Operations Manager	As required.
Hard stand areas around processing area (C, O, Cl)	Unsealed roads used regularly for access will be watered using water carts or sprays to minimise the generation of dust and particulate.	Plant Operations Manager	As required.
Hard stand areas around processing area (C, O, Cl)	All non-sealed roads are speed limited to 40kph (to be confirmed once operation commences). Speed limits will be enforced and reduced further, if required, to ensure vehicle speeds do not contribute to unacceptable dust generation.	Plant Operations Manager	As required.
Concentrate handling facilities (O)	Maintain entrance and interior of the concentrate storage and truck loading facility to ensure there is no concentrate on the floor and adjoining roads.	Plant Operations Manager	As required.
Concentrate handling facilities (O)	Prompt clean-up of any concentrate spillage.	Plant Operations Manager	As required.

Source	Air Quality Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	Indicative response to AQ-LIC1 and 2 – Level 1 trigger: Review current and planned operations considering: • dust generating sources; • the current level of dust controls being applied; • check real-time dust monitors and note areas of increase; • 24-hour average from midnight to midnight; and • consider the current/forecast meteorological conditions (measure and record wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation) with respect to mobile plant locations and plan operations accordingly. Revised activities and additional dust controls may be applied or planned as required.	Sustainability Manager	Ongoing throughout construction, operations and closure in response to trigger levels being reached.
LIC trigger (C, O, CI)	Indicative response to AQ-LIC1 and 2 – Level 2 trigger: • the dust trend is either rising and a response to trigger level 1 may not be sufficient, or there has been a step change from below trigger level 1 straight to trigger level 2. This could be due to an increase in site activity, rising ambient PM10 concentrations or a change in wind direction; • if trigger Level 2 is triggered without previously triggering trigger Level 1, complete the trigger Level 1 review bearing in mind that trigger Level 2 is now also triggered; and • If applied dust control measures are not sufficient and additional measures are not available, consider restricting operations. Considering the 24-hourly trend will inform operations if the trend is only just beginning to rise, or whether the trend is at a sustained higher level. This informs the timing of the actions required.	Sustainability Manager	Ongoing throughout construction, operations and closure in response to trigger levels being reached.
LIC trigger (C, O, CI)	Indicative response to AQ-LIC1 and 2 – Level 3 trigger: • this is a prompt that 50µg/m^3 PM_{10} or 120µg/m^3 TSP (the daily average compliance limit for AIC1 and 3 respectively) is exceeded for an hourly average and that if this is sustained for a 24-hour period, compliance will not be met; and • in addition to considering further restrictions to activities as for trigger Level 2, ceasing work should be considered if conditions and the 24-hourly trend suggest that compliance may not be met. The margin for this decision will need to be evaluated on a case-by-case basis since the reliability of forecast conditions can vary.	Sustainability Manager	Ongoing throughout construction, operations and closure in response to trigger levels being reached.
LIC trigger (C, O, CI)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the Air Quality Management Plan (AQMP) throughout the LOM.	Sustainability Manager	Ongoing throughout construction, operations and closure.

<table>
<tr><th>Source</th><th>Air Quality Control and Management Strategies</th><th>Responsibility</th><th>Timing</th></tr>
<tr><td>LIC trigger (C, O, CI)</td><td>In the event that trigger levels continue to be triggered, the early warning mobile monitors may be deployed at locations based on the history of LIC triggers and access availability and additional triggers based on their monitoring added to the operational AQMP.</td><td>Sustainability Manager</td><td>Ongoing throughout construction, operations and closure.</td></tr>
<tr><td>Compliance (C, O, CI)</td><td>In the event that monitoring shows that conditions 1, 2, 4 or 5 have been breached, the Tenement Holder must immediately cease the activity which resulted in the breach. (ML6438 Schedule 2 – Condition 6.)</td><td>Mining Manager</td><td>Ongoing throughout construction, operations and closure.</td></tr>
<tr><td colspan="4">Applicable Outcome:
No loss of abundance or diversity of native vegetation on or off the Land through:
• clearance;
• dust/contaminant deposition;
• fire;
• reduction in water supply; or
• other damage, unless prior approval under the relevant legislation. (ML6438 Schedule 6 – Clause 2.)</td></tr>
<tr><td colspan="4">Design/Engineering Controls</td></tr>
<tr><td colspan="4">Refer above design and engineering controls for dust control.</td></tr>
<tr><td colspan="4">Management Controls</td></tr>
<tr><td colspan="4">Refer above design and engineering controls for dust control.</td></tr>
<tr><td colspan="4">Applicable Outcome:
No impacts to agricultural productivity for third-party users on and off the Land as a result of mining operations, including:
• reduction on crop yield;
• reduction in grain quality; and
• adverse health impacts to livestock. (ML6438 Schedule 6– Clause 3.)</td></tr>
<tr><td colspan="4">Design/Engineering Controls</td></tr>
<tr><td colspan="4">Refer above design and engineering controls for dust control.</td></tr>
<tr><td colspan="4">Management Controls</td></tr>
<tr><td colspan="4">Refer above design and engineering controls for dust control.</td></tr>
</table>

Source	Air Quality Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, Cl)	Indicative response to AQ-LIC3 and AQ-LIC4 trigger: • review available information related to adjacent / regional crop yields, i.e., is it a non-mining related trend?; • review all other monitoring data (e.g., surface water, vegetation condition, groundwater etc.) to ensure any decrease is related to air quality/dust impact; • review current and planned operations considering: • dust generating sources; • the current level of dust controls being applied; • revision or amendment of mining activities and additional dust controls may be applied as required; and • obtain additional expertise as applicable such as an agronomist, adjacent croppers, Grain Producers SA expertise etc.	Sustainability Manager	Ongoing throughout construction, operations and closure in response to trigger levels being reached.
LIC trigger (C, O, Cl)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the Air Quality Management Plan (AQMP) throughout the LOM.	Sustainability Manager	Ongoing throughout construction, operations and closure.
General			
Training and awareness (C, O, Cl, PC).	Site Inductions and Training for relevant personnel (employees, contractors and subcontractors) will be conducted on air quality requirements to ensure the appropriate use of water sprays and dust control measures.	Safety/ Training Advisor	Prior to commencement of work on site.
Complaints (C, O, Cl, PC)	A 24-hour-a-day, 7-days-a-week, free-call telephone complaints line will be established for the purpose of receiving complaints from members of the public in relation to mining operations. (ML6438 Schedule 2 – Condition 45, MPL146 Schedule 2 – Condition 18, EML6439 Schedule 2 – Condition 10.)	Sustainability Manager	Ongoing.
Complaints (C, O, Cl, PC)	Reasonable measures will be made to notify the public of the complaints line telephone number and the fact that it is a complaints line. (ML6438 Schedule 2 – Condition 46, MPL146 Schedule 2 – Condition 19, EML6439 Schedule 2 – Condition 11.)	Sustainability Manager	Ongoing.
Complaints (C, O, Cl, PC)	The complaints register will record specific detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the mining operations. (ML6438 Schedule 2 – Condition 47, MPL146 Schedule 2 – Condition 20, EML6439 Schedule 2 – Condition 12.)	Sustainability Manager	Ongoing.
Complaints (C, O, Cl, PC)	All records in respect of the public complaints must be maintained for a period of at least 7 years. (ML6438 Schedule 2 – Condition 48, MPL146 Schedule 2 – Condition 21, EML6439 Schedule 2 – Condition 13.)	Sustainability Manager	Ongoing.
Complaints (C, O, Cl, PC)	The public complaints register will be made publicly available except for the name and contact details of each complainant. (ML6438 Schedule 2 – Condition 49, MPL146 Schedule 2 – Condition 22, EML6439 Schedule 2 – Condition 14.)	Sustainability Manager	Ongoing.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

Table 5-5: Air quality – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: No public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. (ML6438 Schedule 6 - Clause 1, EML6439 Schedule 6 – Clause 1.)				
Refer to Table 5-4.	Key assumptions made in predicting dust impacts by the Hillside Project and in recommending mitigation and management controls are: 1. Baseline air quality data is representative.	Establish air quality monitoring program as detailed in Table 5-6. (ML6438 Schedule 2 – Condition 7, Condition 4.1, Condition 5).	Sustainability Manager	Prior to commencement of construction.
		Review collected site PM_{10} data to establish a more representative air quality baseline for the Hillside Project.	Sustainability Manager	1 month prior to commencement of construction.
Applicable Outcome: No loss of abundance or diversity of native vegetation on or off the Land through: • clearance; • dust/contaminant deposition; • fire; • reduction in water supply; or • other damage, unless prior approval under the relevant legislation. (ML6438 Schedule 6 – Clause 2.)				
Refer to Table 5-4.	2. Assumed watering frequency is adequate.	Assess the adequacy of the water truck fleet by visual observation and through monitoring data review during operations and make adjustments if necessary.	Mining Manager	Ongoing and as per triggering of leading indicator criteria for dust.
		Predictive models to forecast potential dust generation will be evaluated through an assessment and trial period as a potential planning and management tool.	Mining Manager, Sustainability Manager	Three-year trial period during operations.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-4.	3. Salt crusting on the TSF surface is effective in restricting dust generation.	Assess the performance of dry tailings surfaces by visual observation in windy conditions and apply additional management measures if required, e.g., maximise wetted surface during periods if significant dust generation occurs.	Plant Operations Manager	Ongoing and as per triggering of leading indicator criteria for dust.
	4. Monitoring alerts system appropriately calibrated to provide effective indication for action.	Calibration of trigger alerts system with levels (concentrations) to ensure adequate warning ahead of time to respond to rising dust trends and avoid compliance criteria exceedances.	Mine Controller	Within 12 months after commencement of construction to allow for all seasons and ambient conditions including wind directions to be covered in the calibration. Reviewed in first year of operations.
		Develop factor relationships between monitor locations and sensitive receptors to allow development/refinement of alert systems and response to complaints and review of monitoring data.	Sustainability Manager	One month prior to commencement of construction. Reviewed in first year of operations.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: No impacts to agricultural productivity for third-party users on and off the Land as a result of mining operations, including: • reduction on crop yield; • reduction in grain quality; • adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 3.)				
Refer to Table 5-4.	5. Rehabilitation of overburden landforms can be scheduled to avoid hot, dry conditions.	Ensure mine planners understand the air quality requirements for the Hillside Project and the need to schedule landform rehabilitation activities at the most appropriate times of the year. Requirement to be included in site inductions and mining departments progressive rehabilitation procedure.	Sustainability Manager Mining Manager	Inclusion in inductions prior to commencement of operations. Inclusion in mining departments progressive rehabilitation procedure prior to commencement of progressive rehabilitation.
		Prepare public access website format and real time data presentation. (ML6438 Schedule 2 – Condition 9.)	Sustainability Manager	One month prior to commencement of construction.
		Visual analysis of the raw data will be undertaken monthly to identify any anomalous readings such as zero readings (power cuts, clogged filters, change of filter), anomalously high or low or repetitive readings. These will be investigated on a case by case basis and records of inclusion or exclusion from the data set recorded.	Sustainability Manager	Monthly during construction, operations and closure.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-4.		Measure $PM_{2.5}$ for a period of no less than one year and establish PM_{10} measurement can be used as a proxy for $PM_{2.5}$. Approval will be sought from the Director of Mines, to enable the monitoring of PM_{10} to be used as a proxy for $PM_{2.5}$, demonstrated compliance with Condition 2 for a period of no less than one consecutive year after the commencement of mineral processing; and establish that PM_{10} measurements can be used as a proxy for $PM_{2.5}$ measurements. (ML6438 Schedule 2 – Condition 3.)	Sustainability Manager	No less than one year after commencement of construction. Reviewed in first year of operations.
Additional management strategy Review by independent expert (air quality expert) on the air quality records to show no impacts to agricultural productivity for third-party land users on or off the Land as a result of mining operations, including reduction in crop yield (PC).		After 12 months of monitoring of copper levels in TSP dust, review potential applicable credible risk health-based limits and determine potential trigger levels.	Sustainability Manager	12 months after copper ore has been intersected by mining activities.

5.4.6 Environmental Measurement Criteria

Air quality outcome measurement criteria and leading indicator criteria are outlined in Table 5-6, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period. This review will be based on the availability of required infrastructure such as power sources which may no longer exist after closure, and in consideration of the monitoring results during operations.

Table 5-6: Air quality – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Meteorological monitoring in accordance with AS/NZS 3580.14-2011 to measure and record (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation. (ML6438 Schedule 2 – Condition 14.)	Weather station location M1 – refer to Figure 5-1.		Continuous.			Sustainability Manager	Regular review of data to ensure proper operation.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: No public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations. (ML6438 Schedule 6 – Clause 1, EML6439 Schedule 6 – Clause 1)							
PM_{10} will be monitored by Beta-Attenuation Mass (BAM) monitor or equivalent technology in accordance with AS/NZS 3580.9.11:2016 (PM_{10}).	Five locations (M2, M3, M5, M11 and M13) – see Figure 5-1. Post-closure locations to be reviewed in consultation with the Regulator during the closure period.	Less than 50µg/m^3 as a 24-hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; (ML6438 Schedule 2 – Condition 1.1.) or Where the total PM_{10} dust concentration entering the site exceeds 50µg/m^3 as a 24-hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM_{10} dust leaving the site does not exceed the measured level entering the site during that period. (ML6438 Schedule 2 – Condition 1.2.) The above criteria is achieved during construction, operations, closure and post-closure monitoring period.	Continuous real time at intervals not more than 10 minutes – averaging period 24 hours (midnight to midnight) during construction, operations and closure. Monitoring will continue for a period of 12 months post-closure or until such time as data indicates that air quality impact from the site is approaching background.	Control sites are dependent on the wind directions – see Table 5-7.	**Leading Indicator Criteria (AQ-LIC1)**. Continuous real time monitoring by BAM or equivalent technology at 5 locations, recording data at intervals not more than 10 minutes averaged over a period of 1 hour identifies that PM_{10} levels are not greater than the following trigger levels: • Level 1 (40µg/m^3); • Level 2 (50µg/m^3); and • Level 3 (60µg/m^3).	Sustainability Manager	Daily review and reporting in Annual Compliance Report and on public access website. (ML6438 Schedule 2 – Condition 9.)

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
$PM_{2.5}$ will be monitored by BAM or equivalent technology in accordance with AS/NZS 3580.9.12:2013 ($PM_{2.5}$).	One locations (M2) (see Figure 5-1). PM^{10} is accurately measured at 5 locations (M2, M3, M5, M11 and M13), and the $PM_{2.5}$ measured at the M2 location provides a real-time measurement of the ratio between PM_{10} and $PM_{2.5}$ on an ongoing basis. This measured ratio can then be used to estimate the $PM_{2.5}$ at the other locations. Post-closure locations to be reviewed in consultation with the Regulator during the closure period.	NEPM criteria (2016) 25µg/m^3 24 hour (midnight to midnight). NEPM criteria (2016) 8µg/m^3 12-month average. for $PM_{2.5}$ leaving the site, measured on average over a 24-hour period (midnight to midnight) with measurements taken at intervals of not more than 10 minutes. (ML6438 Schedule 2 – Condition 2.) The above criteria is achieved during construction, operations, closure and post-closure monitoring period.	Continuous real-time at intervals not more than 10 minutes: - averaging a period of 24 hours (midnight to midnight) for 24-hour criteria. - averaging period 12 months for 12 month criteria during construction, operations and closure until such time as Director of Mines provides agreement to use PM_{10} proxy. Post-closure monitoring will be PM_{10} as a proxy.	Control sites are dependent on the wind directions – see Table 5-7.		Sustainability Manager	Daily review for 24-hour data, monthly review for annual average data. Reporting in the Annual Compliance Report and on public access website. (ML6438 Schedule 2 – Condition 9.)

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
TDD will be monitored by dust deposition gauges in accordance with AS/NZS 3580.10.1:2016.	M2, M3, M5, M11 and M13 (see Figure 5-1). Post-closure locations to be reviewed in consultation with the Regulator during the closure period.	TDD leaving the site does not exceed 4g/m^2/month averaged over all 12 month periods and (ii) the mine contribution to TDD leaving the site does not exceed 2g/m^2/month for all months. (ML6438 Schedule 2 – Condition 4.) The above criteria is achieved during construction, operations, closure and post-closure monitoring period.	Monthly (30 days (+/- 2 days) continuous) during construction, operations and closure. Monitoring will continue for a period of 12 months post-closure or until such time as data indicates that air quality impact from the site is approaching background.	Pollution/wind rose plots of hourly dust (TSP and PM_{10}) concentrations to enable concentration of TDD entering site to be calculated. Wind direction data.		Sustainability Manager	Monthly review and reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Total Suspended Particulates (TSP) will be monitored by BAM or equivalent technology in accordance with AS/NZS 3580.9.3:2015.	Real time TSP monitors at M2 and M13 – see Figure 5-1. Post-closure locations to be reviewed in consultation with the Regulator during the closure period.	TSP leaving the site does not exceed an average of 120µg/m^3 for all 24 hour periods (midnight to midnight) and an average of 90µg/m^3 for any 12-month period. (ML6438 Schedule 2 – Condition 5.) Unless otherwise agreed with the Director of Mines. ML6438 Schedule 2 – Condition 5.1.) The above criteria is achieved during construction, operations, closure and post-closure monitoring period.	Continuous real-time at intervals not more than 10 minutes: • averaging period 24 hours (midnight to midnight) for 24-hour criteria; and • averaging period 12 months for 12-month criteria during construction, operations and closure. Monitoring will continue for a period of 12 months post-closure or until such time as data indicates that air quality impact from the site is approaching background.	Control sites are dependent on the wind directions – see Table 5-7.	**Leading Indicator Criteria (AQ-LIC2)** Continuous real time monitoring by BAM or equivalent technology at 2 locations, recording data at intervals not more than 10 minutes averaged over a period of 1 hour identifies that TSP levels are not greater than the following trigger levels: • Level 1 (80µg/m^3); • Level 2 (100µg/m^3); and • Level 3 (120µg/m^3).	Sustainability Manager	Daily review and reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Response of public complaints received in relation to air quality at the time of complaints.	Monitored via the Community Response Process, a 24-hour community complaints response line that will receive, report and respond to any complaints from the public in relation to Air Quality in accordance with the Complaints Management Procedure EC PRO 320 (Appendix 4.7).	Community Response Process is implemented as per the Complaints Management Procedure EC PRO 320.				Sustainability Manager	Reporting of number of complaints and performance of response in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Bioavailable copper as $CuFeS_2$ present in dust – dust collected from the high volume air sampler (HVAS) TSP in accordance with AS/NZS 3580.9.3:2015. *NB: Dust sourced from the HVAS will be used for testing as the dust deposition gauges are subject to contamination (from birds, organic material from agriculture etc.) and are therefore less reliable and less accurate.*	M1 – see Figure 5-1. Post-closure locations to be reviewed in consultation with the Regulator during the closure period.	Compliance with ML6438 Schedule 2 – Condition 7 – the Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program. Collection of representative data of Hillside dust copper content which can be used in assessments of potential human and livestock health impacts.	24-hour period every 6 days for 12 months from the commencement of open pit pre-strip. From the end of that 12-month period to completion of closure activities = evaluate data annually and reduce initially to sample collection every 6 days for one month per quarter, reducing further in a further 12 months onwards based on data evaluation and agreement with regulators. Monitoring will continue for a period of 12 months post-closure or until such time as data indicates that air quality impact from the site is approaching background.	There is no control or baseline for this data.		Sustainability Manager	Annual review and reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: No loss of abundance or diversity of native vegetation on or off the Land through: • clearance; • dust/ contaminant deposition; • fire; • reduction in water supply; or • other damage, unless prior approval under the relevant legislation. (ML6438 Schedule 6 – Clause 2.)							
TDD monitoring (refer above).							
Native vegetation surveys to measure abundance and diversity – see Section 5.10.							
Applicable Outcome: No impacts to agricultural productivity for third-party users on and off the Land as a result of mining operations, including: • reduction on crop yield; • reduction in grain quality; and • adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 3.)							
TDD monitoring (refer above).							
Bioavailable copper in dust (refer above).							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Copper levels in grain (wheat and barley) collected and analysed for copper levels in accordance with SARDI guidelines.	Samples from grain delivery trucks from the Crop Quality Monitoring Area (see Figure 5-2) at the bulk grain handling depot during protein sampling.	Maximum residual copper below the 10mg/kg copper limit as per advice from SARDI.	Annually during construction, operations and closure. Monitoring will continue for a period of 12 months post-closure or until such time as data indicates that air quality impact from the site is approaching background.	Maximum residue limits for copper in grain (barley and wheat) of 10mg/kg of harvested grain (SARDI).	**Leading Indicator Criteria (AQ-LIC3)** Maximum residual copper levels in grain (wheat and barley) collected and analysed for copper levels in accordance with SARDI guidelines from grain delivery trucks from the Crop Quality Monitoring Area do not exceed 8mg/kg (lagging indicator after harvest).	Sustainability Manager	Annual review and reporting in the Annual Compliance Report.
Potential for mining-impacts to agricultural productivity resulting in complaints. Method – based on specific written complaints relating to agricultural productivity, investigate potential for impact being mining-related through review of available control data to determine potential level of impact from operation on specific agricultural area.	Based on complaint origin, i.e., area of potentially impacted agricultural activity.	Investigation of complaint determines no evidence of mining-related impact to agricultural productivity.	In response to written complaints relating to agricultural productivity during construction, operations and closure.	Control data will include wind directions and speed, dust (PM_{10}, $PM_{2.5}$, TDD, TSP) copper levels in dust and copper in crops and Rex crop yields and any published crop yield data.	**Leading Indicator Criteria (AQ-LIC4)** Crop yield (tonnes per hectare) on the Crop Quality Monitoring Area measured by area harvested and volume trucked for market, significantly decrease in response to an increase in impact deposited dust data.	Sustainability Manager	Annual review and reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
PM_{10} will be monitored by BAM or equivalent technology in accordance with AS/NZS 3580.9.11:2016 (PM_{10}).	Five locations (M2, M3, M5, M11 and M13) – see Figure 5-1. Post-closure locations to be reviewed in consultation with the Regulator during the closure period.	PM10 leaving the site does not exceed an average of 150µg/m^3 over a 24-hour period (midnight to midnight) more than 3 times per calendar year (*US Clean Air Act of 1963* secondary standard for damage to crops and vegetation) as an indicator for potential reduction in crop yield. The above criteria is achieved during construction, operations, closure and post-closure monitoring period (noting this will be achieved through compliance with ML6438 Schedule 2 – Condition 1.1 and 1.2.).	Continuous real time at intervals not more than 10 minutes – averaging period 24 hours (midnight to midnight) during construction, operations and closure.	Control sites are dependent on the wind directions – see Table 5-7.	Lower PM_{10} LIC are already in place (AQ-LIC1) hence would result in triggering action which would also result in achievement of this outcome.	Sustainability Manager	Daily review and reporting in the Annual Compliance Report.
Crop yield (t/ha) measured in terms of harvest volumes (t) per area harvested (ha).	Crop Quality Monitoring Area (see Figure 5-2).	Crop yield on the crop quality monitoring area shows no decline greater than that expected based on the broader growing conditions and seasonal variation based on rainfall and all other monitoring data collected by Rex which may influence crop growth. Information will also be gathered through consultation with local farmers and if required, expert agronomists.	Annually post-harvest during construction, operations and closure.	Previous annual crop yields. Any published crop yield data.		Sustainability Manager	Annual review

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Residual impacts to agricultural productivity and health impacts to livestock over LOM.	Independent expert (agronomist expert).	Independent expert (agronomist expert) verifies no impacts to and unlikely to be future impacts to agricultural productivity or livestock health attributable to mining related activities.	Prior to relinquishment.	Control data = LOM dust monitoring data; LOM crop copper content monitoring data.		Sustainability Manager	In final closure report for relinquishment.

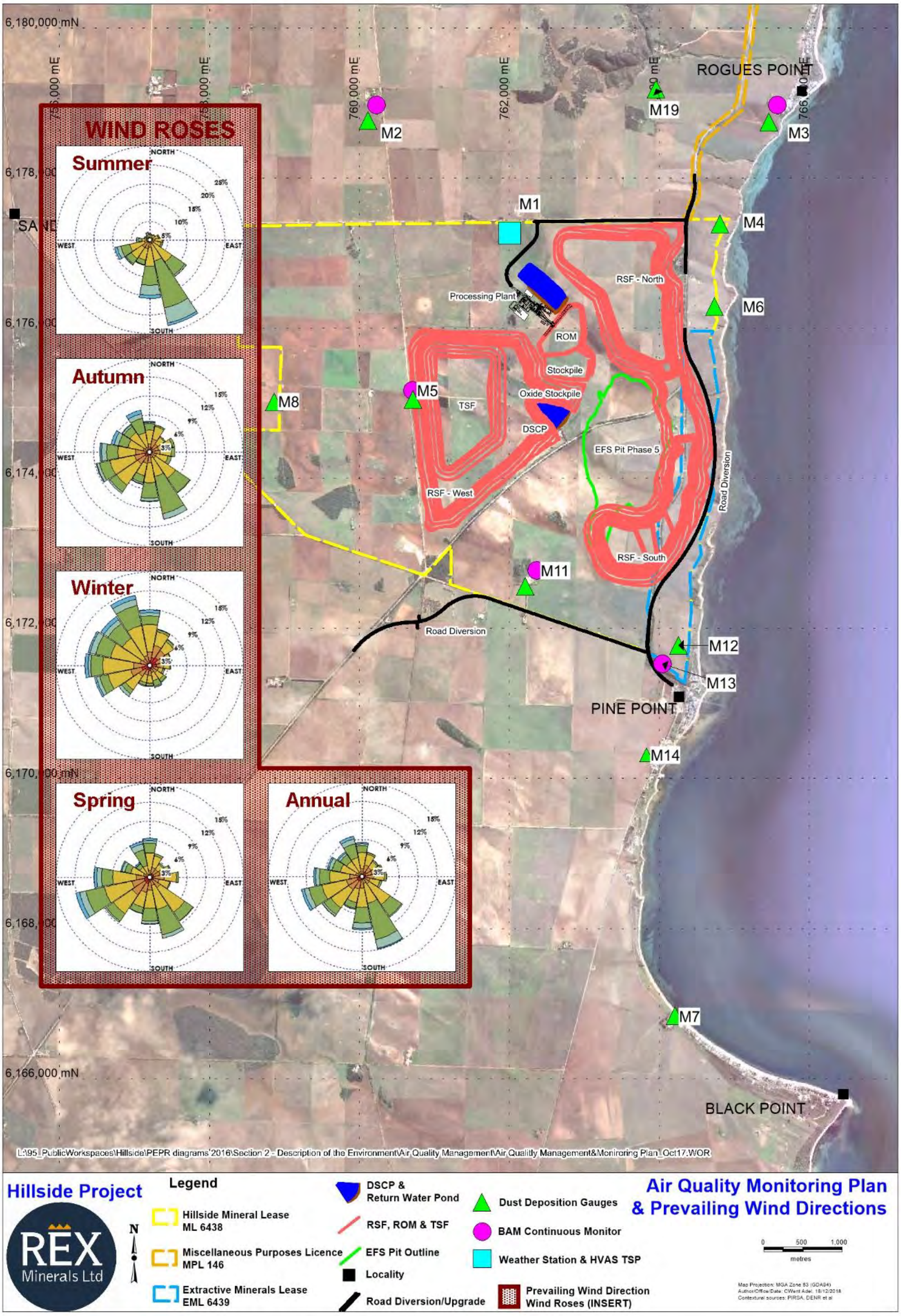

Figure 5-1: Air quality monitoring locations

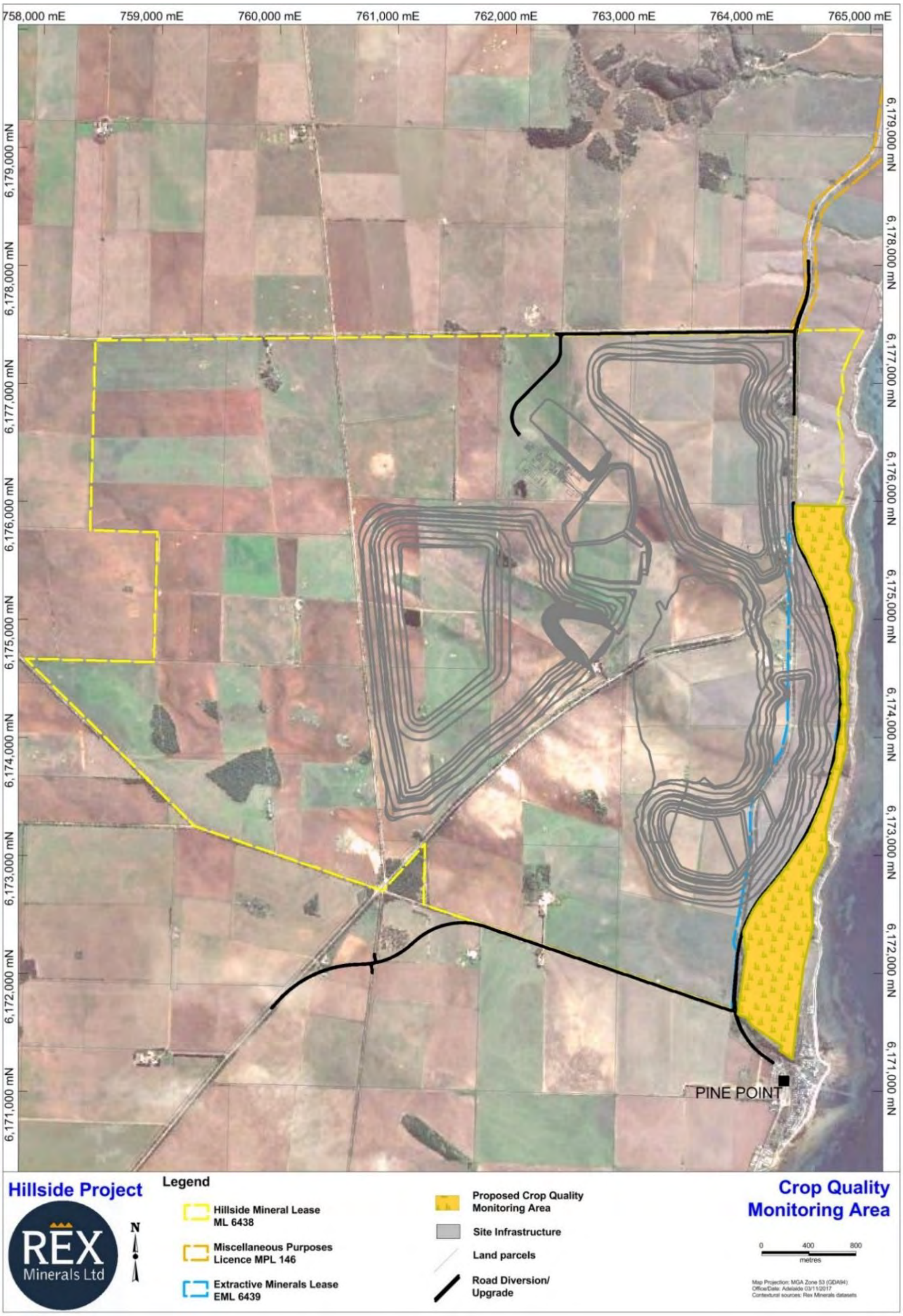

Figure 5-2: Crop quality monitoring area

Table 5-7: Air quality – Control and impact monitoring locations depending on wind direction

Wind Direction Blowing From	Control (Ambient – Upwind) Monitoring Location	Impact (Downwind) Monitoring Location
Southeast	M13	M2, M1
Northwest	M2, M1, M8	M13
Southwest	M2, M5, M11, M13	M3, M1
Northeast	M3, M1	M5, M11
East	M3, M13	M5, M1, M8
North	M2, M1, M3	M11, M13
South	M11, M13	M2, M1, M3

5.5 Noise

5.5.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The noise related tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.5.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Noise includes:

- Section 25 of the *Environment Protection Act 1993* (SA);
- Environment Protection (Noise) Policy 2007 (Noise EPP);
- Yorke Peninsula Council Development Plan February 2014 (i.e., in place at the time of granting of the ML);
- Australian Standard AS1055 Acoustics, Description and Measurement of Environmental Noise; and
- Australian Standard AS1259 Acoustics — Sound Level Meters.

5.5.3 Noise Context

Existing noise levels around the Project are generally typical of a rural area. The main sources of noise include dolomite mining and processing at the Arrium facility, the Port Wakefield Proof and Experimental Establishment located across Gulf St Vincent, farming equipment, a largely disused recreational rifle range just south of Ardrossan, road traffic, and livestock.

Baseline (pre-construction) noise monitoring for the proposed Hillside Project was undertaken by an independent expert (acoustic engineer), AECOM in November 2012, previously discussed in MLP Section 5.6.1, Section 6.6.9.3 and Section 8.3.2.1 and see MLP Appendix 5.6-A. No further baseline monitoring is planned prior to Project commencement as noise conditions are expected to be unchanged.

The EFS Noise Impact Assessment was conducted by Resonate Acoustics in August 2015 to assess and model the impact of noise from baseline monitoring and the Stage 1 EFS Project (see Appendix 3.5-A). The assessment considered the worst-case noise impact of four stages of mining operations occurring over years with maximum mine activity, namely Years 0, 1, 5 and 9, and compared the results with the requirements of the ML conditions. The assessment indicates that:

- modelling has shown the greatest potential for public nuisance will be due to operational noise from mobile plant working within the ML;
- modelling shows that exceedances of the noise criteria are not expected for the Hillside Project over any years of operation. However, the DEM requires that mining operations minimise noise nuisance where practical as part of the social license to operate; and
- modelling concluded that with noise mitigation measures in place, noise emissions from the Project can meet the requirements of the ML and EML and achieve an acceptable environmental outcome.

Meteorological effects on noise is primarily due to either wind distribution or vertical temperature gradient, or both. In reality, the fluctuating meteorological conditions may have a significant effect on the perceived noise level at sensitive receptor locations. Therefore, implementing operational controls and management measures that consider the prevailing meteorological conditions are likely to ensure that noise nuisance is appropriately managed while also ensuring compliance with the regulated noise criteria and environmental outcomes.

5.5.4 Noise Impacts and Outcomes

Table 5-8 provides the list of potential noise impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-8: Noise – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the date that this Mineral Lease was granted. (ML6438 Schedule 6 – Clause 6, EML6439 Schedule 6 – Clause 2.)	
ML-N1	Public nuisance impacts on surrounding residential receptors from noise emanating from the mine site during construction.
ML-N2	Public nuisance impacts on surrounding residential receptors from noise emanating from increase in road traffic from road diversions required for the Hillside Project.
ML-N3	Public nuisance impacts on surrounding residential receptors from noise emanating from the fixed plant mine site during operation.
ML-N4	Public nuisance impacts on surrounding residential receptors from noise emanating from the mobile plant mine site during operation (including rehabilitation).
ML-N7	Displacement of terrestrial native fauna and marine fauna due to noise and vibration from mine construction and operation.
ML-BV2	Reduced public amenity as a result of air overpressure (noise) associated with blast activities.

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome in Sixth Schedule Clause 2. (EML6439 Schedule 6 – Clause 3.)	
EML-N1	Public nuisance impacts on surrounding residential receptors from noise emanating from the removal and transport of extractive stockpiles.
DSD EML- N1	Public nuisance impacts on surrounding residential receptors from noise emanating from the removal and transport of extractive stockpiles.

5.5.5 Environmental Outcomes and Controls

The control and management measures that will be implemented throughout the life of mine to mitigate potential noise impacts are detailed in Table 5-9.

Table 5-10 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-9: Noise control and management strategies

Source	Noise Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the date that this Mineral Lease was granted. (ML6438 Schedule 6 – Clause 6, EML6439 Schedule 6 – Clause 2.)			
Design/Engineering Controls			
Fixed and mobile plant (C, O, CI)	Haul trucks will be purchased with appropriate noise attenuation fitted.	Mining Manager	Prior to purchase of haul trucks.
Fixed and mobile plant (C, O, CI)	Prior to final selection and purchase of the preferred mobile fleet, consideration will include the following: • An assessment of the actual measured sound power levels and spectral characteristics; and • An assessment to ensure that no obvious annoying noise characteristics occur as defined by the Noise EPP e.g., planetary gear tonal noise emission, under load, excessive retard grid blower noise, or cooling fan noise.	Mining Manager	Prior to purchase of haul trucks.
Fixed and mobile plant (C, O, CI)	Distribute RSFs and stockpiles to assist with noise shielding. The noise attenuation benefits provided by the strategically located RSFs are significant (Appendix 3.5-A). • The RSFs have been designed to provide a barrier effect, shielding haul roads, the open pit and processing plant; and • The location of the processing plant has been selected to be shielded by the natural topography.	Mining Manager	Ongoing during construction and operations.

Source	Noise Control and Management Strategies	Responsibility	Timing
Fixed and mobile plant (C, O, CI)	Noise reduction devices such as mufflers and broadband noise reversing alarms will be fitted and operating effectively.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
Reduction of noise impact as a result of blasting (C, O)	See blasting controls in Table 5-13 in Section 5.6.		
Management Controls			
Reduction of noise impact as a result of blasting (C, O)	See blasting controls in Table 5-13 in Section 5.6.		
Fixed and mobile plant (C, O, CI)	Operational vehicles kept to established and designated tracks, work zones and speed limits.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
Fixed and mobile plant (C, O, CI)	Where practicable, the operation of the rock breaker will be limited to daytime operation only, particularly given the impulsive annoyance characteristics typical of rock-breaking activities.	Mining Manager Closure Manager	Ongoing during construction operations and closure.
Fixed and mobile plant (C, O, CI)	Not mixing the operation of attenuated and non-attenuated haul trucks on the southern RSF haul routes to minimise noise annoyance associated with alternating noise characteristics where practicable.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure
Fixed and mobile plant (C, O, CI)	Shutting or throttling equipment down whenever it is not in actual use where practicable.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
Road diversion works (C)	Activities related to the EML related to loading and trucking of excess roadside aggregate will be undertaken during daylight hours and in such conditions to minimise noise impacts.	Construction Manager	During road diversion works.

Source	Noise Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	Trigger Level 1 indicative response actions include: • Listen to the real-time audio feed to assess noise event and characteristics; • If the noise event is not due to mining operations, no further action is required; • If the noise event is caused by mining operations, check the location of plant and equipment nearest the monitoring station(s); • Are any annoying noise characteristics present? If yes, apply noise control measures as soon as practicable to minimise the potential for exceedance of noise compliance limits; and • Consider the current and forecast meteorological conditions with respect to mobile plant locations and plan operations accordingly. This will inform the timing of the mitigation actions required.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
LIC trigger (C, O, CI)	Trigger Level 2 indicative response actions include: • Implementation of Level 1 response actions where they have not already been undertaken; • Immediate action will be taken to control any identified annoying noise characteristics with current operations. • Applied controls will be reviewed, and additional controls applied where available; • Further review of the current and forecast meteorological conditions; and • Consider restriction of operations based on weather forecast and existing application of controls.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
LIC trigger (C, O, CI)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the Noise Management Plan (NMP) throughout the life of mine.	Sustainability Manager	Ongoing throughout construction, operations and closure.
Exceedance of conditions (C. O, CI, PC)	In the event that monitoring shows that ML6438 Schedule 2 – Condition 10 (subject to Condition 11), has been breached, those activities that resulted in the breach will be immediately ceased until such time as levels comply. (ML6438 Schedule 2 – Condition 13.)	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
Exceedance of conditions (C. O, CI, PC)	Noise exceedances will be reported to the relevant department and continuous monitoring will be publicly available via the public internet site.	Sustainability Manager	Ongoing.
Applicable Outcome: The Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome in Sixth Schedule Clause 2. (EML6439 Schedule 6 – Clause 3.)			
Design/Engineering Controls			
Road diversion works (C)	Any temporary stockpiling of excess roadside aggregate will be positioned as far as reasonably practicable (approximately 600m) from Pine Point. (EML6439 Schedule 6 – Clause 3.)	Construction Manager	During road diversion works.

Source	Noise Control and Management Strategies	Responsibility	Timing
Management Controls			
Road diversion works (C)	Activities related to the EML related to loading and trucking of excess roadside aggregate will be undertaken during daylight hours and in such conditions to minimise noise impacts.	Construction Manager	During road diversion works.
General			
Implementation of NMP (C, O, CI)	Implementation of the operational NMP, Noise Monitoring Program and Noise Response Procedures.	Sustainability Manager	Ongoing.
Training and awareness (C, O, CI, PC)	Site Inductions and Training for relevant personnel (employees, contractors and subcontractors).	Safety/Training advisor	Ongoing prior to individuals commence work.
Training and awareness (C, O, CI).	Selected site personnel to be trained by an acoustic engineer to identify noise characteristics and how the presence of a noise characteristic/s affects the magnitude of the measured noise level and its relationship with the 'not to be exceeded' noise level. Training will also be provided on how to carry out attended noise monitoring to assist with noise management. A trained person will be on site at all times to the extent reasonably practical.	Training advisor	Ongoing prior to individuals commencing monitoring.
Awareness (C, O, CI).	Real time monitoring will be publicly available via the Public Internet Site for the life of mine (ML6438 Schedule 2 – Condition 12)	Sustainability Manager	Ongoing.
Complaints (C, O, CI, PC)	Refer to complaint controls Air Quality Section 5.4.		
Complaints (C, O, CI, PC)	If a landowner of privately-owned land considers the Hillside Project to be exceeding the noise measurement criteria in the ML and/or EML, and further monitoring fails to assist a mutual agreement to be reached, an independent review will be undertaken by an acoustic engineer.	Sustainability Manager	In response to unresolved complaints.

Note: (C) = construction (O) = operations (CI) = active closure (PC) = post-closure to relinquishment.

5.5.6 Environmental Measurement Criteria

Noise outcome measurement criteria and leading indicator criteria are outlined in Table 5-11, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated.

As all noise sources will be removed at the end of the closure implementation period, there will be no noise monitoring conducted during the post-closure period.

Table 5-10: Noise – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the date that this Mineral Lease was granted. (ML6438 Schedule 6 – Clause 6, EML6439 Schedule 6 – Clause 2.)				
Refer to Table 5-9.	Appropriate sound power specification of mobile and fixed plant.	An acoustic engineer will prepare sound power specifications to assist with plant purchase decision-making and will conduct attended noise monitoring to confirm manufacturer sound power levels.	Mining Manager	Prior to purchase of equipment.
	No annoying noise characteristics associated with operation of mobile and fixed plant.	A suitably qualified independent expert (acoustic engineer) will be commissioned to measure tonal/modulating/impulsive/low frequency noise characteristics of the mobile plant (ML6438 Schedule 6 – Clause 7.4).	Mining Manager	Within 3 months of the commencement of earthworks that involve a mobile plant fleet.
	Correlation of meteorological conditions, operational activities and the relationship between noise levels at both the continuous and compliance audit locations are not well understood.	Noise compliance audits: noise levels dB(A) will be measured by an acoustic engineer in real time using an attended National Association of Testing Authorities (NATA) calibrated Class 1 Sound Level Analyser in accordance with AS 1259 and AS 1055 at locations A2 to A7 on Figure 5-3 every 1 to 3 months in accordance with the presence of the required meteorological conditions during construction and initial operations until correlation is identified. Based on the above monitoring, the noise model (predictive modelling of noise impacts undertaken by Resonate Acoustics in August 2015 (see Appendix 3.5A) will be calibrated to develop empirical relationship with meteorological data from the weather station at each sensitive receptor and LIC trigger levels reviewed accordingly.	Mining Manager	Attended noise monitoring during construction. Calibration and review of LIC following attended compliance audits.
	Noise level at each sensitive receptor based on location and noise levels recorded at monitoring points.	A suitably qualified independent expert (acoustic engineer) will be commissioned to determine the adjustment factor applicable to noise measurements at each monitoring location to be applied for noise levels at each sensitive receptor. This will include inclusion of a penalty for each characteristic where tonal/modulating/impulsive/low frequency characteristics are present. (ML6438 Schedule 6 – Clause 8.)	Mining Manager	Prior to commencement of construction. Reassessment and confirmation during compliance audits and following noise characteristics assessment.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-9.	Mining operations noise emission predictions reliant on mining plan.	A suitably qualified independent expert (acoustic engineer) will review the model based on noise characteristics study, any mine plan changes and the noise compliance audits.	Mining Manager	On availability of noise characteristics study noise compliance audit results.
	Requirement for approval to exceed noise levels.	The ML condition states: *The Tenement Holder can only exceed the noise levels stipulated in Condition 10 if the Director of Mines:* *Is satisfied, on the basis of information provided to him by an acoustic engineer, that the noise from the mining operation will not cause an adverse impact at the sensitive receiver due to the existing influence of ambient noise, or the limited duration and/or frequency of occurrence of the activity, and* *provides prior approval for the exceedance.* (ML6438 Schedule 2 – Condition 11.) In the event that it is identified through the compliance audits, noise monitoring or other factors, that a higher noise level may be required, a suitably qualified independent expert (acoustic engineer) will be commissioned to collate appropriate information for submission to the Director of Mines.	Sustainability Manager	When and if need is identified.
		Prepare public access website format and real time data presentation (ML6438 Schedule 2 – Condition 12).	Sustainability Manager	1 month prior to commencement of construction.
	Refer to blasting uncertainties in Table 5-14 in Section 5.6.			
Applicable Outcome: The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 2.				
Refer to Table 5-9.	No uncertainties identified.	No current or future works identified.		

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Table 5-11: Noise – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the date that this Mineral Lease was granted. (ML6438 Schedule 6 – Clause 6, EML6439 Schedule 6 – Clause 2.)							
Noise levels dB(A) will be measured by unattended continuous real time noise monitoring stations with audio links. Parameters measured: • L_{Aeq} for each 15-minute interval; • L_{Amin}, L_{A90}, L_{A10} and L_{Amax} for each 15-minute interval; and • 15-minute one-third octave L_{Aeq} noise levels corresponding to the L_{Aeq} 15-minute interval. in accordance with AS 1259 and AS 1055.	Locations C1 to C5 on Figure 5-3. (Note C5 is in Settlement Zone, C1-C4 are in Primary Production areas).	Noise generated from mining operations measured for or at sensitive receptors in accordance with EPP (Noise) 2007 does not exceed the following limited at those sensitive receptors: • 56dB(A) L_{Aeq} between the hours of 7am and 10pm and 49dB(A) L_{Aeq} between the hours of 10pm and 7am within a Primary Production Zone (as delineated in the Yorke Peninsula Council Development Plan at the date that the Mining Tenement was granted); or • 54dB(A) L_{Aeq} between the hours of 7am and 10pm and 47dB(A) L_{Aeq} between the hours of 10pm and 7am within a Settlement Zone (as delineated in the Yorke Peninsula Council Development Plan at the date that the Mining Tenement was granted, set out in the Seventh Schedule of this Tenement Document). (ML6438 Schedule 2 _ Condition 10.)	Continuous real time during construction, operations and closure.	Yorke Peninsula Council Development Plan (Feb 2014) EPP (Noise) 2007	**Noise Leading Indicator Criteria (N-LIC1).** Trigger Level 1 *Primary production area* • 7am – 10pm = 51dB(A) L_{Aeq} • 10pm – 7am = 44dB(A) L_{Aeq} *Settlement Zone* • 7am – 10pm = 49dB(A) L_{Aeq} • 10pm – 7am = 42dB(A) L_{Aeq} Trigger Level 2 *Primary production area* • 7am – 10pm = 54dB(A) L_{Aeq} • 10pm – 7am = 47dB(A) L_{Aeq} *Settlement Zone* • 7am – 10pm = 52dB(A) L_{Aeq} • 10pm – 7am = 45dB(A) L_{Aeq} Note these criteria may be amended based on calibration of the noise impact model and empirical relationship definition with meteorological data.	Mining Manager	Reviewed weekly. Reported in Annual Compliance Report. Noise monitoring data will be available in real time on the public website. (ML6438 Schedule 2 – Clause 12.)

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Number of and response to public complaints received in relation to noise recorded in the public complaints register. Monitored via the Community Response Process, a 24-hour, 7 day-per-week community complaints response line that will receive, report and respond to any complaints from the public in relation to noise in accordance with the Complaints Management Procedure EC PRO 320.	Location as relevant to the complaint.	Investigations conducted in response to public complaints related to noise identify that noise emanating from the mining operations are in accordance with the current amenity as defined by the by the Yorke Peninsula Council Development Plan at the date that ML6438 was granted (16 September 2014).	As and when complaints are received.	Control = Complaints Management Procedure EC PRO 320 (Appendix 4.7).		Sustainability Manager	Reporting of number of noise complaints and performance of response in the Annual Compliance Report. Public complaints register will be publicly available.
Meteorological monitoring as identified in Table 5-6 in Air quality Section 5.4. Blasting monitoring as identified in Table 5-15 in Section 5.6.							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 2; 3.1. the Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome in Sixth Schedule Clause 2. (EML6439 Schedule 6 – Clause 3.)							
Survey by a qualified surveyor to define and then verify the location of aggregate stockpiles in the EML.	Temporary stockpile locations in the EML	No extractive material stockpiled south of the intersection of Pine Point Road and St Vincent Highway, thus leaving a separation distance from Pine Point of approximately 600m.	When stockpiles are established during road realignment works. Survey prior to locating stockpiles and verification once stockpiles are placed.	600m separation distance.		Construction Manager	Reviewed on receipt of survey information.

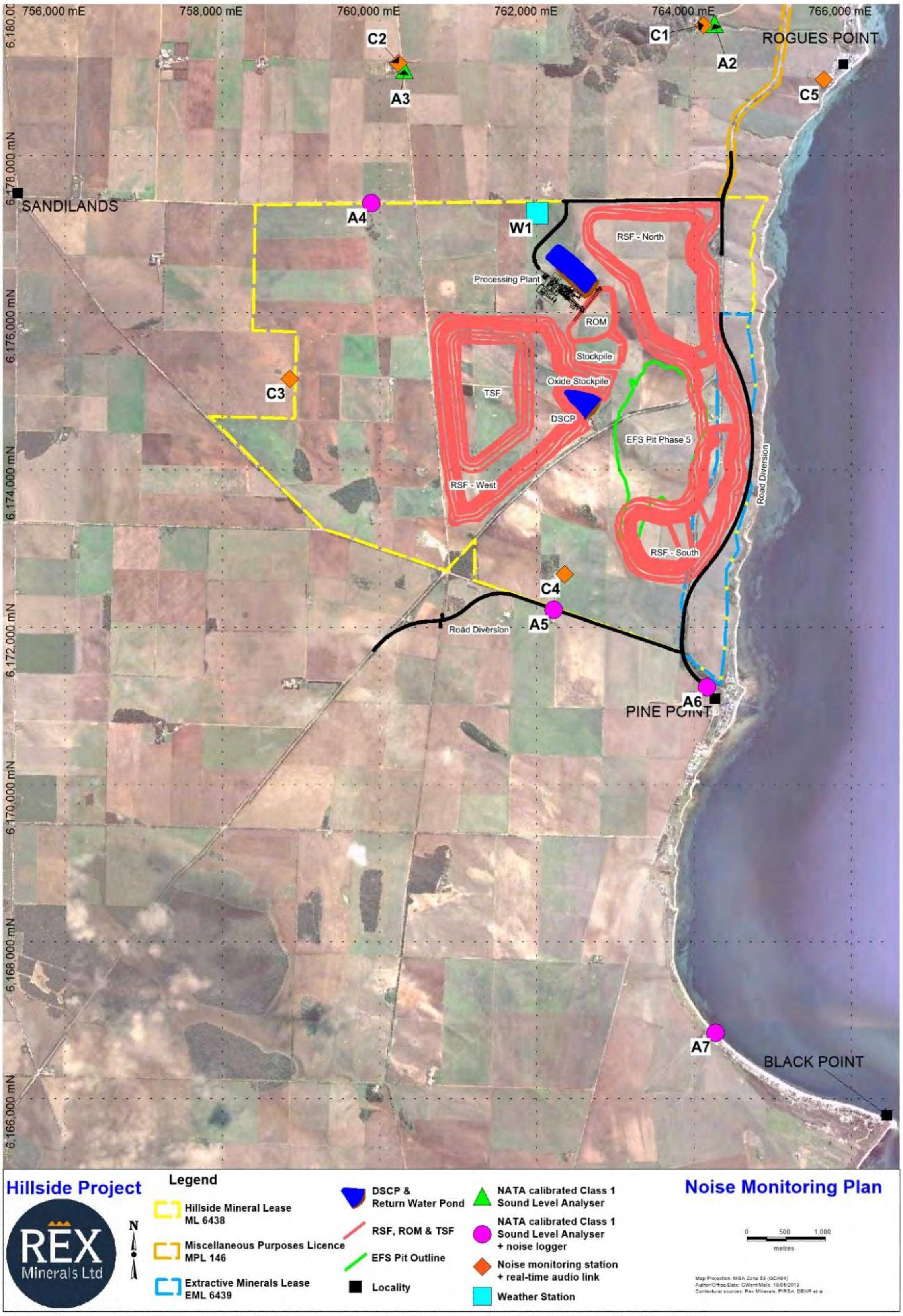

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Figure 5-3: Noise monitoring locations

5.6 Blasting

5.6.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438. There are no relevant blasting requirements in EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.6.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Blasting includes:

- *Explosives Act 1936* (SA);
- *Work Health and Safety Act 2012* (SA);
- *Mining Act 1971* (SA);
- Civil Aviation Regulations 1988; and
- Blasting Australian Standard AS 2187.2 Explosives – Storage and Use: Use of Explosives.

5.6.3 Blasting Context

Mining activities will use both packaged and bulk type explosives, ammonium nitrate/fuel oil (ANFO) and heavy ANFO will be the preferred explosive used with the use of emulsions generally restricted to those cases where the blast holes contain water.

As the explosive detonates in a blast hole, the shock wave that is generated radiates from the source and will attenuate in both amplitude and frequency. The rate of this attenuation will vary depending on the ground conditions. Therefore, the level of ground vibration measured at any point from the blast will be dependent on a range of factors which include:

- maximum explosive quantity per blast hole;
- distance from the blast to the monitoring point;
- geological conditions the vibration is required to pass through; and
- confinement and coupling of the explosive.

Ground vibration is measured in terms of velocity (mm/s). The most common method for the prediction of vibration levels from blasting is the scaled distance equation which relates the level of vibration to the maximum instantaneous charge weight and distance between the blast and the sensitive receiver. The ground conditions will control the rate the vibration attenuates which can be determined for a given site.

An Independent Technical Report, the Hillside Mine Blasting Impact Assessment Report, was conducted by Saros in March 2013 to assess the blasting impacts including ground vibration and air overpressure for the Project, see MLP Appendix 8.3-B. This assessment indicates:

- MLP exclusion zone distance for fly rock from the open pit perimeter modelled to be 426m;
- blast sizes will depend on operational planning but are expected to range from 150,000t to 500,000t of rock. On average, the operation will require 360,000t of rock to be blasted every two days to meet its production requirements for the Life of Mine;
- blast holes will be typically between 150–229mm in diameter but may vary depending upon fragmentation, heave or special blasting requirements, ranging from 100–229mm in diameter;
- holes will be stemmed unless there is some special blasting requirement (e.g., pre-split holes) that dictates otherwise; and
- the modelling shows that the air overpressure and vibration levels will be well under the ML conditions using standard drill and blast practices.

The EFS pit design is smaller in size and will have a smaller footprint of overpressure and vibration than the MLP. The EFS uses the same drill and blast parameters, however, the maximum size of the individual blasts will generally be smaller for the EFS pit design, but the blast exclusion zone, bench heights and burden and spacing will not differ from those noted in the MLP.

5.6.4 Blasting Impacts and Outcomes

Table 5-12 provides the list of potential blasting impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-12: Blasting – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: In construction and operation, ensure that there are no adverse impacts to: • public safety; • human comfort; • third-party property (including stock); • adjacent land use; • aircraft; or • other receptors from air blast, fly rock and vibrations caused by blasting. (ML6438 Schedule 6 – Clause 9.)	
ML-BV1	Reduced public amenity as a result of ground vibration associated with blast activities.
ML-BV2	Reduced public amenity as a result of air overpressure (noise) associated with blast activities.
ML-BV3	Reduced public safety and damage to third-party property (including stock) from fly rock.
ML-BV4	Structural damage to roads and houses caused by blast activities.

Potential Impact Event ID	Potential Impact Event Description
ML-BV5	Disturbance to native fauna (terrestrial and marine) due to blasting activities.
ML-BV6	Disturbance to livestock on neighbouring properties as a result of blasting activities.
ML-BV7	Impact on agricultural aircraft flying over the clearance zone during a blast.
ML-AL1	Blast exclusion zone restricting access to adjacent land user for normal farming activities and aerial spraying. *(As this potential impact relates to Adjacent Land Use it has been addressed in Section 5.21.)*
ML-AL3	Reduced access to land parcels as a consequence of blast exclusion zone and road changes. *(As this potential impact relates to Adjacent Land Use it has been addressed in Section 5.21.)*

5.6.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential blasting impacts are presented below.

Blasting control and management strategies are detailed in Table 5-13. These control strategies are proactive and will be conducted based on predicted weather conditions, review of monitoring data or part of normal operations.

Table 5-14 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-13: Blasting control and management strategies

Source	Blasting Control and Management Strategies	Responsibility	Timing
Applicable Outcome: In construction and operation, ensure that there are no adverse impacts to: • public safety; • human comfort; • third-party property (including stock); • adjacent land use; • aircraft; or • other receptors from air blast, fly rock and vibrations caused by blasting. (ML6438 Schedule 6 – Clause 9.)			
Design/Engineering Controls			
Open pit blasting (C, O)	Blasting will be scheduled to avoid weather conditions that may result in the exceedance of either noise and/or dust.	Mining Manager	Prior to blasting.
Open pit blasting (C, O)	Establishment of the Blast Exclusion Zone for each blast by the Blast Controller.	Blast Controller	Prior to blasting.
Open pit blasting (C, O)	Setting and maintaining Blast Exclusion Zones to ensure no risk to the public or passing traffic from fly rock impacts.	Mining Manager	Prior to blasting.

Source	Blasting Control and Management Strategies	Responsibility	Timing
Open pit blasting (C, O)	Realignment of both the St Vincent Highway and Yorke Highway is proposed to avoid the Blast Exclusion Zone.	Mining Manager	During construction.
Open pit blasting (C, O)	Application for an aviation exclusion zone directly over the pit so aircraft will not be allowed to fly within the Blast Exclusion Zone.	Mining Manager	Prior to mining.
Management controls			
Open pit blasting (C, O)	Blasting at the Hillside Project pit perimeters will be conducted using modified drill and blast practices including pre-splitting and buffer blasting to ensure fly rock stays within the exclusion zone.	Mining Manager	During blasting.
Open pit blasting (C, O)	Current mine planning indicates blasting will be undertaken preferably at 13:00 local time on dayshift and approximately every day to provide for minimal impact on the surrounding community and allow enough time for inspection of any misfires before nightshift commences.	Mining Manager	During blasting.
Open pit blasting (C, O)	Notification signs will be positioned on the road to notify passing vehicles that blasting occurs.	Mining Manager	Prior to blasting.
Open pit blasting (C, O)	Implementation of 'Pre-Blast Environmental Assessment' will record and provide consideration to the wind speed, direction, and meteorological conditions prior to each blast. The assessments will be routinely analysed, assessed and reported.	Mining Manager	Prior to blasting.
Open pit blasting (C, O)	Assignment of Blast Guards into position to visually monitor the potential propagation of fly rock.	Blast Controller	Prior to blasting.
Open pit blasting (C, O)	Blasting will be designed, undertaken and monitored by a suitably qualified professional.	Mining Manager	During blasting.
Open pit blasting (C, O)	Permanent 'Real-Time Continuous Blast Vibration and Air Overpressure Monitoring System' will record measurements of ground vibration and air overpressure levels and be calibrated in accordance with Blasting Australian Standard AS2187.2.	Mining Manager	During blasting.
Open pit blasting (C, O)	Portable 'Ad-Hoc Monitoring' will be undertaken to assist in measuring air overpressure and ground vibration at relevant locations surrounding the operation and toward the nearest sensitive receptors.	Mining Manager	During blasting.

Source	Blasting Control and Management Strategies	Responsibility	Timing
Open pit blasting (C, O)	Notification of blasting will include the following: • 'Weekly Blast Schedule' of planned blasts will be posted on the Hillside Public Internet Site, however, may be subject to variation. • 'SMS Messaging System' will provide notification to property owners adjacent to and within the Land subject to their consent and be provided no less than 48 hours in advance of the blast. (ML6438 Schedule 2 – Condition 18). • 'Notification Protocol' will be implemented in the case of blast exclusion zones extending into third-party property adjacent to and within the Land. This protocol will include a clear plan indicating the blast location, proposed time and exact extent of the blast clearance area to facilitate planning and timing of agricultural activities including aerial crop dusting.	Mining Manager	Prior to blasting.
Open pit blasting (C, O)	Key appointments and responsibilities will include: • nominated responsible person; • development supervisor; • production supervisor; • drill and blast engineer; • blast controller; • shotfirer; • blast guard; and • magazine keeper.	Mining Manager	Ongoing.
Open pit blasting (C, O)	Monitoring records will be maintained for each blast (this will include a video record of the blast).	Mining Manager	Ongoing.
Open pit blasting (C, O)	Should an adverse blast event occur, an inspection will be undertaken of the road for fly rock and any fly rock will be removed and the incident recorded in the Incident Register and notified to the regulator within 24 hours.	Mining Manager	Should an adverse blast event occur.
Dust from blasting (O)	Dust generation from blasting controls as identified in Air Quality Section 5.4.	Mining Manager	Ongoing.
LIC trigger response measures			
LIC trigger (O)	Indicative response actions include: • review the current and planned operations in consideration of aspects such as geology, blast timing sequence and throw direction, charge weight per hole, stemming quantity and quality, size of the blast, current and forecast weather conditions; • identify aspects for amendment to minimise vibration or overpressure; and • amend blast protocols accordingly.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.

Source	Blasting Control and Management Strategies	Responsibility	Timing
Exceedance of conditions (C. O, Cl, PC)	Unless agreed with the property owner for a higher level, all blasting activities will cease and an independent blasting expert will be employed to investigate the cause of the exceedance and report back to the Mining Manager the proposed changes to blasting procedures to prevent a re-occurrence.	Mining Manager	Following an exceedance.
Implement Blast Management Plan (BMP) (O)	Implementation of the BMP, blast monitoring program and blast response Procedures., as reviewed regularly to ensure reflects the requirements of the site and regulatory compliance.	Mining Manager	Ongoing.
General			
Training and awareness (O).	Site inductions and training for relevant personnel (employees, contractors and subcontractors); to ensure environmental awareness, legal responsibilities and blast control measures.	Safety/Training advisor	Ongoing prior to individuals commence work.
Open pit blasting management plan (O)	Blast modelling and the BMP will be reviewed once blasting commences in accordance with recommendations provided by Blasting Geomechanics (Appendix 7.3-C) and regularly thereafter. The BMP will include implementation of regular reviews of charge mass, stemming type and height, drill hole diameter and spacing, initiation sequence, face height and orientation.	Mining Manager	Following start of blasting & regularly thereafter.
LIC Trigger (C, O, Cl)	The trigger response actions will be reviewed based on their effectiveness and amended as applicable based on investigations into applicable events.	Mining Manager	In response to trigger events.
Complaints (O)	Implement complaints controls as identified in Air Quality Section 5.4.		

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

Table 5-14: Blasting – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	**Current and Future Works List**	**Responsibility**	**Timing of Works**
Applicable Outcome: In construction and operation, ensure that there are no adverse impacts to: • public safety; • human comfort; • third-party property (including stock); • adjacent land use; • aircraft; or • other receptors from air blast, fly rock and vibrations caused by blasting. (ML6438 Schedule 6 – Clause 9.)				
Refer to Table 5-13.	Drill and blast design is representative of modelling parameters.	Review of blast modelling and BMP. Adjust blasting model based on empirical data from blast monitoring and practices.	Mining Manager	Blast modelling and the BMP reviews will begin with the commencement of blasting and will be ongoing through until blasting permanently ceases at the end of operations.
	Assumes detailed characterization of geology.	Adjust operational procedures in the BMP as updated information is obtained from geological mapping, blast monitoring, weather monitoring and updated modelling.	Mining Manager	Blast modelling and the BMP reviews will begin with the commencement of blasting and will be ongoing through until blasting permanently ceases at the end of operations.
	Unexpected geology causes an issue for blasting though managed with geological investigations and resource definition work.	The results of ongoing mining -related geological investigations and resource definition work will provide information for blast design.	Mining Manager	Blast modelling and the BMP reviews will begin with the commencement of blasting and will be ongoing through until blasting permanently ceases at the end of operations.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-13.	Weather influence on air overpressure.	Adjust operational procedures in the BMP as updated information is obtained from geological mapping, blast monitoring, weather monitoring and updated modelling.	Mining Manager	Blast modelling and the BMP reviews will begin with the commencement of blasting and will be ongoing through until blasting permanently ceases at the end of operations.
		A waiver as agreed with the DEM is obtained to allow fly rock encroachment on third-party property within the blast exclusion zone. (ML6438 Schedule 2 - Condition 15.)	Mining Manager	Prior to commencement of blasting activities that is modelled to potentially encroach on third-party property (nominally Year 2 to 3).
		Before blasting commences a no fly zone over the open pit granted by Civil Aviation Safety Authority (CASA).	Mining Manager	Prior to commencement of blasting activities.

5.6.6 Environmental Measurement Criteria

Blasting outcome measurement criteria and leading indicator criteria are outlined in Table 5-15, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period. This review will be based on the availability of required infrastructure such as power sources which may no longer exist after closure, and in consideration of the monitoring results during operations.

Table 5-15: Blasting – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: In construction and operation, ensure that there are no adverse impacts to: • public safety; • human comfort; • third-party property (including stock); • adjacent land use; • aircraft; or • other receptors from air blast, fly rock and vibrations caused by blasting. (ML6438 Schedule 6 – Clause 9.)							
Peak particle velocities (PPV) in mm/s will be measured from each blast in accordance with Blasting Australian Standard AS2187.2.	Blast Monitoring Systems, locations –Figure 5-4.	5mm/s PPV for 95% of blasts per year, 10mm/s PPV maximum unless agreement is reached with the occupier that a higher limit may apply. (All blast events comply with AS2187.2.)	All blasts, real-time recording.		**Leading Indicator Criteria (B-LIC1)** PPV measured in accordance with Blasting Australian Standard AS 2187.2 in real-time every blast at the Blast Monitoring Systems locations identifies that response actions are triggered with the following trigger levels: • Level 1 = Vibration PPV >5-<10mm/s; and • (PPV >=10mm/s will apply if a higher maximum has been agreed to by the occupier). (Note lagging indicator as occurs after each blast.)	Development Superintendent	Reviewed after each blast. Reported in Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Air overpressure level, dB(Lin) peak will be measured from each blast in accordance with Blasting Australian Standard AS 2187.2.	Blast Monitoring Systems, locations –Figure 5-4.	115dB(Lin) for 95% of blasts per year, 120dB(Lin) maximum unless agreement is reached with the occupier that a higher limit may apply.	All blasts, real-time recording.		**Leading Indicator Criteria (B-LIC2)** Air overpressure measured in accordance with Blasting Australian Standard AS 2187.2 in real time every blast at the Blast Monitoring Systems locations identifies that response actions are triggered with the following trigger levels: • Level 1 = Air overpressure >115 and <120dB (lin); and • (Air overpressure >=120dB (lin) will apply if a higher maximum has been agreed to by the occupier). (Note lagging indicator as occurs after each blast.)	Development Superintendent	Reviewed after each blast. Reported in the Annual Compliance Report.
Response of public complaints received in relation to blasting at the time of complaints.	Monitored via the Community Response Process, a 24-hour community complaints response line that will receive, report and respond to any complaints from the public in relation to blasting in accordance with the Complaints Management Procedure EC PRO 320.	Community Response Process is implemented as per the Complaints Management. Procedure EC PRO 320.		PPV and fly rock monitoring. Control = Complaints Management Procedure EC PRO 320.		Development Superintendent	Reporting of number of complaints and performance of response in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Fly rock displacement in metres will be measured by a method determined prior to each blast (will be one or more of the following methods including visual methods by Blast Guards, permanent cameras, or drones, and the final location of fly rock recorded using a GPS).	All fly rock displacement >350m from the blast pattern or if it encroaches on 3rd party property.	Investigation of any reported impacts to public safety, human comfort, damage to third-party property, adjacent land use or aircraft or other receptors from fly rock to demonstrate it was not due to mining operations.	Immediately after any reported impacts received in writing relating to fly rock from blasting.		**Leading Indicator Criteria (B-LIC3)** Fly rock displacement in metres, measured by a method determined prior to each blast at locations where fly rock is identified >350m from the blast pattern or where it has encroached on third-party property identifies that response actions are triggered with the following trigger levels: • Level 1 = Fly rock displacement >350 and <426m); and • Level 2 = Fly rock displacement >426m). (note lagging indicator as occurs after each blast)	Development Superintendent	Reporting of number of complaints and performance of response in the Annual Compliance Report.

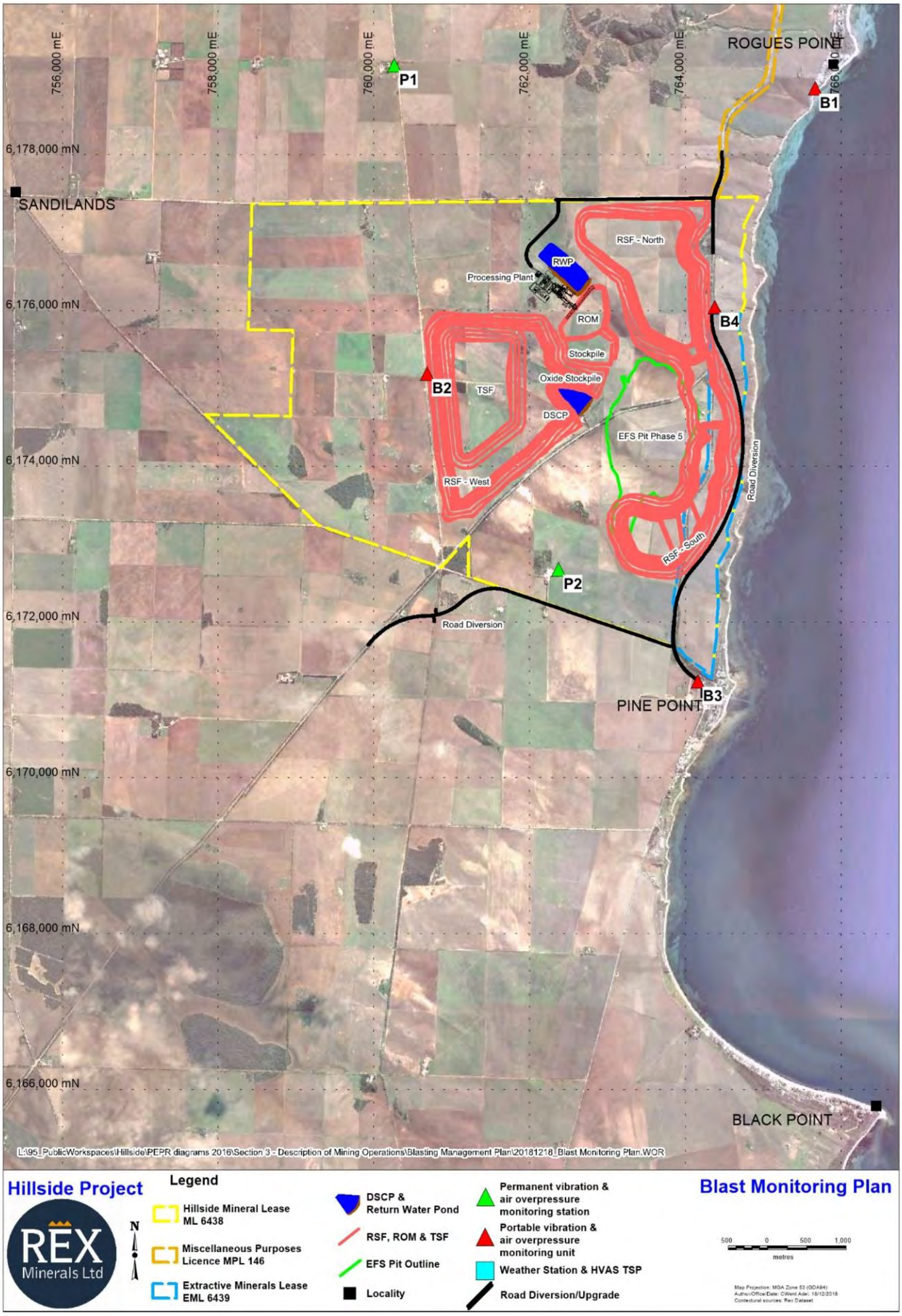

Figure 5-4: Hillside Project blast monitoring

5.7 Visual Amenity

5.7.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.7.2 Applicable Legislation and Standards

The following legislation and standards are applicable for potential environmental impacts regarding Visual Amenity:

- *Development Act* and associated regulations;
- Yorke Peninsula Council Development Plan (Government of South Australia 2014); and
- Australian Standard AS 4282-1997; Control of the obtrusive effects of outdoor lighting.

5.7.3 Visual Amenity Context

The Hillside Project is located within an area dominated by an agrarian landscape with limited areas of natural vegetation and a coastal outlook.

The visual amenity is characterised by undulating topography with small ridges and shallow drainage lines running from north-west towards Gulf St Vincent. The predominantly agricultural cropping and livestock farming land is flanked by coastal landscapes and views of Gulf St Vincent to the east and mild-undulating hills to the west. The section of coastline between Ardrossan and Pine Point is considered to be of moderate scenic value (Lothian 2005, Wynne 1980). Broad-scale clearance has removed a large proportion of native vegetation within the region. Isolated areas of remnant vegetation are predominantly surrounded by agricultural land (NYNRM Board 2009).

In addition to natural landforms and land use, visual amenity in the vicinity of the Project also includes light from the townships of Ardrossan, Pine Point and Black Point and light from the Port Ardrossan silo and bulk storage area are visible from the vicinity of the Project. Traffic light from the Yorke and St Vincent Highways is notable due to the traffic volumes, particularly heavy vehicle traffic. In addition, during times of peak agricultural activity, farm machinery lights are visible as many activities continue at night.

An independent technical report, the Visual Amenity Assessment Report, was prepared by COOE Pty Ltd in March 2013 to assess the visual amenity parameters for the Project (see MLP Appendix 5.5-A). This assessment included the following key points:

- A view shed analysis identifying those locations where visibility of the Project would be greatest based on the plan showing the proposed locations of major infrastructure associated with the Project. Final site selection of land-based viewpoints was determined by Rex and COOE in consultation with the Hillside Mine Community Voice (HMCV);
- The selected viewpoints considered the location of the surrounding residential receptors, visible locations along main transport routes for the general public and potential viewpoints for the wider community. The resultant

locations were situated along major, secondary and minor roads within the area surrounding the Project. The sites selected are all located on public land to ensure ongoing access for monitoring purposes; and

- These viewpoints will be measured to ensure that any waste temporarily stored on the land is not visible from these positions.

The geographical positioning system (GPS) reference points for the selected viewpoints are provided in Table 5-16 and Figure 5-5 and a photographic survey of each site was undertaken to determine the landscape character of the area. These locations were selected by COOE as being representative viewsheds of the project area, thereby covering all individual receptors within the viewshed areas. Note that the original viewpoint location 2 (Pine Point Road) was removed due to lack of access onto private third-party land. Locations 6 and 7 were added to ensure appropriate southern viewshed coverage. Location 8 has been added for further western viewshed coverage and to account for the additional three receptors identified to the west of the project (noting that viewpoint 3 also accounts for these receptors). An updated baseline of photographs will be completed prior to construction to update and include location 8.

Table 5-16: Viewpoint photo monitoring locations

Viewpoint Number	Reference Name	Easting	Northing
1	Black Point	765,762	6,165,835
3	Sandy Church Road	757,781	6,177,402
4	Yorke Highway (north)	765,267	6,180,375
5	Corner (Yorke Highway – Sandy Church Road)	764,401	6,177,462
6	Pine Point	763,983	6,170,907
7	Yorke Highway (south)	759,926	6,171,701
8	Pine Point Road (west)	757,836	6,174,667

Plate 5-1: Viewpoint 1: Black Point

Plate 5-2: Viewpoint 3: Sandy Church Road

Plate 5-3: Viewpoint 4: Yorke Highway

Plate 5-4: Viewpoint 5: Corner (Yorke Highway and Sandy Church Road)

Plate 5-5: Viewpoint 6: Pine Point

Plate 5-6: Viewpoint 7: Yorke Highway (south of the Project)

5.7.4 Visual Amenity Impacts and Outcomes

Table 5-17 provides the list of potential visual amenity impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-17: Visual amenity – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. (ML6438 Schedule 6 – Clause 12, EML6439 Schedule 6 - Clause 4.)	
ML-VA2	Change in landforms (temporary and permanent) causing a reduction in visual amenity during operation.
ML-VA1	Reduction in visual amenity from clearance of vegetation and excavations during construction.
ML-VA4	Reduction in aesthetic and recreational value of area from increase in general solid waste and litter.
ML-A3	Decrease in ambient air quality resulting in public nuisance at neighbouring sensitive receptors from dust emanating from Hillside Project. (This potential impact relates to air quality this impact has been addressed in Section 5.4.)
ML-AL5	Reduced productivity resulting from shading of farm land by changed landscape. (This potential impact relates to adjacent land use and has been addressed in Section 5.21.)
ML(C)-VA1	Post-completion visual amenity unacceptable to relevant stakeholders.
DSD EML-VA1	Reduction in visual amenity due to stockpile activities within the EML.
Applicable Outcome: The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations. (ML6438 Schedule 6 – Clause 13 and 46.)	
ML-VA3	Nuisance to the public from light spill derived from mobile plant during construction and operation.
ML-NF4	Displacement of native fauna from light spill from Hillside mining and associated infrastructure. (This potential impact relates to Native Fauna and has been addressed in Section 5.11.)

Potential Impact Event ID	Potential Impact Event Description
DSD-ML-TTP2	Effect of light spill on livestock.
Applicable Outcome: Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the Land at mine completion. (MPL146 Schedule 2 – Condition 1, ML6438 Schedule 2 – Condition 18.)	
ML(C)-VA1	Post-completion visual amenity unacceptable to relevant stakeholders.
Applicable Outcome: The Tenement Holder must ensure that any temporary waste stored on the land is not visible by any third-party from any land based viewpoint. (ML6438 Schedule 2 – Condition 17.)	
ML-VA4	Reduction in aesthetic and recreational value of area from increase in general solid waste and litter.

5.7.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential visual amenity impacts are detailed in Table 5-18.

Table 5-19 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-18: Visual amenity control and management strategies

Source	Visual Amenity Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. (ML6438 Schedule 6 – Clause 12, EML6439 Schedule 6 – Clause 4.)			
Design/Engineering Strategies			
During mine design	Positioning and design of permanent mine landforms and/or other earthen bunds to screen activities; • Mine entry has been designed to be shielded by RSFs and soil stockpiles; and • Location of the Processing Plant has been selected to be shielded by the natural topography (ML6438 Schedule 6 – Clause 14.2, 14.4, EML6439 Schedule 6 – Clause 5.1.1.)	Project team	Already completed.
During mine design	Design of closure landforms as far as practicable will be integrated with surrounding environment through height, batter design and final landform shape. The shape of the high relief landforms such as the TSF and RSF are consistent with other relief along the coastal with gentle concave shape with flat top. (Refer to Figure 3-100 in Section 3) (ML6438 Schedule 6 – Clause 14.5.)	Project team	Already completed.

Source	Visual Amenity Control and Management Strategies	Responsibility	Timing
Waste management design	Temporary waste storage will be to the south of the process plant to minimise visual intrusion from the lease boundary (ML6438 Schedule 2 – Condition 17). See also Commercial and Industrial Waste Management Section 5.20.	Sustainability Manager	Ongoing.
Waste management design	Applicable waste management design controls as identified in the Commercial and Industrial Waste Management Section 5.20.		
Management Strategies			
Screening (C, O, CI)	Vegetation will be established to screen built infrastructure and minimise views into site (ML6438 Schedule 6 – Clause 14.3) – refer to future works.	Sustainability Manager	Planting during construction.
Disturbance activities (C, O)	Construction and mining operations will be scheduled in stages to minimise areas of vegetation clearing and topsoil stripping as far as possible.	Construction Manager Mining Manager	Ongoing.
Screening (C, O)	Revegetation and embankments will be established as windbreaks to shield stockpiles and working areas from prevailing winds – refer to future works.	Sustainability Manager	Ongoing.
Disturbance activities (C, O)	Rehabilitation will be conducted on areas no longer required as soon as possible after they are available (season dependant). (MPL146 Schedule 6 – Clause 1)	Construction Manager Mining Manager	Ongoing.
Backfill (O)	Planned partial backfilling of the pit will be implemented as soon as possible where the mining schedule allows.	Mining Manager	During operations.
Progressive rehabilitation (O)	The progressive rehabilitation program will be implemented to meet the rehabilitation and mine closure plan. Progressive rehabilitation will commence soon after the lower batters are completed in years 2 and 4. The southern and northern RSFs will be completed in Years 8 and 9. Progressive rehabilitation of completed portions of the western RSF is a priority and will occur as soon as practicable in the mine scheduling This will include procedures to ensure that rehabilitation begins as soon as suitable portions of the final landforms become available and as seasonal conditions allow. Rehabilitation strategies are detailed in Section 3.10 (ML6438 Schedule 6 – Clause 14.6, 14.7.)	Mining Manager Sustainability Manager	Ongoing throughout operations.
Progressive rehabilitation (O)	External faces of permanent mine landforms will be vegetated where practical to reduce the impact of changes in landscape colour. (ML6438 Schedule 6 – Clause 14.8.)	Mining Manager Sustainability Manager	Ongoing throughout operations.
Progressive rehabilitation (C, O)	Any areas of disturbance created through temporary stockpiles or access roads will be rehabilitated once infrastructure is in place for the MPL and EML (EML6439 Schedule 6 – Clause 5.1.2).	Construction Manager	On completion of infrastructure.
Waste management controls	Applicable waste management controls as identified the Commercial and industrial waste management Section 5.20.		

Source	Visual Amenity Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations. (ML6438 Schedule 6 – Clause 13 and 46.)			
Design/Engineering strategies			
Lighting (C, O, Cl)	Placement of lights to reduce light spill in directions not required for mining activities.	Construction Manager Mining Manager Closure Manager	Ongoing.
Lighting (C, O)	All fixed lighting will comply with the Australian Standard AS 4282-1997; Control of the obtrusive effects of outdoor lighting. (ML6438 Schedule 6 - Clause 48.)	Construction Manager	During placement of fixed lighting.
Management Strategies			
Lighting (C, O, Cl)	Night time lighting to be restricted to levels required to provide safe working conditions.	Construction Manager Mining Manager Closure Manager	Ongoing.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (O)	VA-LIC1 indicative response actions include: • Review mine plan and rehabilitation records to identify reasons for plan not being implemented; • Identify potential actions for amelioration, which may include discussion with regulators and other key stakeholders for amendment to the plan; • Conduct actions and / or document requirements for future action; and • Review monitoring frequency and type to reflect sensitivity of amendments implemented.	Sustainability Manager	Annually during operations in response to progressive rehabilitation plan not being implemented as required.
LIC trigger (O)	VA-LIC2 indicative response actions include: • Review complaint and associated validation investigation along with operational records to identify potential light source causing the intrusion; • Measurement of lux light emissions by a suitably qualified person using a calibrated lux meter; • Identify potential actions for amelioration of intrusion; • Conduct actions and/or document requirements for future action; and • Review monitoring frequency and type to reflect sensitivity of amendments implemented.	Sustainability Manager	Ongoing in response to light intrusion complaints.

Source	Visual Amenity Control and Management Strategies	Responsibility	Timing
Applicable Outcome: Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the Land at mine completion. (MPL146 Schedule 2 – Condition 1, ML6438 Schedule 2 – Condition 18.)			
Management Strategies			
Removal of infrastructure (C)	All infrastructure will be removed from the land on mine closure, unless otherwise approved in writing by the Director of Mines prior to demolition.	Closure Manager	During closure.
Applicable Outcome: The Tenement Holder must ensure that any temporary waste stored on the land is not visible by any third-party from any land based viewpoint. (ML6438 Schedule 2 – Condition 17.)			
Management Strategies			
Waste management design	Applicable waste management design controls as identified in the Commercial and Industrial Waste Management Section 5.20.		
General			
Training and awareness (C, O, Cl, PC)	Site Inductions and training for relevant personnel (employees, contractors and subcontractors) to ensure they are suitably qualified in visual amenity concepts.	Safety/Training advisor	Ongoing prior to individuals commence work.
Complaints (C, O, Cl, PC)	Complaint controls as detailed in Air Quality Section 5.4.		

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.7.6 Environmental Measurement Criteria

Visual amenity outcome measurement criteria and leading indicator criteria are outlined in Table 5-20, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

Table 5-19: Visual amenity – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. (ML6438 Schedule 6 – Clause 12, EML6439 Schedule 6 – Clause 4.)				
Refer to Table 5-18.	Short term climatic cycles and long-term trends of change could slow down revegetation and/or accelerate rill and/or sheet erosion of slopes.	Progressive rehabilitation will provide opportunities to optimise rehabilitation methods suited to the specific closure conditions of the site including climate extremes incurred and landscape conditions (slopes, soils, etc.).	Sustainability Manager	As progressive rehabilitation is implemented throughout the life of mine.
	Updated baseline viewshed photographs.	Update the viewshed photographs and include location 8	Sustainability Manager	Prior construction.
	Locations of vegetation screening along public roads.	Investigate, in consultation with adjacent land owners and council, potential screening locations along Sandy Church Road and the realigned highway.	Sustainability Manager	During roadworks to allow for screening implementation following completion of road works.
	Locations of vegetation screening/windbreaks.	Investigate and implement, in consultation with adjacent land owners and in consideration of meteorological data, appropriate screening and windbreak types and location. This will need to commence during construction where the reality of what is visible from various receptive locations is properly understood.	Sustainability Manager	During construction, prior to operations commencing.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations. (ML6438 Schedule 6 – Clause 13.)				
Refer to Table 5-18.	Assume that the direct light spill will be able to be shielded appropriately at all times.	Monitoring trends in the frequency and extent of light spill related complaints that will determine whether there is any relationship between specific mining activities. The individual complaint investigations (see Table 5-68) will record the mining activities conducted at the time – this is a more general review to identify trends should they be apparent.	Sustainability Manager	Annual trend review.
Applicable Outcome: Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the Land at mine completion. (MPL146 Schedule 2 – Condition 1, ML6438 Schedule 2 – Condition 18.)				
Refer to Table 5-18.	Post-closure uses for mine-site infrastructure and the power line and water pipeline.	Ongoing discussions with key stakeholders to identify any beneficial reuse of site infrastructure post-closure.	Sustainability Manager	Throughout the life of mine.
		Ongoing liaison with SA Water and the electricity provider relating to the potential post-closure uses of their infrastructure in the MPL It is currently anticipated that the SA Water pipeline and overhead powerlines will remain (refer to Table 3-67 in Section 3.10.2).	Sustainability Manager	Throughout the life of mine.
		Should feasible alternate infrastructure uses be identified, provide the Department with an agreement between the tenement holder and the post-closure land holder for approval by the Director of Mines.	Sustainability Manager	Prior to mine closure.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must ensure that any temporary waste stored on the land is not visible by any third-party from any land-based viewpoint. (ML6438 Schedule 2 – Condition 17.)				
Refer to Commercial and industrial waste management Section 5.20.	Applicable waste management future and current works as identified in Commercial and Industrial Waste Management, Section 5.20.			

Table 5-20: Visual amenity – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape. (ML6438 Schedule 6 – Clause 12, EML6439 Schedule 6 – Clause 4.)							
Visual amenity will be measured through photo monitoring, i.e., photographs taken from the same direction at the same zoom from static photo monitoring locations.	ML = 6 photo monitoring viewpoint locations listed in Table 5-16 and Figure 5-5. EML = Locations 4, 5 and 6 photo monitoring viewpoint locations listed in Table 5-16 and Figure 5-5.	Monitoring provides evidence the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.	Annually during construction and operations.	Baseline viewpoint Plates Plate 5-1 to Plate 5-6.	**Leading Indicator Criteria (VA-LIC1).** Progressive rehabilitation implemented as per the mine plan detailed in Section 3.10 as confirmed by the annual mine survey and rehabilitation records.	Sustainability Manager	Annual review and reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Visual amenity of temporary storage areas for waste materials – refer to Table 5-77 in Commercial and Industrial Waste Section 5.20.							
Visual inspections recording presence or absence of stockpiles.	Where the extractive stockpiles are established (EML).	Site inspection confirms that all stockpiles are removed from the EML post-mine completion.	6 months post-road completion within the EML.	Records of creation of stockpiles.		Construction Manager	Annual review and reporting in the Annual Compliance Report.
Final visual amenity impact in terms of form, contrasting and reflective aspects, visual softening and blending with landscape assessed through review of pre-mining and post-mining photo monitoring records by an independent expert.	Six photo monitoring viewpoint locations listed in Table 5-16 and Figure 5-5 (ML).	An independent expert verifies the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape compared with the original landscape and closure landform design.	Twice, once in summer and once in winter, prior to relinquishment.	Baseline viewpoint Plates Plate 5-1 to Plate 5-6.		Closure Manager	Reported in the Final Closure Plan.

What Will Be Measured and Form (Method)	Locations	Outcome achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations. (ML6438 Schedule 6 – Clause 13.)							
Inspections conducted by suitably qualified personnel against the parameters of visual amenity related to obtrusive effects of outdoor lighting.	All activity locations in the Project's impact footprint. Locations applicable to complaints received.	Records of Annual Site Inspections of fixed lighting will demonstrate compliance with AS 4282-1997.	Annually throughout construction, operations and closure.	Australian Standard AS 4282-1997: Control of the obtrusive effects of outdoor lighting.	**Leading Indicator Criteria (VA-LIC2).** Validated public complaints received in relation to light emissions as recorded in the public complaints register.	Sustainability Manager	Annual review and reporting in the Annual Compliance Report.
Applicable Outcome: Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the Land at mine completion. (MPL146 Schedule 2 – Condition 1, ML6438 Schedule 2 – Condition 18.)							
Visual inspections of all infrastructure locations on the MPL and ML. Demolition records in the form of contractor invoices and material removal records.	All infrastructure locations on the MPL and ML.	Visual inspections identify that unless otherwise approved, all above ground infrastructure has been removed from the land.	Once, prior to finalisation of active closure.	As built diagrams and figures from construction		Closure Manager	Reported in the Final Closure Plan.
Presence of written agreements between the tenement holder and the post-closure land owner for retention of infrastructure. Presence of approval from Director of Mines.	All relevant areas on the ML and MPL.	Written agreements between the Tenement Holder and a land owner exist where infrastructure is not to be removed.	Once, when agreement is reached prior to relinquishment.			Closure Manager	Reported in the Final Closure Plan.

What Will Be Measured and Form (Method)	Locations	Outcome achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that any temporary waste stored on the land is not visible by any third-party from any land-based viewpoint. (ML6438 Schedule 2 – Condition 17.)							
Visual amenity of temporary storage areas for waste materials – refer to Commercial and Industrial Waste, Section 5.20.							

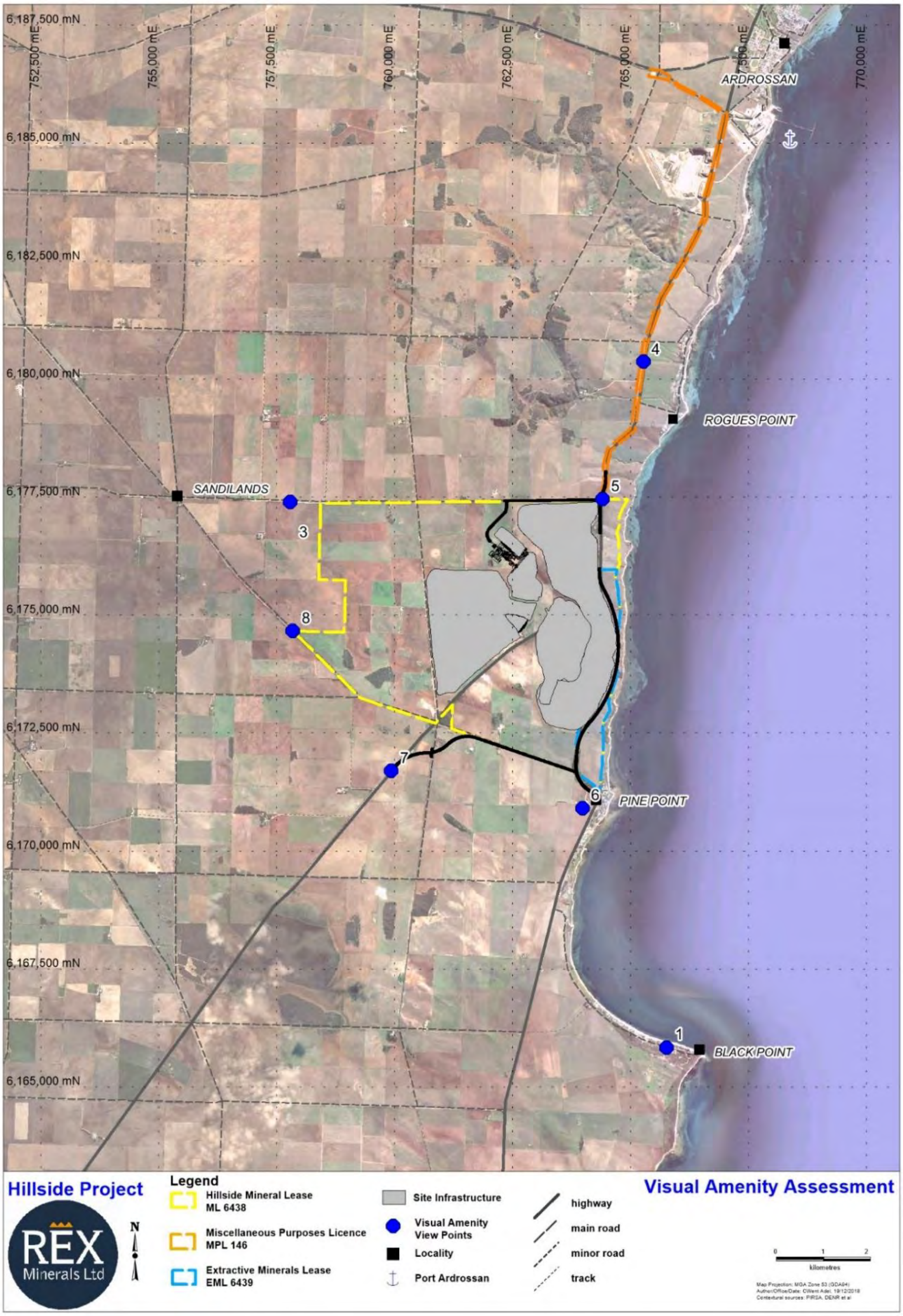

Figure 5-5: Visual amenity photo monitoring locations

5.8 Soil and Land Disturbance

5.8.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The soil and land disturbance related tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.8.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding soil and land disturbance includes:

- *Mining Act 1971* (SA);
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (Cth);
- *Natural Resources Management Act 2004* (SA);
- *Environment Protection Act 1993* (SA);
- Environment Protection Regulations 2009 (SA);
- South Australian Environment Protection Authority, 'Guidelines for Miners: Tailings and Tailing Storage Facilities in South Australia', Minerals Regulatory Guideline (MG5), September 2009;
- Australian National Committee on Large Dams (ANCOLD), 'Guideline on Tailings Dams – Planning, Design, Construction, Operation and Closure', May 2012;
- Australian Standard 1940-2004: The storage and handling of flammable and combustible liquids;
- Australian Standard 1692-2006: Steel tanks for flammable and combustible liquids; and
- Environment Protection Authority, Bunding and Spill Management, August 2012.

5.8.3 Soil and Land Disturbance Context

The Hillside Project contains soil cover that consists of sands to sandy clay loams that have been degraded by land clearing, grazing and cultivation for over a hundred years. The subsoils have similar texture, but with increasing clay content. Rocky outcrops are apparent, occurring on the surface within and surrounding the Project and in the subsoil, especially within gullies.

An independent technical report, the Mine Rehabilitation (Characterisation of Overburden) Report, was prepared by COOE Pty Ltd in August 2012 to identify soil and land characterisation (see MLP Appendix 5.14-B). This assessment indicates:

- upper layers of soil tend to be mildly alkaline but are suitable for agricultural purposes. However, the soil becomes more sodic and saline with depths exceeding 2m below the surface; and
- soil pH generally decreases (becomes more acidic) 5m below the surface in six out of ten core samples, becoming less suitable for agricultural use.

Based on this soil and land characterisation study the soil profile is described as follows:

- topsoil (the organic layer and A horizon) to an average of 0.5m within the Project area, comprising of mainly sand to sandy clay loams, but topsoil can be non-existent around rocky outcrops;
- subsoil (B and C horizons) ranging to 2m deep, comprising light to medium clays with medium to heavy clays in the valleys and clay loams on the ridges; and
- deep regolith (D horizon or R), found mostly deeper than 2m, consisting of sandy clay becoming finer to loam clay to the east of the Project and rocky regolith in or near gullies.

Preliminary agricultural soil quality assessments were made in November 2017 to supplement the MLP baseline soil data, described in detail in Section 2.4.

A review of the Agricultural Soil Analysis Report, (Appendix 2.2-A); indicates:

- soil pH tends to be alkaline with a median soil pH of 8.05 and mildly saline, median electrical conductivity (EC)1:5 0.16dS/m;
- the exchangeable sodium percentage and boron content are within the acceptable agricultural soil range;
- generally, all topsoil sampled have acceptable soil fertility for agricultural production with the exception of deficiencies in nitrates, sulphur and copper reported at most sites, and iron, and manganese efficiencies at some sites; and
- most topsoil was found to be deficient in copper.

An assessment of the available topsoil, assuming stripping to 0.3m, and subsoil, assuming removal from the open pit area to a depth of 3.7m, was made to identify the quantity that will be stripped and stockpiled against the soil requirement for rehabilitation. This inventory, presented in Table 5-21, identifies a surplus of rehabilitation soil materials. It is noted that the inventory as presented is also conservative as it does not include the soils to be stripped from the Throoka Creek diversion area.

Table 5-21: Topsoil and subsoil inventory

Area	Topsoil Depth (m)	Subsoil Depth (m)	Proposed Cover Type	Area (ha)	Topsoil (Mt)	Subsoil (Mt)
TSF	0.2	0	Native grasses/salt bush/salt tolerant species	168.4	0.573	-
RSF 0° flat land *(all RSFs including cleared flat area around pit)*	0.3	0.4	Agricultural (cropping)	297.9	1.520	2.026
RSF 10° slopes *(all RSFs)*	0.3	0.4	Agricultural (cropping)	252.1	1.286	1.715
RSF 15° slopes *(South and North)*	0.2	0	Native vegetation rehabilitation	86.9	0.296	-
RSF 15° slopes *(West)*	0.3	0	Agricultural pursuits (other)	57.0	0.194	-

Area	Topsoil Depth (m)	Subsoil Depth (m)	Proposed Cover Type	Area (ha)	Topsoil (Mt)	Subsoil (Mt)
RSF 20° slopes (*all RSFs)*	0.2	0	Native vegetation rehabilitation	43.0	0.146	-
Plant	0.3	0	Agricultural (cropping)	19.2	0.098	-
ROM	0.3	0.4	Agricultural (cropping)	83.5	0.426	0.568
Roads/Other	0.3	0	Agricultural (cropping)	55.3	0.282	-
Total				**1063.5**	**4.82**	**4.31**
Soil available for rehabilitation (topsoil stripped to 0.3m, subsoil in pit area stripped to 3.7m (noting that additional subsoil will be stripped from the creek diversion area).					6.16	4.6
Surplus available					1.34	0.29

5.8.4 Soil and Land Impacts and Outcomes

Throughout the MLP process the evaluation of mining activities during construction, operation and rehabilitation identified potential impact events mostly related to soil stripping, topsoil management and the potential for soil contamination. These potential impact events were either raised as concerns by stakeholders or based on industry experience on similar open cut metalliferous mining operations.

Table 5-22 provides the list of potential soil and land disturbance management impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-22: Soil and land disturbance management – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15, MPL146 Schedule 2 – Condition 2, EML6439 Schedule 6 – Clause 6.)	
ML-S1	Decreased soil quantity available for rehabilitation from erosion of soil stockpiles and exposed land.
ML-S2	Decreased soil quality from compaction during mining activities.
ML-S3	Decreased soil quality through the degradation of viable native seed due to long term stockpiling.
ML-S4	Decreased soil quality due to build-up of weed seed in the topsoil stockpile from long-term storage.
ML-S5	Decreased soil quality due to build-up of salt from dust suppression activities and/or from mixing with saline subsoils.
ML-SW1	Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment. (*This impact relates to surface water quality and is therefore addressed in Section 5.14.)*
ML(C)-S1	Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure.

Potential Impact Event ID	Potential Impact Event Description
ML and EML and MPL (C)-S2	Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure.
DSD EML-S1	Decreased soil quantity and quality available for rehabilitation from erosion of soil stockpiles, compaction and fuel spills.
Applicable Outcome: Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre-mining land use can be recommenced after mine completion. (ML6438 Schedule 6 – Clause 16.)	
ML-S1	Decreased soil quantity available for rehabilitation from erosion of soil stockpiles and exposed land.
ML(C)-S1	Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure.
ML and EML and MPL (C)-S2	Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture at closure.
ML(C)-S3	Instability of final landforms post-closure leading to the erosion of soil.
DSD ML-S1	Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post-completion. *(This impact relates to TSF seepage and is covered in Section 5.17)*
DSD ML-M1 and **DSD ML-S2**	Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on adjoining land uses (including cropping) during operations and post-completion. *(This impact relates to acid rock drainage and is covered in Section 5.15.)*
DSD EML-S1	Decreased soil quantity and quality available for rehabilitation from erosion of soil stockpiles, compaction and fuel spills.
Applicable Outcome: The Tenement Holder must, ensure that: • there is no contamination of land and soils either on or off site as a result of mining operations; and • no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations. (ML6438 Schedule 2 – Condition 19.)	
ML-S6	Decreased soil quality due to contamination from spills of fuel, oil or a hazardous chemical.
ML-S7	Decreased soil quality due to potentially contaminated airborne dust emanating from the mining operation. *(This impact relates to air quality and is also covered in Section 5.4.)*
ML-TSF1 to TSF7	Decreased soil quality due to contamination from discharge of tailings. (*The impact relates to TSF and is therefore addressed in Section 5.17.)*
ML-W1	Soil or water contamination due to incorrect waste disposal. *(The impact relates to Waste Disposal and is therefore addressed in Section 5.20.)*
ML-SW4	Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment. *(The impact relates to surface water contamination and acid rock drainage control and is therefore addressed in Section 5.14 and Section 5.15 respectively.)*

Potential Impact Event ID	Potential Impact Event Description
DSD ML-S1	Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post-completion. *(This impact relates to TSF seepage and is covered in Section 5.17.)*
DSD ML-M1 and **DSD ML-S2**	Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on adjoining land uses (including cropping) during operations and post-completion. *(This impact relates to acid rock drainage and is covered in Section 5.15.)*
ML-SW1	Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment. (*This impact relates to surface water and is therefore addressed in Section 5.14.)*

5.8.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential soil and land disturbance impacts are detailed in Table 5-23. Note that the design and management controls to be implemented, to ensure quality and quantity is not reduced, are the same controls that will ensure the achievement of the outcome relating to pre-mining land use establishment.

The controls in Table 5-23 are aimed at providing the following in accordance with ML6438 Schedule 6 – Clause 17.

- Strategies to achieve recovery of topsoil and subsoil from areas to be disturbed by mining operations;
- Strategies for maintaining the quality and quantity of stockpiled soil/s until such time that it is used for rehabilitation purposes;
- Strategies for reinstatement of these soils so as to maximise the likelihood of achieving the required outcomes;
- An auditable record of soil movement including recovery, stockpiling and reinstatement; and
- Strategies for the establishment of post-mine completion land uses and areas, including the re-establishment of land for agriculture.

Table 5-24 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-23: Soil and land disturbance control and management strategies

Source	Soil and Land Disturbance Management Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15, MPL146 Schedule 2 – Condition 2, EML6439 Schedule 6 – Clause 6.)			
Design/Engineering Controls			
Strategies to achieve recovery of topsoil and subsoil (C, O)	Soil storage areas for the separation of topsoil and subsoil stockpiles will be designed to prevent cross contamination and returning soil close to the original source. Height restrictions will apply where applicable to protect the soils physical and chemical quality (ML6438 Schedule 6 – Clause 17). Topsoil and subsoil will be stockpiled separately to avoid working areas, areas of natural drainage and access tracks. If practical, topsoil will be directly returned to site rehabilitation works.	Mining Manager	During soil stripping.
Strategies to achieve recovery of topsoil and subsoil (C, O)	Implementation of a soil stripping schedule will ensure stripping and stockpiling of topsoil and subsoil to maintaining the quality and quantity of soils until such time that it is used for rehabilitation purposes. This process will be undertaken in stages removing the topsoil (~<0.3m) and then the subsoil (~0.3–2m). (ML6438 Schedule 6 – Clause 17.)	Mining Manager	During soil stripping.
Strategies to achieve recovery of topsoil and subsoil (C, O)	Poor quality soils, identified by a pre-stripping soil survey, particularly overburden, will be preferentially handled and selectively placed within the RSFs. This material will not be used for rehabilitation.	Mining Manager	Ongoing.
Strategies to achieve recovery of topsoil and subsoil (C, O)	Erosion and sediment control systems will be installed, including: • divert clean surface water runoff around soil stockpiles (refer to Surface Water Section 5.14); and • surface of the completed soil stockpiles will be left in a rough condition to help with prevention of erosion until vegetation is established and to promote water infiltration.	Mining Manager	Ongoing.
Strategies to achieve recovery of topsoil and subsoil (C, O)	Saline soil, identified by a pre-stripping soil survey, will be stored separately, and runoff directed away from topsoil to prevent leachate (i.e., saline water) from contaminating clean soil. Salt contaminated soil (where saline dust suppression occurred) will be appropriately removed or remediated after the cessation of mining activities.	Mining Manager	Ongoing.
Soil contamination (C, O)	The design of fuel, oil and chemical storage facilities and transfer points and associated retaining bunds will be in accordance with Australian Standards 1940-2004 and 1692-2006 and EPA Bunding and Spill Management guidelines.	Plant Operations Manager (reagents) Mining Manager (fuel and explosives)	Ongoing.
Soil contamination (C, O)	Tailings and process water pipelines and spill bunds will be constructed to the appropriate Australian Standards and guidelines.	Plant Operations Manager	Ongoing.

Source	Soil and Land Disturbance Management Control and Management Strategies	Responsibility	Timing
Soil contamination (C, O)	Seepage underdrainage water will be removed from the TSF via a gravity drain and discharged into the Decant Seepage Collection Pond (DSCP) which in turn will be returned to the Return Water Pond (RWP) (refer to Tailings Storage Facility Section 5.17).	Plant Operations Manager	Ongoing.
Management Controls			
Strategies to maintain soil quality and quantity (C, O)	Soil stockpiles will be stabilised with physical and/or chemical binders as required to minimise erosion such as vegetated with annual or perennial species, which will be maintained until the soil is required for rehabilitation.	Sustainability Manager	Ongoing.
Strategies to maintain soil quality and quantity (C, O)	Soil moisture content will be checked prior to stripping soil to avoid handling saturated soils that may damage soil structure or result in the loss of soils.	Sustainability Manager	Prior to soil stripping.
Strategies to maintain soil quality and quantity (C, O)	Water from the sewerage treatment plants and SA Water mains water will be used as a fresh water source for dust suppression of topsoil and subsoil stockpiles as required.	Sustainability Manager	Ongoing.
Strategies to maintain soil quality and quantity (C, O)	Establish a vegetated cover to reduce the potential for erosion and a dust suppression barrier. Sterile ryegrass (or similar species) will be included into the seeding program to provide a fast-growing vegetation cover to protect the soil surface until the pasture or native species establish.	Sustainability Manager	Ongoing.
Strategies to maintain soil quality and quantity (C, O)	Soil will be returned to as near to the original location as practicable placing 'good' subsoil first and covering with topsoil. The soil cover layer will be as close to pre-mining conditions as practical. If necessary, the soil will be ameliorated to ensure that the physical and chemical state will support viable crops and/or pastures.	Sustainability Manager	Ongoing.
Strategies to maintain soil quality and quantity (C, O)	Minimise compaction of soils during mining through controlled land clearance, traffic management and ripping compacted soil as part of rehabilitation activities.	Mining Manager	Ongoing.
Strategies to maintain soil quality and quantity (C, O)	Vehicles and equipment will be maintained to Australian Standards to prevent leakages.	Plant Operations Manager	Ongoing.

Source	Soil and Land Disturbance Management Control and Management Strategies	Responsibility	Timing
Strategies to maintain soil quality and quantity (C, O)	Implementation of a soil tracking system will ensure the recovery of topsoil and subsoil from areas to be disturbed by mining and include: 1. Delineation of land areas to be disturbed by mining activities. 2. A pre-stripping soil survey will be conducted by a trained site soil specialist. 3. Record of soil movements from mine footprint to topsoil or subsoil stockpile. 4. Survey of soil stockpile volumes by soil type and date of collection. 5. Record of soil movement from stockpiles to the designated end use placement. 6. Survey of soil cover volume on rehabilitated sites. (ML6438 Schedule 6 – Clause 17.)	Mining Manager (1, 3, 4, 5, 6) Sustainability Manager (2)	Ongoing.
Soil stripping and storage (C, O, Cl)	A pre-stripping soil survey will be undertaken prior to clearance to provide site-specific soil and land characterisation information and to develop (soil stripping) maps to provide instructions to the operators stripping the soils for transferring to the pre-designated soil storage areas. (ML6438 Schedule 6 – Clause 17.)	Sustainability Manager	Prior to soil stripping.
Soil stripping and storage (C, O, Cl)	Soil condition monitoring, including erosion, vegetation and weed presence, through visual assessment using a GPS and camera, will be assessed on subsoil and topsoil stockpiles monthly during winter and quarterly throughout the rest of the year show significant weed presence, erosion or poor stabilising vegetation cover. Remedial action will be taken where inspections identify requirement for improvement.	Sustainability Manager	Ongoing while soil is stockpiled.
Soil stripping and storage (C, O, Cl)	A soil database will contain all soil records from the surveys (pre-stripping, soil movement, soil quantity, condition and quality) recording from (1) the source to (2) stockpiles and (3) final placement. (ML6438 Schedule 6 - Clause 17.)	Sustainability Manager	Ongoing.
Wind erosion of soils (C, O, Cl)	Implementation of the air quality controls and monitoring as discussed in Air Quality Section 5.4, to avoid loss of soil as dust during haulage, while on stockpiles and during rehabilitation.		

Source	Soil and Land Disturbance Management Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (O)	LIC–S1 indicative response actions include: • Review monitoring data to identify if there has been a decrease in soil quality; • Review locations and timing for direct replace with mining team and schedule placement at earliest possible time; • Reduce stockpile height to 2m; • Identify potential actions for amelioration in consultation with soil experts; • Identify the most efficient application of those actions, i.e., during stockpiling, prior to reuse in rehabilitation or post-rehabilitation placement; • Conduct actions and/or document requirements for future action; • Review monitoring frequency and type to reflect sensitivity of amendments implemented; and • Review and update the Soil and Land Disturbance Management Plan (SLMP) as applicable.	Closure Manager	Ongoing during closure and post-closure.
Applicable Outcome: Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre-mining land use can be recommenced after mine completion. (ML6438 Schedule 6 – Clause 16.)			
Design/Engineering Controls			
Strategies to achieve recovery of topsoil and subsoil (C, O)	Poor quality soils, particularly overburden, will be preferentially handled and selectively placed within the RSFs. This material will not be used for rehabilitation.	Mining Manager	Ongoing.
Management Controls			
Rehabilitation and closure (O, CI)	A progressive rehabilitation program will be implemented to rehabilitate areas of disturbance once no longer required for mining operations to minimise potential for erosion. Contour banks engineered drains and sumps will be built to control the flow of water over long-term surfaces to minimise the loss of soil through erosion and will be used to trap any soil erosion as near to the source as practicable. (ML6438 Schedule 6 – Clause 17.)	Sustainability Manager	Ongoing.
Rehabilitation and closure (O, CI)	Implementation of a progressive rehabilitation program to track progress on the rehabilitation mine closure criteria presented throughout this PEPR.	Sustainability Manager	Ongoing.
Rehabilitation and closure (O, CI)	Topsoil containing native vegetation seed, i.e., stripped from native vegetation areas, will be replaced on progressive revegetation areas to be rehabilitated as native vegetation as soon as possible. (ML6438 Schedule 6 – Clause 17.)	Sustainability Manager	Ongoing.
Rehabilitation and closure (O, CI)	Soil will be returned to as near to the original location as practicable placing 'good' subsoil first and covering with topsoil. The soil cover layer will be as close to pre-mining conditions as practical. If necessary, the soil will be ameliorated to ensure that the physical and chemical state will support viable crops and/or pastures	Sustainability Manager	Ongoing.

Source	Soil and Land Disturbance Management Control and Management Strategies	Responsibility	Timing
Rehabilitation and closure (O, CI)	Seeds from remnant native vegetation will be collected and stored.	Sustainability Manager	Ongoing.
Rehabilitation and closure (O, CI)	Surplus soil will be used strategically to improve the final soil depth and overall quality, particularly on the lower slopes of the batters. In addition, some surplus soil will be retained for one year post-completion to address any soil erosion or failures until the vegetation is established and soils stabilised.	Sustainability Manager	Ongoing.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (O)	LIC–S2 indicative response actions include: • review monitoring data to identify the potential cause of the area of concern; • obtain expert opinion where there is uncertainty of potential cause or required action; and • implement amendments as required. Review monitoring frequency and type to reflect sensitivity of amendments implemented.	Closure Manager	Ongoing during closure and post-closure.
Applicable Outcome: The Tenement Holder must, ensure that: • there is no contamination of land and soils either on or off site as a result of mining operations; and • no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations. (ML6438 Schedule 2 – Condition 19.)			
Design, Engineering and Management Controls			
Soil contamination (C, O, CI)	All spills of fuel, oil or hazardous chemical that occur outside the confined or bunded areas will be reported and remediated as soon as practicable in accordance with EPA requirements.	Sustainability Manager	Ongoing.
Soil contamination (C, O, CI)	Waste management controls as detailed in Commercial and Industrial Waste Section 5.20		
Soil contamination (C, O, CI)	Air quality controls as detailed in air quality Section 5.4.		
Soil contamination (C, O, CI)	TSF management controls as detailed in Tailings Storage Facility Section 5.17.		
Soil contamination (C, O, CI)	Acid rock drainage controls as detailed in Acid Rock Drainage Section 5.15.		

Source	Soil and Land Disturbance Management Control and Management Strategies	Responsibility	Timing
General			
Complaints (O)	Implement complaints controls as identified in Air Quality Section 5.4.		
Implementation of SLMP (C, O, Cl)	Implementation of the SLMP, Soil Monitoring Program and Soil and Land Disturbance Response Procedures. (ML6438 Schedule 6 – Clause 17.)	Sustainability Manager	Ongoing.
Training and awareness (C, O, Cl, PC)	Site inductions and training for relevant personnel (employees, contractors and subcontractors); to reinforce the importance of keeping vehicles and people on established and designated tracks and to train selected employees and contractors who will be able to distinguish between topsoil and sub-soil based on texture and colour.	Safety/Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.8.6 Environmental Measurement Criteria

Soil and land disturbance outcome measurement criteria and leading indicator criteria are outlined in Table 5-25, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-24: Soil and land disturbance management – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15, MPL146 Schedule 2 – Condition 2, EML6439 Schedule 6 – Clause 6.)				
Refer to Table 5-23.	Uncertainty with respect to the effectiveness of the proposed measures for soil recovery, soil management and soil placement depend on how close the soil volume estimation from preliminary site investigations and mine planning is compared to what is encountered during operations.	Develop a soil movement procedure prior to earthworks commencing which will comprise records of soil recovery, stockpiling and reinstatement and to ensure that soil recovered from cleared native vegetation is stored separately.	Sustainability Manager in conjunction with Mining Manager	Prior to ground disturbance.
	Assuming that erosion controls and the stabilsation of soil stockpiles will be effective in high rainfall/wind events.	Visual inspection of stockpiles as per monitoring in Table 5-25 Remediation actions implemented in response to monitoring results.	Sustainability Manager	As per Table 5-25.
		Conduct pre-stripping soil surveys (ML6438 Schedule 6 – Clause 18). These surveys will be conducted by a trained site soil specialist to classify and map the topsoil and subsoil types found within the mine footprint. The surveyor will calculate and record volumes of different soil types and assign the appropriate handling and storage location for future placement.	Sustainability Manager	Prior to ground disturbance.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-23.		Establish the soil database. The database will include soil stockpile locations, soil types, soil quality, soil volumes, the dates and methods of soil stripping, amelioration treatment, planting for stockpile stabilisation, fertiliser application, weed control and return for placement to designated rehabilitation areas. Populate with baseline data and continue to update as soil monitoring data becomes available.	Sustainability Manager in conjunction with Mining Manager	Prior to ground disturbance.
		Soil condition monitoring will be conducted on rehabilitated areas monthly during winter, quarterly throughout the rest of the year. This monitoring will include erosion, vegetation and weed presence assessed through visual assessment using a GPS and camera. This monitoring will provide additional information related to maintenance of soil quality and quantity.	Sustainability Manager	Commencement with the completion of each rehabilitated area and continuing for 3 years post-placement.
Applicable Outcome: The Tenement Holder must, ensure that: • There is no contamination of land and soils either on or off site as a result of mining operations; and • No contamination of land and soils either on or off site after mine completion occurs as a result of mining operations. (ML6438 Schedule 2 – Condition 19.)				
Refer to Table 5-23.		Appropriate mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post-mine completion will be developed and implemented. (ML6438 Schedule 6 – Clause 17.6.)	Closure Manager	Plan developed during closure period and enacted prior to relinquishment.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre-mining land use can be recommenced after mine completion. (ML6438 Schedule 6 – Clause 16.)				
Refer to Table 5-23.	Uncertainties exist in relation to establishment of vegetation on disturbed areas and further trials of alternative cover mix scenarios are required.	Progressive Rehabilitation trials will be designed to address issues, test cover mix species or test new rehabilitation concepts, if required.	Sustainability Manager	As rehabilitation-related issues from soil monitoring are identified OR as new rehabilitation concepts are identified AND as suitable progressive rehabilitation trial locations are available.
	Uncertainties exist in relation to establishment of vegetation on disturbed areas and further trials of alternative cover mix scenarios are required. AEP rainfall events and their effect on rehabilitation outcomes. Potential drought conditions could impact vegetation growth.	Progressive rehabilitation to be conducted as detailed in Section 3.7.5 of the PEPR (ML6438 Schedule 6 – Clause 17.5) – results reported in the Annual Compliance Report. This will provide: • Evidence to the Director of Mines that where practicable, the pre-mining land use can be recommenced after mine completion; and • Monitoring results over a variety of weather conditions over the life of mine to provide certainty on sustainability of rehabilitation post-closure.	Sustainability Manager	Progressive rehabilitation will commence 2 to 3 years after commencement of mining. (Refer to Section 3.7.5.)

Table 5-25: Soil and land disturbance management – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15, MPL146 Schedule 2 – Condition 2, EML6439 Schedule 6 – Clause 6.)							
Soil quality – Soil texture and colour (in accordance with Australian Soil Classification (Isbell and NCST 2016)), compaction (in situ with a penetrometer), pH, EC, cation exchange capacity (CEC) and exchangeable sodium percentage (ESP), nutrients, and copper concentrations will be analysed at a NATA accredited laboratory. Four soil sub-samples (from the same zig-zag run) will be bulked to form one soil sample, representing 1ha of rehabilitated surface.	Where soil has been replaced on rehabilitation areas. Soil will be collected in a zig-zag pattern on each rehabilitated area from the top 0.1m of soil (subsoil and/or topsoil depending on cover), with 30m to 50m spacing, aiming for a minimum of four sub-samples per hectare of similar soil type.	Monitoring records of soil quality demonstrate that soil quality has been maintained from baseline (pre-strip) conditions i.e., the mean of soil quality parameters (pH, EC, metals, CEC and ESP) used on rehabilitation sites is within two standard deviations of the pre-mining means for 97.5% of the soil samples.	Initially within 3 months of placement on rehabilitated areas. Annually for 3 years post-placement (during operations, closure and post-closure).	Pre-stripping survey (soil compaction (in-situ with a penetrometer), texture and colour on areas designated for clearance conducted once, prior to clearance. (Record of pre-disturbance soil quality. (ML6438 Schedule 6 – Clause 18.)). Soil quality of all topsoil and subsoil stockpiles, analysed within 6 months of the stockpile creation for the same parameters and using the same sampling method as for rehabilitation areas	**Soil and Land Disturbance Leading Indicator Criteria (LIC -S1)** Annual review of the topsoil stockpiles from native vegetation areas identify that the storage of this topsoil has: (1) exceeded the 12-month storage time for topsoil from native vegetation strip locations; or (2) exceeded 2m height.	Sustainability Manager	Reviewed annually and reported in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Soil quantity - surveying of soil placement area and thickness by type, and calculations of volume. Spot checks of cover thickness using an auger or a shovel will be made randomly (four per hectare) to verify cover thickness will also be conducted.	Where soil has been replaced on rehabilitation areas.	Record of soil quantity and type replaced – soil volumes replaced reconcile with soil stockpiles.	Once on replacement of soil (subsoil and / or topsoil depending on cover) on rehabilitated areas during operations and closure.	Soil database: Soil quantity - Recording dates of soil recovery, area and depth of soil recovered by type, and calculations of volumes. Soil quantification of the topsoil and subsoil stockpiles within 6 months of stockpile completion (Survey of soil area and height of stockpiles by soil type, and calculations of volumes using mine survey techniques conducted by a qualified surveyor).		Mining Manager	Entered into soil database and reported in the Annual Compliance Report.

Applicable Outcome: The Tenement Holder must ensure that:

- There is no contamination of land and soils either on or off site as a result of mining operations; and
- No contamination of land and soils either on or off site after mine completion

occurs as a result of mining operations. (ML6438 Schedule 2 – Condition 19.)

Soil quality monitoring as identified above.

Air quality monitoring as detailed in Air Quality Section 5.4.

Surface water monitoring as detailed in Surface Water Section 5.14.

Groundwater monitoring as detailed in Groundwater Section 5.16.

Waste management monitoring as detailed in Commercial and Industrial Waste Section 5.20 relevant to this outcome.

TSF potential contamination monitoring as detailed in Tailings Storage Facility Section 5.17.

Acid rock drainage potential contamination monitoring as detailed in Acid Rock Drainage Section 5.15

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Hydrocarbon and reagent spill records = Volume, type, location and clean up actions, including movement or treatment of contaminated soils, recorded in a register.	Any area where a hydrocarbon and reagent spill occurs.	Register of spill management provides evidence that any and all contaminated soil has been removed or treated appropriately.	If and when spills occur. During construction, operations and closure.	Baseline soil quality. Site contamination NEPM values.		Sustainability Manager	Reviewed if spills occur and reported in Annual Compliance Report.
A soil contamination assessment will be conducted by a suitably qualified expert in accordance with EPA requirements.	Disturbance footprint of Hillside operations, not including RSFs and TSF	Soil contamination assessment provides evidence that any and all contaminated soil has been removed or treated appropriately.	Post infrastructure removal and prior to rehabilitation	Baseline soil quality. Site contamination NEPM values.		Sustainability Manager	Reported in the Final Closure Plan.
Applicable Outcome: Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre-mining land use can be recommenced after mine completion. (ML6438 Schedule 6 – Clause 16.)							
Soil quality, quantity and condition monitoring as identified above. Copper levels in grain monitoring identified in Air Quality Section 5.4. Revegetation monitoring identified in Native Vegetation Section 5.10. Surface water monitoring as detailed in Surface Water Section 5.14. Groundwater monitoring as detailed in Groundwater Section 5.16. TSF potential contamination monitoring as detailed in Tailings Storage Facility Section 5.17. Acid rock drainage potential contamination monitoring as detailed in Acid Rock Drainage Section 5.15.							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Post-closure land use being created, surveyed area rehabilitated as measured by the site surveyor, in terms of area returned to: • native grasses/salt bush/salt tolerant species; • agricultural (cropping); • native vegetation; and • Agricultural (other).	Areas progressively rehabilitated.	Progressive rehabilitation over the life of mine on a yearly basis indicates trend on an area basis is in line with the pre-mining land use as described in Table 3-64: Indicative cover type as a percentage of proposed disturbed final landform at mine closure.	Annually. During operations and closure.	Table 3-64: Indicative cover type as a percentage of proposed disturbed final landform at mine closure. Figure 3-99: Potential post-closure land use options within the ML		Sustainability Manager	Annual review and reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Geotechnical stability assessment of the TSF, RSF and open pit on closure by a suitably qualified independent expert (geotechnical engineering expert).	TSF, RSF and open pit landforms.	An independent geotechnical expert verifies the final landforms have been constructed and closed to design to a) Are physically stable (ML6438 Schedule 6 – Clause 19) b) Ensure that pre-mining land use can be recommenced as consistent with the closure plan (ML6438 Schedule 6 – Clause 16) and c) ensure that risks to the health and safety of the public are as low as reasonably practicable and do not result in public injuries or deaths that could have been reasonably prevented. (ML6438 Schedule 6 – Clause 36.)	Once prior to relinquishment.	EFS design: RSF – as detailed in Section 3.7 and 3.10 TSF – as detailed in Section 3.7 and 3.10 Open pit design as detailed in Section 3.5 and 3.10.	**Soil and Land Disturbance Leading Indicator Criteria (LIC-S2)** Annual visual inspection of final landforms for erosion, signs of instability (cracks, embankment movement, slumping, bulges etc) or seepage conducted annually during the post-closure period identify potential for instability.	Closure Manager	Reported in the Annual Compliance Report and final Mine Closure Report.

5.9 Coastal and Marine

5.9.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438 only (and do not apply for EML6439 and MPL146). This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

There are no ML, EML and MPL conditions (Second Schedule) that relate to Coastal and Marine.

5.9.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Coastal and Marine includes:

- *Marine Parks Act 2007* (SA);
- *Environment Protection Act 1993* (SA);
- *Harbors and Navigation Act 1993* (SA);
- *Coast Protection Act 1972* (SA); and
- AS/NZS 5667.12-1999 Water quality sampling Guidance on sampling of bottom sediments.

5.9.3 Coastal and Marine Context

The Project area is adjacent to the Gulf St Vincent (that is characterised by relatively high mean salinities ranging from 35.5 to 42.0 parts-per-thousand (ppt) and temperatures above 26ºC in summer (Bye 1976). The majority of the coastline is sheltered with low wave energy, weak currents, and extensive areas of quiet water shallows.

Low annual rainfall and high summer temperatures combined with relatively shallow waters, particularly on the expansive intertidal flats, mean that evaporation rates exceed fresh-water input. This results in higher salinity levels in the upper reaches of the Gulf than in the southern end of the Gulf (towards Kangaroo Island). Gulf waters also have a limited exchange with the Southern Ocean in the Investigator Straight.

Net clockwise water circulation in Gulf St Vincent is drawn ‘in’ at the surface and carried ‘out’ along the bottom, which is opposite to how water circulates in classical estuarine circulation. For this reason the Gulf is referred to as a reverse (or inverse) estuary. Upper Gulf waters are typically turbid as a result of the input of suspended carbonate matter from the south, which is transported northwards along the long-shore drift to the Upper Gulf area (Shepherd & Sprigg 1976).

The tidal range at the entrance of Gulf is about 1m, increasing to 3m at its upper reaches of the Gulf (Schluter et al. 1995). The most defining tidal patterns of the Gulf are the periods of dodge tides; a South Australian term for flat neaps; that is when neap tides have minimal rise or fall over a 24-hour period. The Gulf experiences dodge tides for one to two days twice a month. Kangaroo Island, at the mouth of the Gulf, slows tidal flushing; and it takes 80 to 100 days for Gulf waters to completely flush through. Wind waves rather than currents are the main modifying factor for the eastern coast of Yorke Peninsula (Edyvane 1999).

An independent technical assessment, presented in the Coastal and Marine Baseline Report, conducted by COOE Pty Ltd in December 2011 assessed the coastal and marine environment for the Project (see Appendix 5.9-A.) The baseline surveys have been divided into:

- intertidal and coastal habitats.;
- subtidal habitats;
- status of seagrass health; and
- subtidal sediment characteristics.

To achieve the study objectives, the survey sites were selected to represent the coastline near to the Project site and the wharf facilities in Port Ardrossan. Note that there are now no proposed activities at the Port of Ardrossan and hence sites are not included in this PEPR. This assessment indicates:

- There was very little reef habitat recorded throughout the survey area. Of the reefs recorded, these habitats consisted of rock boulders and broken bottom reef with sparse microalgae and filter feeding communities;
- The marine habitats were dominated by seagrass communities that are widespread in the Upper Gulf;
- The seagrass communities growing on the sand substrates in the survey area were dominated by species from the *Posidonia genus* (i.e., *P. sinuosa, P. angustifolia* and *P. australis*);
- The lower intertidal zone was composed of patches of *Zostera (Z. tasmanica*) and *P. australis*; and
- The deeper subtidal waters (water depth greater than -7m) consisted of sparse to medium dense mixed communities of *Halophila, Zostera* and *Posidonia* seagrass and sparse filter feeders such as Razorfish (*Pinna bicolor*), sponges, soft corals (Gorgonia sea fans – order Alcyonacea) and hydroids.

Baseline data has identified species and habitats of conservation value and enable recommendations for future monitoring.

5.9.4 Coastal and Marine Impacts and Outcomes

Table 5-26 provides the list of potential coastal and marine impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-26: Coastal and marine – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: No loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post-mine completion. (ML6438 Schedule 6 – Clause 26.)	
DSD ML-M1	Leaching of metals or other contaminants through waste rock dumps, oxide and ore stockpiles impacting on the marine environment during operations and post-completion.
ML-A7	Degradation of marine environment from dust deposition resulting from the mining operations. *(The impact relates to relates to dust deposition which is controlled and monitored as in accordance with Air Quality Section 5.4).*

Potential Impact Event ID	Potential Impact Event Description
MPL-SW5	Increased sediment loads in downstream surface water flows causing smothering of marine flora and fauna impacting the marine environment. *(The impact relates to the water quality of surface water off the land and is therefore addressed in Section 5.14).*
ML-R4	Damage to marine flora and fauna as a result of increased deposition of radionuclide dusts.
ML-N7	Displacement of terrestrial native fauna and marine fauna due to noise and vibration from mine construction and operation.

5.9.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential coastal and marine impacts are detailed in Table 5-27.

Table 5-28 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-27: Coastal and marine control and management strategies

Source	Coastal and Marine Control and Management Strategies	Responsibility	Timing
Applicable Outcome: No loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post-mine completion. (ML6438 Schedule 6 – Clause 26.)			
Design and Management Controls			
Potential air quality impact pathway sources (C, O, CI, PC)	Air Quality Management discussed in Air Quality Section 5.4 encompasses control measures to minimise the potential for airborne dust leaving the site, including deposited dust.		
Potential surface water impact pathway sources (C, O, CI, PC)	The 'Surface Water Management System' discussed in Surface Water Section 5.14 will encompass design parameters to minimise the potential for suspended sediments in surface water leaving the site, to include 'Surface Water Evaporation/Sedimentation Ponds' designed to act as terminating structures for detaining all runoff inflow. The purpose being to stop and hold all inflow to allow for evaporation and infiltration as well as controlling and removing silts and/or pollutants.		
Potential groundwater impact pathway sources (C, O, CI, PC)	Groundwater management is discussed in Groundwater Section 5.16, and in Tailings Storage Facility Section 5.17 and includes control measures to ensure groundwater is not impacted by mining activities.		

Source	Coastal and Marine Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, Cl)	LIC trigger indicative response actions include: • Retest samples to ensure results are accurate; • Review regional level activity and all site monitoring data to determine potential causes for increased copper; • Identify potential control measures in consultation with specialists; and • Implement and conduct short-term monitoring as required to provide evidence of successful control implementation.	Construction Manager Mining Manager Closure Manager	Ongoing during construction operations and closure.
Review CMMP (C, O, Cl, PC)	Based on the trigger and proposed action, review and update the Coastal and Marine Management Plan (CMMP) and any other relevant management plans, such as air quality, surface water or groundwater as applicable.	Sustainability Manager	Ongoing.
General			
Implement CMMP (C, O, Cl, PC)	Implementation of the CMMP, Coastal and Marine Monitoring Program and Coastal and Marine Response Procedures.	Sustainability Manager	Ongoing.
Training and awareness (C, O, Cl, PC).	Site Inductions for relevant personnel (employees, contractors and subcontractors); to ensure they have an understanding of the Rex obligations in relation to coastal and marine management.	Safety/Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.9.6 Environmental Measurement Criteria

Coastal and marine outcome measurement criteria and leading indicator criteria are outlined in Table 5-29, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-28: Coastal and marine – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: No loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post-mine completion. (ML6438 Schedule 6 – Clause 26.)				
Refer to Table 5-27.	Validation of the baseline monitoring given the potential for change in the baseline between 2011 and commencement.	Repeat of the 2011 coastal and marine baseline, incorporating copper in sediment sampling, seagrass abundance and diversity monitoring, marine fauna and flora diversity monitoring and coastal erosion photo monitoring, will be conducted to provide a new baseline.	Sustainability Manager	Prior to the commencement of construction.
	The dust modelling is correct, uncertainty will remain until the dust models are calibrated and validated.	Refer to Air Quality Section 5.4.		
	Assumptions regarding surface water: • all potentially contaminated runoff from the mine footprint will be contained within the mine footprint and will drain towards the pit or the engineered retaining ponds; • runoff from the outer surface of the rock storage facilities (RSF) may contain sediment (but no potentially harmful contaminants), this will drain towards the retaining ponds on the mine lease; and • the surface water management system will trap sediments and prevent their release to the natural drainage system in the area Failure of these controls/design and unpredicted stormwater flows could result in high sediment loads.	Refer to Surface Water Section 5.14.		
	Calibration of groundwater model and confirmation of groundwater flow direction.	Refer to Groundwater Section 5.16.		

Table 5-29: Coastal and marine – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: No loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post-mine completion. (ML6438 Schedule 6 – Clause 26.)							
Copper content in marine sediment, with samples collected in accordance with AS/NZS 5667.12 by a marine scientist and analysed at a NATA accredited laboratory.	5 locations R1 – R5 (2 impact, 3 control) – Figure 5-6 (same as the seagrass monitoring locations).	No loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post-mine completion compared to baseline or where control sites are significantly different to baseline, to control sites (C, O, CI, PC).	Annually (early Spring to Summer) during construction, operations and closure. Once prior to relinquishment, based on no impact being identified during the life of mine. Should mine-related impact be identified during the active life of mine, monitoring will continue on an annual basis post-closure until relinquishment.	2 control sites located outside the potential marine impact area (Figure 5-6). Baseline = COOE 2011 Baseline survey of Marine and Coastal Ecosystems (refer to Appendix 5.9-A).	**Leading Indicator Criteria (C&M-LIC1)** Copper levels in sediments in the potential marine impact area (locations R2 and R3) sampled annually in accordance with AS/NZS 5667.12 by a marine scientist are not statistically different to baseline or where control sites are significantly different to baseline, to control sites.	Sustainability Manager	Annual Compliance Report.
Seagrass abundance and diversity along 50m transects conducted by a marine scientist.	5 locations R1 – R5 (2 impact, 3 control) – Figure 5-6.			2 control sites located outside the potential marine impact area (Figure 5-6). Baseline = COOE 2011 Baseline survey of Marine and Coastal Ecosystems (refer to Appendix 5.9-A).		Sustainability Manager	Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Diversity of marine flora and fauna using underwater video transects conducted by a marine scientist.	Randomly located 10 x 50m tows in the vicinity of the seagrass monitoring locations R1 – R5 (Figure 5-6).			Baseline = COOE 2011 Baseline survey of Marine and Coastal Ecosystems (refer to Appendix 5.9-A).		Sustainability Manager	Annual Compliance Report.
Air quality monitoring as per Air Quality Section 5.4.							
Surface water monitoring as per Surface Water Section 5.14.							
Groundwater monitoring as per Groundwater Section 5.16.							

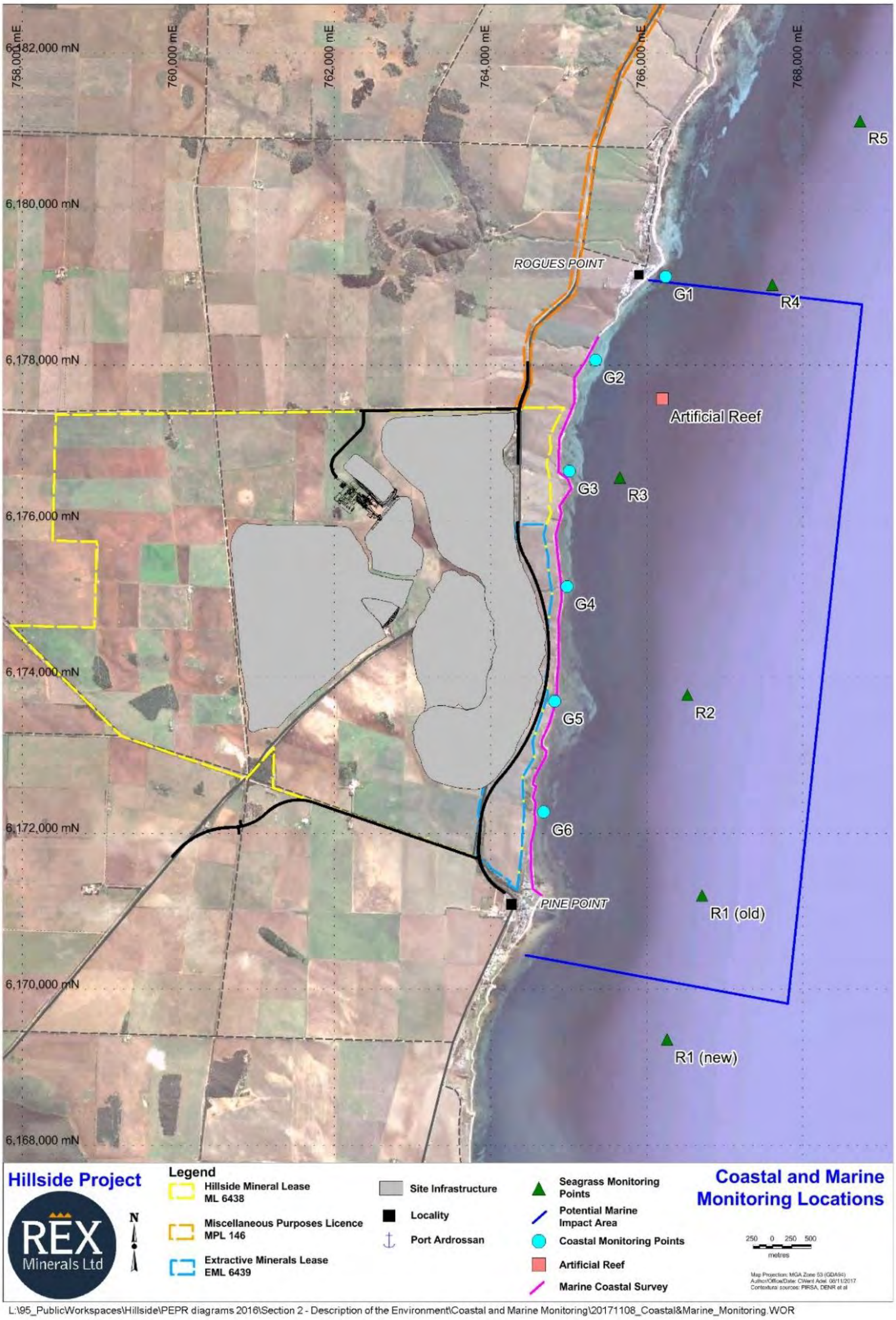

Figure 5-6: Coastal and marine monitoring sites

5.10 Native Vegetation

5.10.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.10.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Native Vegetation includes:

- *Mining Act 1971 (SA);*
- *Development Act 1993* (SA);
- *Native Vegetation Act 1991* (SA);
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth);
- *National Parks and Wildlife Act 1972* (SA);
- *Natural Resources Management Act 2004* (SA); and
- *Fire and Emergency Services Act 2005* (SA).

5.10.3 Native Vegetation Context

5.10.3.1 Native vegetation occurrence

The Hillside Project occurs in an area which has been largely cleared of remnant vegetation in order to accommodate agricultural activities. Isolated small to tiny patches of predominantly Mallee vegetation are scattered across the landscape within and surrounding the ML. The remaining native vegetation within the ML equates to approximately 4% of the whole ML area (3,028ha), predominantly comprising isolated inland and coastal patches and generally narrow roadside vegetation, surrounded by agricultural land.

Independent Technical Reports, the 'Flora Baseline Report' and 'Flora Supplementary Report' conducted by COOE Pty Ltd in September 2011 and July 2012 respectively, completed the ecological assessment for the Project, refer to Appendix 5.10-A and 5.10-B. These assessments indicate:

- baseline vegetation surveys have identified and mapped all native vegetation, including annual species;
- the Project area showed that most of the vegetation is of very poor to poor condition, with low species diversity and significant weed incursion. They are generally characterised by little to no litter cover and overgrazing and are considered to represent low habitat value; and
- it is known that some native vegetation within the ML requires clearing and/or may be impacted by the mine development. This vegetation comprises remnant patches, portions of roadside vegetation and some vegetation within drainage lines.

5.10.3.2 Significant Environmental Benefit (SEB) offset

Vegetation will be cleared to accommodate mine components such as the open pit, TSF and RSF areas, processing plant, workshops, administration buildings and road realignments. A total of 45.01ha comprising ten of the 13 vegetation groups occurring in the ML, EML and MPL area will be affected by the Hillside Project (Table 5-30). The condition of vegetation to be affected ranges from moderate to very poor. Twelve scattered native trees will also be cleared.

Eucalyptus gracilis Mid Mallee Woodland will experience the largest amount of vegetation clearance, with a total of 21.65ha. The 0.03ha of *Eucalyptus incrassata* Mid Mallee Woodland to be cleared has a condition score of 6:1 and represents the only moderate condition vegetation to be cleared for the mine.

Table 5-30: Native vegetation — Clearance and SEB offset calculations for Hillside Project

Vegetation Group	Condition (SEB Ratio)	Total Area Within ML (ha)	Area to be Cleared (ha)	Percentage (%) of Total Area to be Cleared	Offset Area (ha)*
Eucalyptus oleosa ssp., +/-*Eucalyptus gracilis*, +/-*Eucalyptus phenax* ssp. Mid Mallee Woodland	4	7.71	1.35	17	5.39
	2	22.7	0	0	0.00
Eucalyptus socialis ssp., +/-*Eucalyptus gracilis* Mid Mallee Woodland	10	11.3	0	0	0.00
	8	0.93	0	0	0.00
	6	3.26	0	0	0.00
	4	6.91	1.92	28	7.66
	2	32.22	1.91	6	3.81
Eucalyptus gracilis Mid Mallee Woodland	4	19.12	13.75	72	54.99
	2	7.91	7.91	100	15.81
Eucalyptus leptophylla, *Eucalyptus phenax* ssp. Mid Mallee Woodland	4	1.66	0	0	0.00
	2	7.33	3.00	41	6.00
Eucalyptus porosa Mid Mallee Woodland	4	4.61	4.27	93	17.08
	2	7.29	4.32	59	8.63
Eucalyptus incrassata Mid Mallee Woodland	6	4.96	0.03	1	0.15
	4	5.05	0	0	0.00
	2	6.38	0	0	0.00
Austrodanthonia caespitosa Tussock Grassland, *Melaleuca lanceolata* Open Mallee overstorey	4	1.72	1.72	100	6.86
Lomandra sp. Grassy Sedgeland (Irongrass Grassland)	2	0.53	0	0	0.00

Vegetation Group	Condition (SEB Ratio)	Total Area Within ML (ha)	Area to be Cleared (ha)	Percentage (%) of Total Area to be Cleared	Offset Area (ha)*
Gahnia deusta, *Gahnia lanigera* Grassy Sedgeland	2	0.75	0	0	0.00
Coastal Mid Open Shrubland	2	7.57	0	0	0.00
Dodonaea sp. Mid Open Shrubland	4	1.48	1.48	100	5.92
	2	0.46	0.38	83	0.77
Acacia ligulata Shrubland +/-*Eucalyptus porosa* +/-*Eucalyptus gracilis*	2	4.01	1.22	30	2.44
Mixed Mallee	6	0.05	0	0	0.00
	4	3.33	1.77	53	7.09
	2	7.34	0	0	0.00
Scattered trees	N/A	N/A	N/A	N/A	2.96
Total	**N/A**	**176.58**	**45.01**	**25**	**145.57**

Note: Any discrepancies in totals are due to rounding.

* Includes scattered trees.

The SEB will be paid into the Native Vegetation Fund as a lump sum at the commencement of operations. The SEB value calculation is included in Section 3.9.1.

5.10.4 Native Vegetation Impacts and Outcomes

Table 5-31 provides the list of potential native vegetation impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-31: Native vegetation – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; • clearance, • dust/contaminant deposition, • fire, • reduction in water supply, or • other damage, unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22, MPL146 Schedule 6 – Clause 3.)	
ML-NV1	Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation.
ML-NV2	Required land clearance due to placement of mine infrastructure, causing significant impact on threatened species.
ML-NV3	Unauthorised land clearance from saline over spray from dust suppression, causing loss of density and/or diversity of native vegetation.
ML-NV4 and MPL-NV2	Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation.
ML-NV5 & MPL-NV3	Unauthorised land clearance from uncontrolled fires emanating from the Hillside Project area of activity, causing loss of density and/or diversity of native vegetation.
ML-PPA2	Sustained increase in abundance of existing pest plant and animal species in the proposed ML area (The impact relates to Weeds, Pests and Pathogens and is therefore addressed in Section 5.12).
ML(C)-NV1	Ecosystem and landscape function not reinstated to pre-mining conditions.
MPL-NV1	Required land clearance due to placement of infrastructure, causing loss of density and/or diversity of native vegetation.
DSD ML-NV1	Clearance of native vegetation for the waste rock dump causing a break in the roadside corridor native vegetation.
ML-A5	Reduced native plant growth or abundance resulting from increased dust deposition resulting from mining operations. (The impact relates to air quality and is therefore is also addressed in Section 5.4).
ML-PPA1 and MPL-PPA1-4	Introduction of new pest plant and animal species and plant pathogens in the proposed ML area. (The impact relates to weeds, pests and pathogens and is therefore addressed in Section 5.12).
ML-SW1	Disruption of downstream water flows resulting in loss of abundance of native flora. (The impact relates to surface water and is therefore addressed in Section 5.14).
ML-SW2-7	Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment. (The impact relates to surface water and is therefore addressed in Section 5.14).

Potential Impact Event ID	Potential Impact Event Description
ML-SW3-8	Contamination of surface water runoff. (The impact relates to surface water and is therefore addressed in Section 5.14).
ML-SW9	Inundation of areas of remnant vegetation due to changes in the natural water flow resulting in a reduction in abundance of native flora. (The impact relates to surface water and is therefore addressed in Section 5.14).
ML-GW5	Reduced groundwater quantity available for native vegetation as a result of mine dewatering. (The impact relates to depth to groundwater – controls for validation of the groundwater model and groundwater depth monitoring are identified in Section 5.16).
ML(C)-S1	Insufficient topsoil quantity and poor topsoil quality resulting in low establishment of native vegetation and agricultural pasture on rehabilitated sites. (The impact relates to soil and land disturbance and is therefore addressed in Section 5.8).
ML-AL6, ML-NV5, **ML-TTP1**	Fires damaging to agricultural crops and native vegetation. (This potential impact also relates fire control which is detailed in Section 5.18).
Applicable Outcome: The Tenement Holder must not clear any native vegetation on the Land other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway. (EML6439 Schedule 6 – Clause 7.)	
ML-NV1	Required land clearance due to placement of mine infrastructure, causing loss of density and/or diversity of native vegetation.
ML-NV2	Required land clearance due to placement of mine infrastructure, causing significant impact on threatened species.
ML-NV3	Unauthorised land clearance from saline over spray from dust suppression, causing loss of density and/or diversity of native vegetation.
ML-NV4 **and MPL-NV2**	Unauthorised land clearance from manual clearance, causing loss of density and/or diversity of native vegetation.
MPL-NV1	Required land clearance due to placement of infrastructure, causing loss of density and/or diversity of native vegetation.

5.10.5 Environmental Outcomes and Controls

The control and management measures that will be implemented throughout the life of mine to mitigate potential native vegetation impacts are detailed in Table 5-32.

Table 5-33 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-32: Native vegetation control and management strategies

Source	Native Vegetation Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; • clearance, • dust/contaminant deposition, • fire, • reduction in water supply, or • other damage, unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22, MPL146 Schedule 6 – Clause 3.)			
Design/Engineering Controls			
Reduction of clearance (C, O)	Native vegetation clearing impacts will be minimised through strategic placement of mine infrastructure. The limits of areas to be cleared will be clearly marked during construction and operation activities.	Project Team Construction Manager	During design and construction of any infrastructure.
Reduction of clearance (C, O)	Clearance will be staged specific to phases of mining activities.	Construction Manager Mining Manager	During any clearing.
Reduction of clearance (C, O, C)	'Vegetation Control Zones' will be established with signage and barriers to protect designated vegetation.	Construction Manager Mining Manager	Ongoing.
Reduction of clearance (C, O)	Controlled avoidance of clearance to areas with threatened species present will be implemented.	Project Team Construction Manager	During design and construction of any infrastructure.
Reduction of clearance (C, O)	During the construction of the powerline within the MPL, an environmental observer appointed by Rex will be assigned to ensure that the contractors comply with the Legislative and Project environmental standards, including minimisation of vegetation clearance.	Construction Manager	During construction of the powerline.
Reduction of clearance (C, O)	High traffic areas around the site will be graded, compacted or covered with road base in accordance with fit for purpose design and traffic will be restricted to established roads.	Construction Manager Mining Manager	Ongoing.
Reduction of dust impact on native vegetation (C, O, CI, PC)	Refer to air quality controls in Section 5.4.		
Reduction of water supply impacts on native vegetation (C, O, CI, PC)	Refer to surface water controls in Section 5.14. Refer to groundwater controls in Section 5.16.		

Source	Native Vegetation Control and Management Strategies	Responsibility	Timing
Contamination impacts on native vegetation (C, O, CI, PC)	Refer to air quality controls in Section 5.4. Refer to surface water controls in Section 5.14. Refer to groundwater controls in Section 5.16. Refer to soil and land disturbance controls in Section 5.8.		
Reduction on native vegetation from pests, weeds and pathogens (C, O, CI, PC)	Refer to pests, weeds and pathogen controls in Section 5.12.		
Fire control (C, O, CI)	Refer to fire-related controls in Public Safety Section 5.18.		
Management Controls			
Dust suppression impact on native vegetation (C, O, CI)	Dust suppression using water will be undertaken during construction and operation and control over-spray of saline water used for dust suppression.	Construction Manager Mining Manager	Ongoing.
Fire impact on native vegetation (C, O, CI)	Compliance with AS 5062-2006 Fire protection of mobile and transportable equipment.	Safety and Security Manager	Ongoing
Fire impact on native vegetation (C, O, CI)	Implementation of a fire management system with a trained mine firefighting team.	Safety and Security Manager	Ongoing
Reduction of clearance (C, O)	Development and implementation of a ‘Vegetation Clearance Procedure’ to ensure permission is sought through the ‘Clearance Permit System’ for any vegetation removal and clearance occurs immediately prior to development and within designated areas.	Sustainability Manager	Ongoing.
Reduction of clearance (C, O)	Develop and maintain a ‘Native Vegetation Map’ to show areas of vegetation to be retained and cleared.	Sustainability Manager	Ongoing.
Progressive rehabilitation (C, O, CI)	Develop and implement a seed collection and preservation program to supply materials for establishing the revegetation areas and for progressive site rehabilitation.	Sustainability Manager	Ongoing.
Progressive rehabilitation (C, O, CI)	Establishment and implementation of the progressive rehabilitation program. This will include best practice rehabilitation methods on available mine areas and includes ripping of compacted areas to assist the establishment of vegetation using either seed or seedlings of native species from local provenance.	Sustainability Manager	Ongoing.
Reduction of dust impact on native vegetation (C, O, CI, PC)	Refer to air quality controls in Section 5.4.		
Reduction of water supply impacts on native vegetation (C, O, CI, PC)	Refer to surface water controls in Section 5.14. Refer to groundwater controls in Section 5.16.		

Source	Native Vegetation Control and Management Strategies	Responsibility	Timing
Contamination impacts on native vegetation (C, O, Cl, PC)	Refer to air quality controls in Section 5.4. Refer to surface water controls in Section 5.14. Refer to groundwater controls in Section 5.16. Refer to soil and land disturbance controls in Section 5.8.		
Reduction on native vegetation from pests, weeds and pathogens (C, O, Cl, PC)	Refer to pests, weeds and pathogen controls in Section 5.12.		
Fire control (C, O, Cl)	Refer to fire-related controls in Public Safety Section 5.18.		
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, Cl)	**Leading indicator criteria (NV-LIC1)** – Indicative response actions include: • Comparison of monitoring data from different sites to ensure the influence is not a broader climatic or other activity related impact; • Identification of the potential mining-related activity influencing vegetation condition (e.g., dust, dust suppression spray, waste management etc.); • Review adequacy of relevant control actions implemented to mitigate the identified cause (i.e., dust mitigation measures, inundation mitigation measures, waste management measures, etc); and • Amend relevant mitigation measures as applicable.	Sustainability Manager	Ongoing throughout construction, operations and closure
Applicable Outcome: The Tenement Holder must not clear any native vegetation on the Land other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway. (EML6439 Schedule 6 – Clause 7.)			
Design/Engineering Controls			
Reduction of clearance (C, O)	During the realignment of the St Vincent Highway and the realignment of the Yorke Highway within the EML, an environmental observer appointed by Rex will be assigned to ensure that the contractors comply with the Legislative and Project environmental standards, including minimisation of vegetation clearance.	Construction Manager	During realignment roadworks.
Reduction of clearance (C, O, C)	'Vegetation Control Zones' will be established with signage and barriers to protect designated vegetation.	Construction Manager	Ongoing.

Source	Native Vegetation Control and Management Strategies	Responsibility	Timing
General			
Implementation of NVMP (C, O, Cl)	Implementation of the Native Vegetation Management Plan (NVMP) and the Native Vegetation Monitoring Program.	Sustainability Manager	Ongoing.
LIC Trigger (C, O, Cl)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the NVMP throughout the life of mine.	Sustainability Manager	Ongoing throughout construction, operations and closure.
Training and awareness (C, O, Cl, PC)	Site inductions and training for relevant personnel (employees, contractors and subcontractors); vegetation management will be incorporated into Induction Procedures.	Safety/Training advisor	Ongoing prior to individuals commence work.
Training and awareness (C, O, Cl, PC)	Native vegetation monitoring training for personnel conducting native vegetation monitoring.	Training advisor	Ongoing prior to individuals commencing monitoring.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment

5.10.6 Environmental Measurement Criteria

Native vegetation outcome measurement criteria and leading indicator criteria are outlined in Table 5-34, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated.

Table 5-33: Native vegetation – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; • clearance; • dust/contaminant deposition; • fire; • reduction in water supply; or • other damage unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22 & Clause 2 (air quality), MPL146 Schedule 6 – Clause 3.)				
Refer to Table 5-32.	Evidence for extensive or long-term impact from the use of saline water for dust suppression is lacking.	Implement vegetation monitoring plan as per Table 5-34.	Sustainability Manager	As per Table 5-34.
	Vegetation surveys identified all native vegetation and accuracy of external database species inclusion.	Undertake vegetation surveys prior to any land clearance to confirm that no previously unidentified vegetation is present and to confirm the expected native vegetation. Include spot checks for presence of plant species identified in vegetation reports as potentially occurring.	Sustainability Manager	Prior to first ground clearance.
	Mine map accuracy.	Review mine map prior to any vegetation clearance to identify any modifications made between the maps used in the vegetation surveys and the final implementation of mine activities.	Sustainability Manager	Prior to first ground clearance.
	Exact form of vegetation clearance permit system and procedure.	Develop and implement vegetation clearance permit system.	Sustainability Manager	Prior to first ground clearance.
	Uncertainties associated with air quality such as accuracy of dust deposition modelling.	Refer to air quality uncertainties in Section 5.4.		

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-32.	Uncertainties associated with surface water.	Refer to surface water uncertainties in Section 5.14.		
	Uncertainties associated with groundwater.	Refer to groundwater uncertainties in Section 5.16.		
	Uncertainties associated with pests, pathogens and weeds.	Refer to pests, pathogens and weeds uncertainties in Section 5.12.		
	Uncertainties associated with soil and land disturbance.	Refer to soil and land disturbance uncertainties in Section 5.8.		
Applicable Outcome: The Tenement Holder must not clear any native vegetation on the Land other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway. (EML6439 Schedule 6 – Clause 7.)				
Refer to Table 5-32.	No specifically identified uncertainties or assumptions associated with this outcome.			

Table 5-34: Native vegetation – Measurement criteria and leading indicator criteria

<table>
<tr><th>What Will Be Measured and Form (Method)</th><th>Locations</th><th>Outcome Achievement</th><th>Frequency</th><th>Control/Baseline Data</th><th>Leading Indicator Criteria</th><th>Accountability</th><th>Reporting</th></tr>
<tr><td colspan="8">Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through;
clearance,
dust/contaminant deposition,
fire,
reduction in water supply, or
other damage,
unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22 and Clause 2 (air quality), MPL146 Schedule 6 – Clause 3.)</td></tr>
<tr><td>Site inspections by trained site personnel of vegetation condition by visual assessment of the following:
Presence of weeds and pest animals;
Unauthorised clearances and access;
Presence of dust and salt accumulation on leaves;
Erosion;
Litter;
Evidence of stock access;
Fire damage; and
All other identified issues including fire.
Photos and GPS location will be recorded</td><td>Within remnant vegetation locations on and off the land as identified in Figure 5-7.</td><td>Inspection records of vegetation condition indicates no impact to native vegetation on or off the land as a result of factors including unauthorised clearance, dust or contaminant deposition, fire, reduction in water supply or other damage.</td><td>Prior to commencement of construction and monthly during construction, operations and closure.</td><td>Baseline survey prior to construction.

Comparison between sites to account for adverse climatic condition influence.</td><td>Leading indicator criteria (NV-LIC1)

Monthly - Site inspections by trained site personnel of vegetation condition by observation in the locations in Figure 5-1 identify potential mining-related impact on areas of remnant vegetation which, if left unactioned, may adversely affect diversity and abundance of native vegetation.</td><td>Sustainability Manager</td><td>Monthly review.

Reporting in Annual Compliance Report.</td></tr>
</table>

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Vegetation monitoring by a trained botanist of native vegetation: • Species list; • Species abundance; • Health score; and • Presence/absence of dust and salt on leaves.	5 permanent linear quadrats within remnant vegetation locations on and off the land as identified in Figure 5-7.	Vegetation surveys of remnant vegetation show no loss of abundance or diversity of native vegetation as a result of mining activities during operations or post-mine completion, other than that approved for clearing.	Prior to commencement of construction and annually (Spring) during construction, operations and closure.	Baseline survey prior to construction. Comparison between sites to account for adverse climatic condition influence.		Sustainability Manager	Monthly review. Reporting in the Annual Compliance Report.
Vegetation monitoring by a trained botanist of native vegetation: • Species list; • Species abundance; • Health score; and • Presence/absence of dust and salt on leaves.	5 permanent linear quadrats within remnant vegetation locations as identified in Figure 5-7.	Final vegetation survey of remnant and rehabilitated native vegetation areas within the Hillside Impact Footprint show no loss of abundance or diversity of native vegetation when compared to the baseline as a result of mining activities other than that approved for clearing.	Spring prior to relinquishment.	Baseline survey prior to construction. 2011 and 2012 baseline (Appendix 5.10-A and B) (as amended by baseline conducted prior to construction). Comparison between sites to account for adverse climatic condition influence.		Sustainability Manager	Monthly review. Reporting in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity. of native vegetation on or off the Land through; • clearance, unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22 and Clause 2 (air quality), MPL146 Schedule 6 – Clause 3.)							
Areas cleared for project activities through the vegetation clearance permit system including recording of area cleared, date and reason cleared, pre-clearance sign off and post-clearance verification.	Any areas within the Hillside impact footprint that are to be cleared of native vegetation[3].	Records indicate no unauthorised clearance of native vegetation has occurred and clearance activities have been undertaken in accordance with the PEPR, SEB and Clearing Permit Procedures to ensure no loss of abundance or diversity of native vegetation on or off the Land through clearance unless prior approval under the relevant legislation is obtained.	Prior to vegetation clearance during construction and operations.	Site native vegetation map to show areas of vegetation to be retained and cleared. Vegetation clearing permits. SEB calculation.		Sustainability Manager	Review prior and post-clearance of each area. Reporting in the Annual Compliance Report.

[3] Note that clearance of native vegetation on the MPL may be required for the SA Water pipeline and the ElectraNet power line. In accordance with SA Water's cabinet approval, the proposed mains extension between Port Wakefield and Pine Point (including infrastructure up to and including the proposed water meter in Sandy Church Road) will be built, owned and operated by SA Water. Therefore, all approvals necessary to deliver the mains extension will be the responsibility of SA Water. As part of the contractual agreements with ElectraNet, the proposed electricity transmission line will be built, owned and operated by ElectraNet. Therefore, all approvals necessary to deliver the mains extension will be the responsibility of ElectraNet.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; • dust/contaminant deposition, unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22 and Clause 2 (air quality), MPL146 Schedule 6 – Clause 3).							
Air quality, particularly dust deposition monitoring as identified in Section 5.4.							
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; • reduction in water supply, or • other damage, unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 22 and Clause 2 (air quality), MPL146 Schedule 6 – Clause 3.)							
Surface water monitoring as identified in Section 5.14. Groundwater monitoring as identified in Section 5.16.							
Applicable Outcome: The Tenement Holder must not clear any native vegetation on the Land other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway (EML6439 Schedule 6 – Clause 7.)							
Areas cleared for project activities through the vegetation clearance permit system monitoring as identified above.							

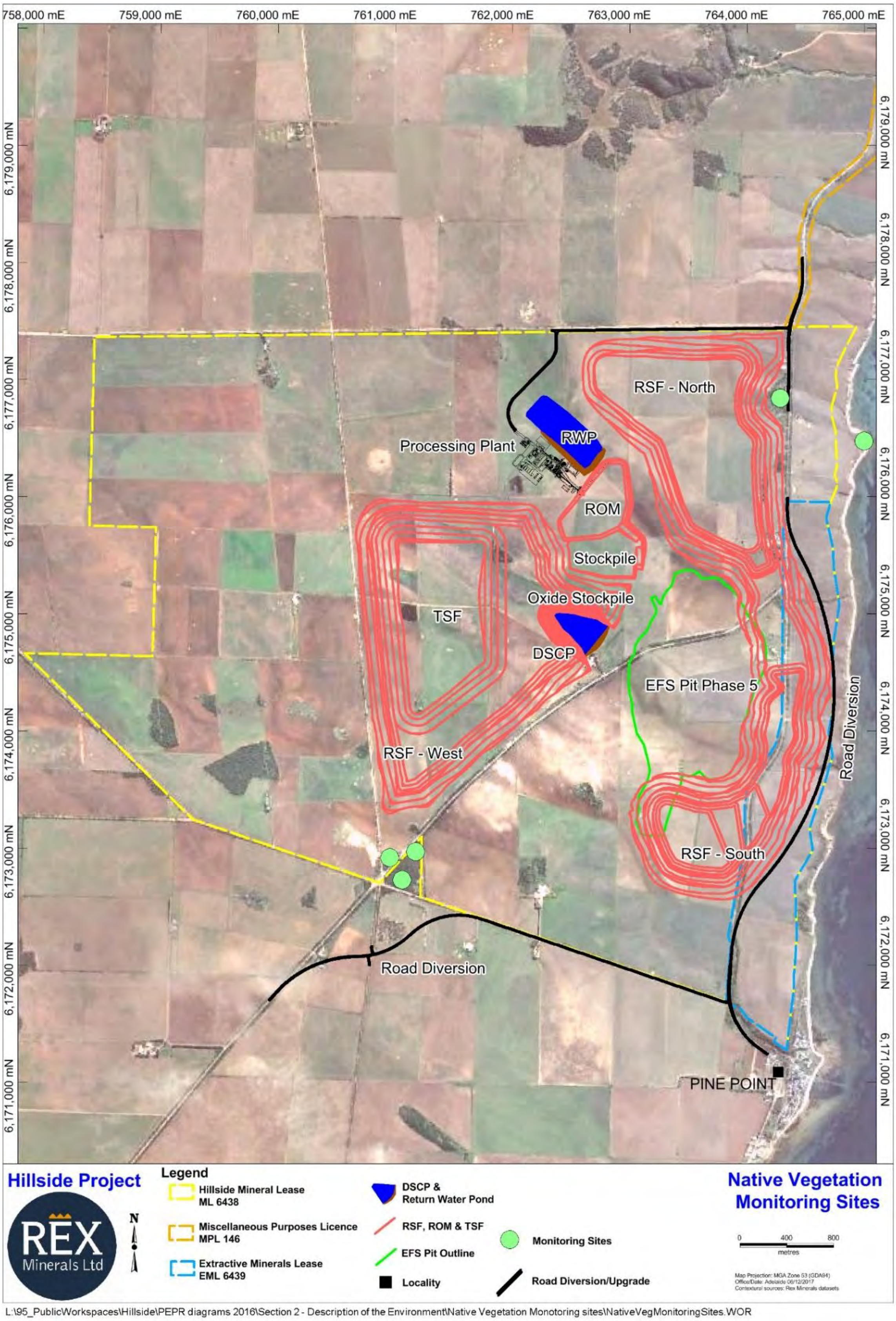

Figure 5-7: Native vegetation monitoring locations

5.11 Native Fauna

5.11.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438 and MPL146; they do not apply for EML6439. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.11.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Native Fauna includes:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth);
- *National Parks and Wildlife Act 1972* (SA); and
- *Native Vegetation Act 1991* (SA).

5.11.3 Native Fauna Context

The Hillside Project is located predominantly on freehold agricultural cropping and livestock farming land.

Independent Technical Reports, the 'Fauna Baseline Report' and 'Fauna Supplementary Report' conducted by COOE Pty Ltd in December 2011 and July 2012 respectively, completed the ecological assessment for the Project, refer to MLP Appendix 5.13-A and 5.13-B. These assessments indicate:

- there is low diversity and abundance of native fauna within the Project area; and
- broad-scale clearance for agricultural purposes has removed a large proportion of native vegetation habitat within the region.

Rex recognises the importance of the remaining remnant native vegetation in the area to native fauna and has undertaken surveys to assess the status of the remaining habitats. These are generally in very poor to poor condition.

5.11.4 Native Fauna Impacts and Outcomes

Table 5-35 provides the list of potential native fauna impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-35: Native fauna – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 23, MPL146 Schedule 6 – Clause 4.)	
ML-NF1 and MPL-NF1	Loss of fauna from land clearing during construction.
ML-NF2 and MPL-NF2	Significant impacts to species of conservation significance.
ML-NF3	Fauna injuries and/or deaths from collisions/interactions with mining infrastructure and vehicles (including fauna entrapment in open voids and collisions with fauna) associated with the Hillside Project.
ML-NF4	Isolation of fauna populations due to presence of the mine acting as a barrier to fauna movement.
ML-TSF8	Fauna injuries and/or deaths from interactions with the TSF (including fauna entrapment and bird death) associated with the Hillside Project. (*This potential impact relates to the TSF and therefore this impact has been addressed in Section 5.17.)*
ML-N7	Displacement of terrestrial native fauna and marine fauna due to noise and vibration from mine construction and operation. (*This potential impact relates to the Noise and Marine therefore this impact has been addressed in Section 5.17.*)
ML-BV5	Disturbance to native fauna (terrestrial and marine) due to blasting activities. (*Controls related to blasting and monitoring of blasting impact is addressed in Section 5.6.)*
ML-PPA1 **ML-PPA2**	Increase in and/or introduction of pest plants and animals from activities associated with the Hillside Project resulting in reduction in flora and fauna species. (*This potential impact relates to the Weeds, Pests and Pathogens and therefore this impact has been addressed in Section 5.10).*
ML(C)-NV1	Ecosystem and landscape function not reinstated to pre-mining conditions. (*This potential impact relates to the Native Vegetation and therefore this impact has been addressed in Section 5.10.)*
ML(C)-TSF4	Discharge of water after closure from leakage through the capping layer, embankment and base (affecting fauna). (*This potential impact relates to the TSF and therefore this impact has been addressed in Section 5.17.)*
DSD ML-NF2	Impact on fauna from contaminated water sources.

5.11.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential native fauna impacts are detailed in Table 5-36.

Table 5-37 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-36: Native fauna control and management strategies

Source	Native Fauna Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (M 6438 Schedule 6 – Clause 23, MPL146 Schedule 6 – Clause 4.)			
Design/Engineering Controls			
During mine design	Strategic placement of mine infrastructure to minimise fauna impact.	Project team	Already completed.
During mine design	Road networks will be designed to use existing tracks, as far as practicable.	Project team	Already completed.
Traffic (C, O, Cl, PC)	Speed restrictions will be applied for all mine and mine access roads.	Safety and Security Manager	Application at construction, ongoing enforcement.
Traffic (C)	Timing of construction vehicle movements will be considered and minimised during early morning/late evening, where possible.	Safety and Security Manager	Construction.
Operations (C, O, Cl)	Fencing will be included on site, where appropriate.	Construction Manager	Construction. Ongoing as applicable.
Operations (C, O, Cl)	Compliance with AS 5062-2006 Fire protection of mobile and transportable equipment.	Mining Manager	Ongoing.
Operations (C, O, Cl)	Provision of emergency response capability at mine and liaise with local emergency services and nearby mining operations.	Sustainability Manager	Ongoing.
Management Controls			
Operations (C, O, Cl)	Implementation of Pest Plant and Animal Monitoring Program to the extent that it may provide information related to the potential injury or death of native fauna (refer to Weeds, Pests and Pathogens, Section 5.12).	Sustainability Manager	Ongoing.
Operations (C, O, Cl)	Audits of contractor operations, including reviewing of environmental management procedures that may influence weeds, pests and pathogens.	Department Manager of the department the contractor is working for	Ongoing Annual for long term contractors.
General			
Implement PPAMP (C, O, Cl, PC)	Implementation of the Pest Plant and Animal Management Plan (PPAMP), Pest Plant and Animal Monitoring Program and the Pest Plant and Animal Response Procedures which will include all the information from this section and Section 5.12.	Sustainability Manager	Ongoing.
Training and awareness (C, O, Cl, PC).	Site Inductions and Training for relevant personnel (employees, contractors and subcontractors) to ensure they are suitably qualified in fauna management will be incorporated into mine site induction procedures and include requirements for compliance with Section 13 of the Animal Welfare Act and Animal Welfare Regulations 2012.	Safety/Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.11.6 Environmental Measurement Criteria

Native fauna outcome measurement criteria and leading indicator criteria are outlined in Table 5-38, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-37: Native fauna – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 23, MPL146 Schedule 6 – Clause 4.)				
Refer to Table 5-36.	Some level of fauna impact will/may occur. Assume that vehicle collisions will injure or kill fauna. Assume that fires will injure or kill fauna.	Implement the Pest Plant and Animal Management Monitoring Program which includes: • investigations and records into the cause of injuries and deaths to fauna; • opportunistic visual surveys; and • photo-point monitoring.	Sustainability Manager	From commencement of construction, ongoing throughout the life of the operation, including closure.

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Table 5-38: Native Fauna – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 2, MPL146 Schedule 6 – Clause 4.)							
Fauna injuries and deaths will be recorded in a fauna sighting log, including details of type of animal, probable time of injury death, type of injury, and results of investigation by a suitably qualified person into probable cause of injury.	Hillside Project impact area and site access locations on the ML. MPL infrastructure area.	Investigation record provide evidence that none of the recorded native fauna injuries or deaths are due to mining operations or mine related activities that could reasonably have been prevented.	Hillside Project impact area and site access locations on the ML: As and when native fauna sightings are made during construction, operations and closure. MPL infrastructure area during construction only.			Sustainability Manager	Investigation initiated on report of injured or dead native fauna. Reported in Annual Compliance Report.

5.12 Pests, Weeds and Pathogens

5.12.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, MPL146 and EML6439. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.12.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Weeds, Pests and Pathogens includes:

- *Natural Resources Management Act 2004* (SA) (NRM Act);
- Local NRM plans; and
- State and Commonwealth declared weed species lists.

Under the NRM Act, pest plants and animals are declared, along with requirements for their limitation, control and prevention. The Northern and Yorke Natural Resources Management Board administers the NRM Act in the Yorke Peninsula region.

5.12.3 Weeds, Pests and Pathogens Context

The Hillside Project land use is agricultural with a small percentage of remnant native vegetation, with pest plants heavily invading the area. The Project area has been subject to a pest plant and animal control and management program since 2010, involving on-ground spraying and baiting. The management of pest plants and animals in the road verges is the responsibility of the abutting landowner.

Ongoing field surveys and management for pest plants and animals have been undertaken by Rex since 2010. Baseline flora and fauna surveys were undertaken by COOE Pty Ltd in 2011, 2012 and 2013 for the Hillside Project, which included surveying the pest plants and animals.

5.12.3.1 Baseline data

59 introduced plant species were sighted and recorded within and surrounding the ML during the baseline vegetation surveys and an additional three species have been sighted by Rex personnel during weed audits.

Nine declared weed species listed under the NRM Act have been identified within the ML (refer to Table 5-39). Declared species are regarded as particularly invasive and pose significant economic and environmental risk, therefore requiring a level of mandatory control of their infestation. There have been no sightings of *Phytophthora* or *Orobanche* (Broomrape) species within the ML.

There were six introduced mammal species and six introduced bird species recorded during surveys (refer to Table 5-40). The common House Mouse (*M. musculus*) dominated the mammal fauna across the ML and MPL area and the Common Starling (*Sturnus vulgaris*) and House Sparrow (*Passer domesticus*) were recorded in the highest numbers.

Two invasive mammal species identified in the EPBC Act Protected Matters Report (SEWPaC 2011); Rabbit (*Oryctolagus cuniculus*) and Fox (*Vulpes vulpes*) were recorded within and surrounding the ML. Two species of snail have been identified within the ML by Rex personnel. The White Italian Snail (*Theba pisana*) is the most common species in the area and the Pointed Snail (*Cochlicella acuta*) has been recorded, however not in great numbers.

Table 5-39: Declared pest plant species within the ML

Species	Common Name
Asparagus asparagoides	Bridal creeper
Cenchrus longispinus	Innocent weed
Echium plantagineum	Salvation Jane
Eragrostis curvula	Love Grass
Euphorbia terracina	False Caper
Lycium ferocissimum	Boxthorn
Marrubium vulgare	Horehound
Solanum elaeagnifolium	Silver leaf nightshade
Tribulus terrestris	Caltrop

Table 5-40: Pest animal species identified within the ML

Species	Common Name
Alauda arvensis	Skylark
Cochlicella acuta	Pointed Snail
Colombia livia	Feral pigeon
Felis catus	Feral cat
Lepus capensis	Brown hare
Mus musculus	Common House Mouse
Oryctolagus cuniculus	Rabbit
Passer domesticus	House Sparrow
Rattus	Black Rat
Streptopelia chinensis	Spotted Turtle-dove
Sturnus vulgaris	Common Starling
Theba pisana	White Italian Snail

Species	Common Name
Turdus merula	Common Blackbird
Vulpes	Fox

5.12.3.2 Weed management along roadsides

The management of declared species on roadsides falls under the jurisdiction of the local NRM Boards under the guidance of the Natural Resource Management Council. The NRM Act states that NRM Boards (or NRM Groups, where they exist) have the responsibility to control on road reserves any declared pest plant or pest animal and that the Minister has empowered them to require landowners to control elsewhere on private and public land. Within some local council areas, landholders may be required to contribute to the control of pests on adjacent roadsides. Where landholders opt to control the pests on adjacent roadsides they must seek approval of the NRM Board and the local council (Native Vegetation Council 2012).

Therefore the ongoing control of pests (plants and animals) along the MPL road corridor will be the responsibility of the adjacent landowner not Rex; noting that Rex is responsible for the control of pests within road corridors that are adjacent to land owned by Rex Hillside (Property) Pty Ltd in and around the ML and EML.

The presence and abundance of declared plant species within the MPL have been captured as a baseline in Table 2-2, however once construction of the powerline is completed the ongoing control of pests within the MPL will not be the responsibility of Rex.

5.12.4 Weeds, Pests and Pathogens Impacts and Outcomes

Table 5-41 provides the list of potential weeds, pests and pathogens impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-41: Weeds, pests and pathogens – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to adjoining land. (ML6438 Schedule 6 – Clause 24, EML6439 Schedule 6 - Clause 8, MPL146 Schedule 2 – Condition 3.)	
ML-PPA1 and MPL-PPA1	Introduction of new pest plant and animal species and plant pathogens in the ML and MPL area.
ML-PPA2 and MPL-PPA2	Sustained increase in abundance of existing pest plant and animal species in the ML and MPL area.
ML(C)-PPA1 and MPL(C)-PPA1	Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits.
DSD EML-PPA1	Introduction or sustained increase of new pest plant and animal species and plant pathogens in the EML area.
DSD EML(C)-PPA1	Competition or predation by pest plants and animals with native vegetation, revegetated native species and agricultural pursuits.

5.12.5 Environmental Outcomes and Controls

A summary of the Weeds, Pests and Pathogens control and management strategies to demonstrate that the environmental outcomes can be and will continue to be achieved, using a hierarchy of controls approach are provide in Table 5-42.

Table 5-43 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-42: Weeds, pests and pathogens control and management strategies

Source	Weeds, Pests and Pathogens Control And Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to adjoining land. (ML6438 Schedule 6 – Clause 24, EML6439 Schedule 6 – Clause 8, MPL146 Schedule 2 – Condition 3.)			
Design/Engineering Controls			
General (C, O, CI)	The surface water management system will minimise both water pooling and the creation of water sources, refer to Surface Water Section 5.14.	Construction Manager Plant Operations Manager	Installation of system during construction, maintenance ongoing.
	The mine area will be fenced and the main access road will be sealed.	Operations Manager	Installation during construction, maintenance ongoing to closure.
Traffic (C, O, CI)	Traffic will be restricted to established roads to minimise weed transportation, refer to Traffic Section 5.19.	Operations Manager	Ongoing.
	A wheel wash will be established at the exit of the operational area / plant area and every piece of equipment that has been on unsealed roads within the site will go through this.	Mining Manager	Installation during construction, maintenance ongoing to closure.
Waste management (C, O, CI)	Putrescible waste management structures will ensure no sources of food are available to attract pests	Sustainability Manager	Ongoing.
Management Controls			
Clearing activities (C, O, CI)	Implementation of the Vegetation Clearance Procedure; this includes staged clearance protocol ensuring clearance occurs immediately prior to development and within designated areas to minimise opportunity for weeds.	Sustainability Manager	Ongoing during vegetation clearance activities.
General (C, O, CI)	Liaise with neighbouring properties to identify any further pest plant species and coordinate pest plant and animal control efforts.	Sustainability Manager	Ongoing.
General (C, O, CI)	Implementation of a pest eradication program, including baiting and warren fumigation of declared pest species as required.	Sustainability Manager	Ongoing.

Source	Weeds, Pests and Pathogens Control And Management Strategies	Responsibility	Timing
General (C, O, Cl)	Implementation of Weed Detection and Response Procedure to report/record occurrence of weeds during day to day activities and followed up with weed control. This will include targeted knock down of summer and winter weeds.	Sustainability Manager	Ongoing.
Traffic (C)	Contracts with contractors working in EML will require vehicle hygiene practices to be implemented to prevent weed introduction.	Construction Manager	During construction works in EML.
Waste management (C, O, Cl)	Waste management measures will ensure no sources of food are available to attract pests (refer to Commercial and Industrial Waste Section 5.20).	Sustainability Manager	Ongoing.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, Cl)	PPA-LIC1 – Indicative response actions include: • Comparison of monitoring data from different sites to ensure the influence is not a broader impact or related to non-mining activities; • Identification of the potential cause of the impact, e.g., feral animals attracted to waste, presence of weeds on adjoining land adjacent to boundary and the like; • Review adequacy of relevant control actions implemented to mitigate the identified cause; and • Amend relevant mitigation measures as applicable.	Sustainability Manager	Ongoing throughout construction, operations and closure.
LIC trigger (C, O, Cl)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the Pest Plant and Animal Management Plan (PPAMP) throughout the life of mine.	Sustainability Manager	Ongoing throughout construction, operations and closure.
General			
Awareness (C, O, Cl, PC).	Ongoing consultation with the NRM Board in relation to control or eradication measures for introduced pest species will be conducted as required and with neighbouring pastoralists to identify any further weed species.	Sustainability Manager	Ongoing.
Implement PPAMP (C, O, Cl, PC)	Implementation of the PPAMP and the Pest Plant and Animal Monitoring Program to identify pest plant and pathogens throughout life of mine.	Sustainability Manager	Ongoing.
Training and awareness (C, O, Cl, PC)	Site inductions and Training for relevant personnel (employees, contractors and subcontractors); this includes pest plant and animal awareness, identification and reporting of weed species and decontamination of plant and equipment.	Safety/Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.12.6 Environmental Measurement Criteria

Weeds, pests and pathogens outcome measurement criteria and leading indicator criteria are outlined in Table 5-44, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

It is noted that while the outcome requires no increase in weeds on the land compared to the adjoining land, Rex has no control over weed management on adjoining land, and in some cases will not have regular access to adjoining private third-party property to conduct monitoring. As such, monitoring is focussed on the Hillside land and public adjoining land for monitoring, and where weeds are not increasing in diversity or abundance on this land, there will, by default, be no impact on adjoining third-party property.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-43: Weeds, pests and pathogens – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to adjoining land. (ML6438 Schedule 6 – Clause 24, EML6439 Schedule 6 – Clause 8, MPL146 Schedule 2 – Condition 3.)				
Refer to Table 5-42.	Variations in seasonal conditions may affect weed and pest populations and may cause changes from the baseline data that are not associated with the construction or operational activities on the Hillside Project ML.	Monitoring as identified in Table 5-44.		
	Change in weed populations since baseline conducted.	Update of weed baseline (ML6438 Schedule 6 – Clause 25, MPL146 Schedule 6 – Clause 5.)	Sustainability Manager	Prior to commencement of ground disturbance.

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Table 5-44: Weeds, pests and pathogens – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to adjoining land. (ML6438 Schedule 6 – Clause 24, EML6439 Schedule 6 – Clause 8, MPL146 Schedule 2 – Condition 3.)							
Pest plant and animal monitoring undertaken by a person suitably trained in the identification of pest plant and animal species by visual inspection walk-over surveys. The monitoring will record: • species, abundance and locations; • photos and GPS coordinates of pest species locations; and • status of control activities.	Weed monitoring areas as identified on Figure 5-8 as updated by baseline to be completed prior to ground disturbance. Pathogen and feral animal monitoring to be conducted in the same locations. Within MPL construction area.	No introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to accessible adjoining land or compared to baseline as a result of mining operations in construction, operation and post-mine completion. (ML6438 Schedule 6 – Clause 24, EML6439 Schedule 6 – Clause 8, MPL146 Schedule 2 – Condition 3.)	Biannual (Summer and Winter) during construction, operations and closure. MPL included during and immediately after construction.	Baseline weed occurrence as Identified in the updated baseline to be completed prior to ground disturbance.	**Leading indicator criteria (PPA-LIC1)** Pest plant and animal site inspections undertaken by a suitably trained person on a monthly basis by visual inspection walk-over surveys of the site to record species of weeds, plant pathogens or pests (including feral animals). The monitoring will be conducted in weed hot spots locations identified in Figure 5-8, along ML boundaries and lease access points as a minimum and record: • species, abundance and locations; and • photos and GPS coordinates of pest species locations.	Sustainability Manager	Monthly inspections. Reviewed biannually. Reported in Annual Compliance Report.
Pest plant and animal monitoring (opportunistic) will be identified visually and captured in a log during day to day activities.	Within ML, MPL and EML.		As reported.			Sustainability Manager	Reported in Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Review of all operational pest plant and animal monitoring records and final monitoring survey undertaken by a suitably qualified person in the identification of pest plant and animal species by visual inspection walk-over surveys. The monitoring will record: • Species, abundance and locations in comparison to baseline in consideration of local and regional changes in weeds, pathogens and pest species; and • Photos and GPS coordinates of pest species locations.	Weed monitoring areas as identified on Figure 5-8 as updated by baseline to be completed prior to ground disturbance.	Suitably qualified expert validates no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to accessible adjoining land or compared to baseline as a result of mining operations. (ML6438 Schedule 6 – Clause 24, EML6439 Schedule 6 – Clause 8, MPL146 Schedule 2 – Condition 3.)	Once, prior to relinquishment.	Baseline weed occurrence as Identified in the updated baseline to be completed prior to ground disturbance.		Sustainability Manager	Prior to relinquishment, reported in final closure report.
Vegetation condition monitoring on and off the land which includes weed monitoring as identified in Native Vegetation Section 5.10.							

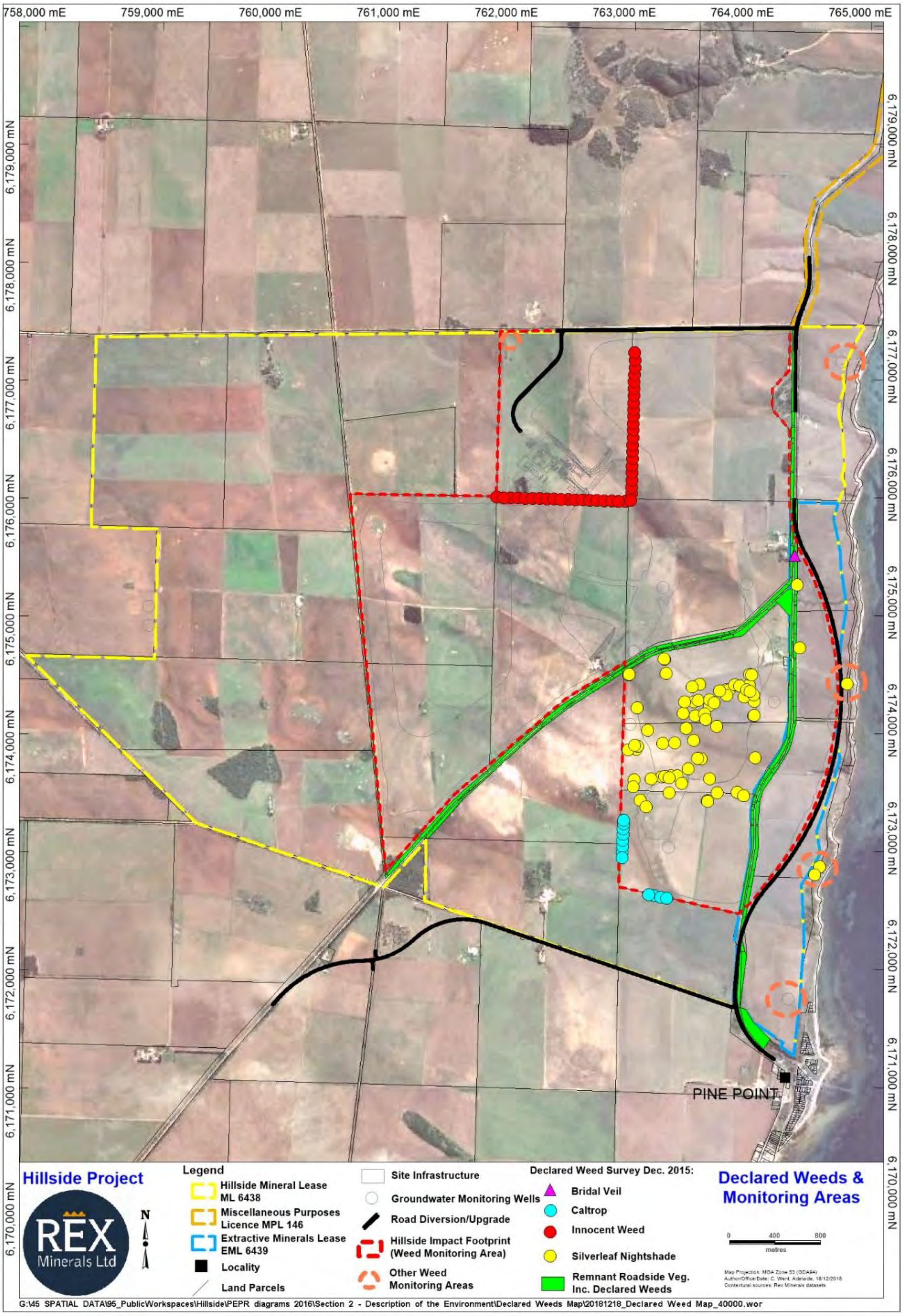

Figure 5-8: Weed monitoring locations (2011 and 2012 baseline)

5.13 Heritage

5.13.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.13.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding heritage includes:

- the *Aboriginal Heritage Act 1988* (SA) is an Act to provide for the protection and preservation of Aboriginal heritage; and
- the *Heritage Places Act 1993* (SA) has provision (Sections 25 and 28) for special protection for sites that may be declared of geological or paleontological significance. Excavating or disturbing such sites, and removing, damaging, destroying or disposing of specimens collected from these sites is prohibited without a permit from the State Heritage Authority.

5.13.3 Heritage Context

The Hillside Project is on freehold land and lies within the traditional territory of the Narungga People. Narungga Nation is the registered claimant for a Native Title claim over the proposed lease areas. There is an Indigenous Land Use Agreement in place with the State, the District Councils of Yorke Peninsula, Copper Coast, Barunga West and Wakefield Regional Council.

The Aboriginal Heritage Collaborative Agreement (Narungga) (refer to MLP Appendix 5.15-D), was established to account for the construction, operation, rehabilitation and mine closure and to ensure agreed heritage management procedures are in place.

The MLP (Section 5.15) describes in detail the existing indigenous heritage sites and extent of heritage surveys that have been undertaken within the ML. There are several sites on Crown Land along the coastal margin close to but not within the boundary of the ML6438.

No non-indigenous cultural heritage sites were identified on ML6438 and the geological monuments, through the MLP 146 process, were identified to be of low risk of being potentially impacted by mining activities.

MPL146 is within the traditional territory of the Narungga People. No heritage survey has been conducted within the MPL146 for the construction of the powerline within the road corridor. A search of the Register of Aboriginal Sites and Objects (the Register) maintained by the Aboriginal Affairs and Reconciliation Division shows one reported Aboriginal Heritage site within the proposed corridor MPL located on the Yorke Highway between James Well Road and Rogues Point Road. The current Narungga Nations Aboriginal Corporation and Rex agreement does not specifically refer to the MPL146 areas however the amended Aboriginal Heritage Collaborative Agreement (Narungga) will include these areas.

The power lines within the Yorke Highway MPL146 corridor will not impact the Horse Gully geological monument however they will need to be placed within geological monument outline area.

5.13.4 Heritage Impacts and Outcomes

Table 5-45 provides the list of potential heritage impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-45: Heritage – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: In construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 27, MPL146 Schedule 6 – Clause 6, EML6439 Schedule 6 – Clause 9.)	
ML-H1	Disturbance or damage to aboriginal objects, sites or remains from mining activities.
MPL-H2	Disturbance and damage of Aboriginal objects, sites and remains during construction of the corridor.
DSD ML- H1	Disturbance or damage of non-Indigenous or heritage sites from mining activity.
DSD MPL- H1	Disturbance or damage of non-Indigenous or heritage sites from mining activity.
DSD MPL- H2	Damage to geological monument Horse Gully.
Applicable Outcome: In construction and operation, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained. (MPL146 Schedule 6 – Cause 7.)	
DSD MPL- H2	Damage to geological monument Horse Gully.

5.13.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential heritage impacts are detailed in Table 5-46: Heritage control and management strategies.

Table 5-47 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-46: Heritage control and management strategies

Source	Heritage Control and Management Strategies	Responsibility	Timing
Applicable Outcome: In construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 27, MPL146 Schedule 6 - Clause 6, EML6439 Schedule 6 – Clause 9.)			
Design/Engineering Controls			
Ground disturbance (C, O, Cl)	Identify zones that are of high sensitivity (for example near the coast, water courses and rock outcrops) and avoid; or undertake surveys and follow established protocols if any objects or items are identified.	Sustainability Manager	Prior to any ground disturbance and ongoing in the event of identification of heritage areas.

Source	Heritage Control and Management Strategies	Responsibility	Timing
Identification of heritage sites (C, O, CI)	Installation of signage for site identification where applicable.	Sustainability Manager	Ongoing in the event of identification of heritage areas.
Identification of heritage sites (C, O, CI)	Restrict vehicle access to site access tracks and project roads as applicable to prevent damage to identified and unknown sites.	Sustainability Manager	Ongoing in the event of identification of heritage areas.
Identification of heritage sites (C, O, CI)	Progressive rehabilitation operations will be designed to avoid known Aboriginal and European heritage sites.	Mining Manager	Ongoing in the event of identification of heritage areas.
Management Controls			
Ground disturbance (C, O, CI)	Implementation of the Aboriginal Heritage Collaborative Agreement (Narungga) including protocol and procedures with the Narungga Nation Aboriginal Corporation for the discovery of Aboriginal sites/relics and in the event a discovery is made, to ensure heritage sites and objects are avoided, salvaged and/or protected or authorisation under the relevant legislation is obtained to disturb the object, site or remains.	Sustainability Manager	Prior to any ground disturbance and ongoing in the event of identification of heritage areas.
Ground disturbance (C, O, CI)	Aboriginal heritage surveys to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed. (ML6438 Schedule 6 – Clause 28.1, MPL146 Schedule 6 – Clause 8.1, EML6439 Schedule 6 – Clause 10.1.)	Sustainability Manager	Prior to any ground disturbance.
Ground disturbance (C, O, CI)	Implementation of an authorisation process prior to disturbance of Aboriginal heritage under the Aboriginal Heritage Act 1988.	Sustainability Manager	Prior to any ground disturbance.
Identification of heritage sites (C, O, CI)	Avoiding disturbance, damage and interference to any Aboriginal site, object or remains within the Land.	Operations Manager	Ongoing in the event of identification of heritage areas.
Identification of heritage sites (C, O, CI)	Reporting requirements for the discovery of sites, objects or remains.	Sustainability Manager	In the event of identification of heritage areas.
Identification of heritage sites (C, O, CI)	Monitoring the status of existing heritage sites and designing avoidance strategies of Aboriginal and European Heritage Sites during mining operations as part of the PEPR Annual Compliance.	Sustainability Manager	Ongoing in the event of identification of heritage areas.
Applicable Outcome: In construction and operation, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained. (MPL146 Schedule 6 – Clause 7.)			
Design/Engineering Controls			
Ground disturbance (C, O, CI)	Identify zones that are of high sensitivity (for example near the coast, water courses and rock outcrops) and avoid; or undertake surveys and follow established protocols if any objects or items are identified.	Sustainability Manager	Prior to any ground disturbance and ongoing in the event of identification of heritage areas.

Source	Heritage Control and Management Strategies	Responsibility	Timing
Ground disturbance (C, O, Cl)	All infrastructure will be located within the road verge in the MPL.	Construction Manager	During construction.
Identification of heritage sites (C, O, Cl)	Installation of signage for site identification where applicable.	Sustainability Manager	Ongoing in the event of identification of heritage areas.
General			
Implement HMP (C, O, Cl, PC)	Implement the Heritage Management Plan (HMP), as reviewed regularly to ensure reflects the requirements of the site and regulatory compliance.	Sustainability Manager	Ongoing.
Training and awareness (C, O, Cl, PC).	Site Inductions for relevant personnel (employees, contractors and subcontractors); to ensure they have an understanding of the Rex obligations under the *Aboriginal Heritage Act 1988* .	Safety/Training advisor	Ongoing prior to individuals commence work.
Training and awareness (C, O, Cl, PC).	A cultural awareness and heritage management training program for relevant personnel (employees, contractors and subcontractors); will facilitate basic cultural awareness in consultation with Narungga Heritage.	Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.13.6 Environmental Measurement Criteria

Heritage outcome measurement criteria and leading indicator criteria are outlined in Table 5-48, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-47: Heritage – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of works
Applicable Outcome: In construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 27, MPL146 Schedule 6 - Clause 6, EML6439 Schedule 6 – Clause 9.)				
Refer to Table 5-46.	Unforeseen heritage items may not be discovered or noticed and be destroyed unintentionally.	Update Government Database search for heritage sites.	Sustainability Manager	Prior to any ground disturbance in previously undisturbed locations throughout the life of mine.
Refer to Table 5-46.	No uncertainties identified.	No future works identified.		

Table 5-48: Heritage – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: In construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained. (ML6438 Schedule 6 – Clause 27, MPL146 Schedule 6 - Clause 6, EML6439 Schedule 6 – Clause 9.)							
Site heritage register identifies known or suspected European and Aboriginal heritage sites, objects or artefacts within the lease Original data will be based on database search results and heritage surveys are they are undertaken. Register will also identify all actions and date actions were undertaken associated with each heritage area.	ML, EML and MPL area	Site heritage register demonstrates that known or suspected European or Aboriginal heritage sites, objects or artefacts within the lease have not been interfered with until appropriate authorisation under the relevant legislation is obtained.	Prior to ground disturbance and ongoing throughout operations and closure	Government database search results and heritage surveys		Sustainability Manager Construction Manager	Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: In In construction and operation, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained. (MPL146 Schedule 6 – Cause 7)							
GPS records and photographic evidence of installed power infrastructure locations measured with a hand-held GPS and camera. (Note that the pipeline is the responsibility of SA Water.)	Horse Gully Geological Monument	The installed location and form of the power infrastructure is 100% within the roadside verge.	Once – following installation of infrastructure	SARIG Geological Monument Layer		Construction Manager	No external reporting. Records held internally and available on request.

5.14 Surface Water

5.14.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

While the ML6438 conditions do not specifically identify surface water outcomes, the Schedule 2 conditions can be interpreted as required outcomes and have been applied as such in this section.

5.14.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Surface Water includes:

- *Environment Protection Act 1993* (SA);
- Environment Protection (Water Quality) Policy 2015 (SA);
- Environment Protection (Waste to Resources) Policy 2010 (SA);
- ANZECC/ARMCANZ (2000) Australian Water Quality Guidelines for Fresh and Marine Waters, Australian and New Zealand Environment and Conservation Council;
- National Health and Medical Research Council (2011) Council Australian Drinking Water Guidelines 6: National Water Quality Management Strategy;
- Environment Protection Authority, Bunding and Spill Management, August 2012;
- Australian Standard 1940-2004: The storage and handling of flammable and combustible liquids;
- Australian Standard 1692-2006: Steel tanks for flammable and combustible liquids; and
- Australian Standard AS/NZS 5667.1:1998: Water quality—Sampling Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.

5.14.3 Surface Water Context

Given its topography, Yorke Peninsula has little drainage definition and most of the surface water catchments terminate in the land-locked, saline lakes that are a common feature of the landscape (NYNRMB 2009). Surface water catchments have been altered significantly by land clearance and agricultural development.

The land within and surrounding the Project area is relatively flat. Slopes in the western section of the proposed ML are generally less than 1.5% and increase to approximately 3% toward the east around existing channelised drainage paths. There are no permanent creeks flowing within the Project area, however, there are several ephemeral drainage lines that cross the site in a general south-easterly direction. Sheet flow is the dominant drainage regime, particularly in the upper reaches of the catchments affecting the Project area. These pre-mining drainage points discharge to Gulf St Vincent.

The relatively flat terrain and high infiltration capacity of the soil within the Project area combined with low average annual precipitation, means that significant run-off is unlikely to be generated, unless under extreme storm conditions. There is no known periodic or sustained inundation, waterlogging or significant inputs of water at the site. Therefore, there are no users of surface water or water dependent ecosystems in the area. Dams are not a significant feature of the region, as piped water is the primary water source for irrigation and livestock.

Surface water runoff around the realigned Yorke Highway will be managed in accordance with the Development Assessment Commission approval.

An Independent Technical Report, the 'Tailings Storage Facility Feasibility Report', was conducted by ATC Williams in August 2016, updated February 2018, to design the 'Surface Water Management System', refer to Appendix 3.4-A. This assessment included:

- Modelling of the Surface Water Management System to manage surface water run-off around the proposed mining operation by the installation of Surface Water Collection Drains, Evaporation/Sedimentation Ponds and the Throoka Creek Diversion to minimise potential impacts from increased sediment, salinity and inundation from surface flows.

In addition, an Independent Technical Report, the 'Hillside Surface Water Assessment Report', was conducted by ATC Williams in August 2017 to observe and characterise the hydrological condition of the catchments and to identify any key infrastructure requirements that would influence the surface water management planning, refer to Appendix 5.14-A. This assessment included the following key points:

- the topography within the catchments consists of gently undulating hills with broad gently sloping gullies with grades less than 1.5%. Steeper slopes and gullies of approximately 3% are prevalent in the area adjacent to the coast, extending inland up to 1km;
- the catchment areas do not contain any permanent creeks or rivers due to the area's low rainfall and the relatively undulating nature of the topography. Historic drainage paths are not visible in the upper reaches of the catchments with the exception of the steeper catchment areas adjacent to the coast;
- light scour was observed in the area within 1 km of the coast indicating historic flows likely exceeding velocities of 1m/s;
- the soil within the catchment areas was reported to be permeable contributing to significant losses; and
- based on discussions with several residents, it is evident that surface water runoff from rain events is rare, again identifying low rainfall and relatively permeable near surface soils.

5.14.4 Surface Water Impacts and Outcomes

Table 5-49 provides the list of potential surface water impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-49: Surface water – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and ensure that (apart from water contained in the pit void); • no surface water contaminated prior to mine completion remains within the Land after mine completion; and • no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)	
ML-SW1	Increased sediment loads in downstream surface water flows causing contamination to the surrounding environment.
ML-SW2	Contamination of surface water run-off with mine hydrocarbons and process chemicals causing contamination to the surrounding environment.
ML-SW3	Increased salinity of surface water run-off resulting in salt scald or salt deposition resulting in the contamination of the environment downstream of the mine site.
ML-SW4	Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment. *(The impact relates to Acid Rock Drainage and is therefore addressed in Section 5.15.)*
ML-SW5	Dissolved copper ions transported by surface water run-off causing contamination to surrounding environment.
ML-W1	Soil or water contamination due to incorrect waste disposal. *(The impact relates to Commercial and Industrial Waste and is therefore addressed in Section 5.20.)*
ML(C)-SW1	Increased sediment loads in downstream water flows causing contamination to surrounding environment.
ML(C)-SW2	Leachates (AMD and dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment. *(The impact relates to Acid Rock Drainage and is therefore addressed in Section 5.15.)*
MPL(C)-SW1	Increased sediment loads in downstream water flows from not properly stabilised land surfaces and/or flooding of adjacent areas from poorly maintained or insufficient drainage.
DSD EML-SW1	Increased sediment loads in downstream water flows as a result of runoff from extractive mineral stockpiles.
Applicable Outcome: The Tenement Holder must ensure that: • Mining operations do not cause inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and • inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion is not caused by mining operations; unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). (ML6438 Schedule 2 – Condition 24, EML6439 Schedule 2 – Condition 1.)	
ML-SW6	Inundation of public roads affecting road users due to changes in the natural surface water flow.
ML-SW7	Inundation of agricultural land affecting surrounding land users due to changes in the natural surface water flow resulting in loss of crop.

Potential Impact Event ID	Potential Impact Event Description
ML-SW8	Inundation of areas of remnant vegetation due to changes in the natural water flow resulting in a reduction in abundance of native flora.
ML-SW9	Disruption of downstream water flows resulting in loss of abundance of native flora.
DSD ML(C)-SW1	Inundation of public roads or agricultural land post-completion due to changes in the natural surface water flow.

5.14.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential surface water impacts are detailed in Table 5-50.

Table 5-51 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-50: Surface water control and management strategies

Source	Surface Water Control and Management Strategies	Responsibility	Timing
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and ensure that (apart from water contained in the pit void); • no surface water contaminated prior to mine completion remains within the Land after mine completion; and no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)			
Design/Engineering Controls			
Site surface water control (C, O, CI)	Surface water will be directed away from cleared areas to decrease erosion and sedimentation potential.	Sustainability Manager	Ongoing.
Contamination control (C, O)	Workshop and plant areas will be concrete lined and sumps and oily water separators will be installed.	Construction Manager	Construction.
Contamination control (C, O, CI)	Dust control utilising saline water will be contained to the internally draining Evaporation / Sedimentation Ponds.	Mining Manager	Ongoing.
Sediment control (C, O, CI)	Progressive landform stabilisation methods and utilisation of energy dissipation where necessary will minimise sediment loads in run-off from disturbed areas and landforms. (ML6438 Schedule 6 – Clause 30.3)	Sustainability Manager	Ongoing.
Site surface water control (C, O, CI)	Surface water collection drains designed to capture run-off from general areas disturbed by mining activities and directed toward one or more evaporation / sedimentation ponds, specifically for on-site water recycling to re-use all available water for processing purposes thus reducing potential for contaminated run-off exiting the Project. The collection drains will encourage opportunistic use of stormwater.	Sustainability Manager	Construction.

Source	Surface Water Control and Management Strategies	Responsibility	Timing
Site surface water control (C, O, Cl. PC)	Surface water evaporation/sedimentation ponds will be constructed, designed to act as terminating structures for detaining all surface water runoff inflow, the purpose being to stop and hold all inflow to allow for evaporation and infiltration as well as controlling and removing silts and/or pollutants. The ponds are designed to have an emergency spillway, a v-notch weir and suitable erosion protection material.	Sustainability Manager	Construction.
Site surface water control (C, O, Cl)	The Return Water Pond (RWP) is designed to retain water from the Process Plant area and the Throoka Creek catchment for a 1:100 AEP storm event in addition to storage of the TSF supernatant water (further discussed in Tailings Storage Facility Section 5.17). All surface water runoff (stormwater) generated in the process plant area will be directed to the RWP for use as process water.	Construction Manager	Construction.
Site surface water control (C, O, Cl)	RSF perimeter drains designed to encapsulate and control surface water around the RSFs (refer to Section 5.14).	Mining Manager	Ongoing as RSFs are constructed.
Site surface water control (C, O, Cl)	TSF and acid rock drainage design, engineering and management controls as detailed in Section 5.17 and Section 5.15 respectively.		
Management Controls			
Contamination control (C, O, Cl)	Hydrocarbon and chemical procedures will include the appropriate use of bunding and storage, of spill kits, the use of hardstand areas where hydrocarbons are transferred and appropriate disposal in accordance with EPA requirements.	Plant Operations Manager (reagents) Mining Manager (hydrocarbons and explosives)	Ongoing.
Waste management (C, O, Cl, PC)	Waste oils and hydrocarbons will be stored in approved containers on-site and removed by an EPA licenced hydrocarbon re-cycling and disposal group.	Sustainability Manager	Ongoing.
Waste management (Cl)	On closure, sewage will be processed through the treatment plant at the processing site and it will remain in place until all other rehabilitation works have been completed. After completion of rehabilitation activities on the Project site, the sewerage treatment plants will be removed.	Closure Manager	Ongoing.
Relinquishment (PC)	The provision of a caveat on the land title post-closure will state that no contamination of surface water will occur after mine completion as a result of mining operations within the Land and any future landowner is required to maintain land on this basis. This will include undertaking any long-term control measures, monitoring and maintenance activities for surface water management (i.e., surface drains, remaining ponds, Throoka Creek diversion drain, RWP spillway) (response to ML6438 Schedule 6 – Clause 30.2).	Legal team	At relinquishment.

Source	Surface Water Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, Cl)	SW-LIC1 – Indicative response actions include: • Compare water quality results to control site to ensure it is not a result of inflow water quality; • Identification of the potential mining-related activity influencing the surface water quality; • Review adequacy of relevant control actions implemented to mitigate the identified cause; • Review weather forecast for potential for additional rainfall events to dictate timing for additional mitigation measures; and • Amend relevant mitigation measures as applicable.	Sustainability Manager	Ongoing throughout construction, operations and closure.
LIC trigger (C, O, Cl)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the Surface Water Management Plan (SWMP) throughout the life of mine.	Sustainability Manager	Ongoing throughout construction, operations and closure.
Exceedance (C, O, Cl)	In situations where an exceedance of surface water qualities downstream of the project area is detected, an investigation will be undertaken to identify the cause and what actions need to be taken to prevent this from recurring.	Sustainability Manager	Ongoing throughout construction, operations and closure.
Applicable Outcome: The Tenement Holder must ensure that: • Mining operations do not cause inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and • inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion is not caused by mining operations; unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). (ML6438 Schedule 2 – Condition 24, EML6439 Schedule 2 – Condition 1.)			
Design/ Engineering Controls			
Site surface water control (C, O, Cl. PC)	'Surface Water Evaporation/Sedimentation Ponds' (sediment traps/evaporation ponds) will be constructed, designed to act as terminating structures for detaining all surface water runoff inflow, the purpose being to stop and hold all inflow to allow for evaporation and infiltration as well as controlling and removing silts and/or pollutants. The ponds are designed to have an emergency spillway, a v-notch weir and suitable erosion protection material.	Sustainability Manager	Construction.
Site surface water control (C, O, Cl)	The RWP is designed to retain water from the Processing Plant area and the Throoka Creek catchment for a 1:100 AEP storm event in addition to storage of the TSF supernatant water (further discussed in Tailings Storage Facility Section 5.17). All surface water run-off (stormwater) generated in the process plant area will be directed to the RWP for use as process water.	Construction Manager	Construction.
Site surface water control (C, O, Cl)	RSF Perimeter Drains are designed to encapsulate and control surface water around the RSFs (refer to Section 5.14).	Mining Manager	Ongoing as RSFs are constructed.

Source	Surface Water Control and Management Strategies	Responsibility	Timing
Closure surface water management (C, PC)	At mine completion, restoration as far as practicable of pre-mining natural flow regimes will be implemented, and water management infrastructure (stormwater, silt control and drainage infrastructure) used during operations will be decommissioned and removed if it is not required to sustain the post-closure hydrological regime.	Closure Manager	Closure.
Management Controls			
Records management (C, O, Cl)	A surface water database will record annual rainfall, infiltration losses to the soil, flow velocities following a storm event and should land use change in the future, roughness values and catchment dimensions will be re-evaluated to assess floodplain levels.	Sustainability Manager	Ongoing.
General			
Implementation of SWMP (C, O, Cl)	Implementation of the Surface Water Management Plan (SWMP), Surface Water Monitoring Program and Surface Water Response Procedures, the contents of which are detailed throughout this PEPR.	Sustainability Manager	Ongoing.
Training and awareness (C, O, Cl, PC)	Site inductions for relevant personnel (employees, contractors and subcontractors); to ensure they understand of the Rex obligations in relation to surface water.	Safety/Training advisor	Ongoing prior to individuals commence work.
Training and awareness (C, O, Cl, PC)	Surface water monitoring training for personnel conducting surface water monitoring.	Training advisor	Ongoing prior to individuals commencing monitoring.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.14.6 Environmental Measurement Criteria

Surface water outcome measurement criteria and leading indicator criteria are outlined in Table 5-51, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-51: Surface water – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and ensure that (apart from water contained in the pit void); • no surface water contaminated prior to mine completion remains within the Land after mine completion; and no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)				
Refer to Table 5-50.	Surface water management system not constructed in accordance with design.	A review by suitably qualified independent expert (hydrology expert) of the Surface Water Management System will be conducted post-construction against the design specifications.	Construction Manager	Post-construction of the surface water management system.
Applicable Outcome: The Tenement Holder must ensure that: • Mining operations do not cause inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and • inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion is not caused by mining operations; unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). (ML6438 Schedule 2 – Condition 24, EML6439 Schedule 2 – Condition 1.)				
Refer to Table 5-50.	Typical roughness values have been used based on previous surface water assessments completed and observations of the catchments. Should land use change in the future, the resulting floodplain levels may also change.	Should land use change in the future, roughness values and catchment dimensions will be re-evaluated to assess floodplain levels.	Sustainability Manager	As and when land use changes on surrounding land over the life of the mine.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-50.	Continuing losses are only applicable to the period for which precipitation is falling. This represents the critical scenario where the soil within the catchments remains saturated for the duration of the model simulation. Therefore, ongoing infiltration losses to the soil have not been modelled.	Rex's environmental monitoring program, which will include the recording of annual rainfall, will be used to modify and improve precipitation estimates after a statistically valid dataset is recorded, 3+ years.	Sustainability Manager	After 3 years of rainfall data on site.
	A 2D modelling approach was used therefore velocity of flows are depth-averaged at a single point.	Flow velocities will be recorded after each storm event by Rex's environmental team.	Sustainability Manager	After every storm event where there is flowing surface water sufficient to sample during construction, operations and closure.
	Calibration of the model is correct without any historical flows. Additionally, rain on grid modelling approach has been adopted for this study which may require review based on temporal patterns.	If there is a rainfall event that results in flow then the model will be re-calibrated with measured inputs such as rainfall, flow rates and velocities in water structures.	Sustainability Manager	Following the collation of surface water monitoring data from at least 2 storm events.
		Appropriate mechanisms to ensure effective transfer of liability and associated responsibility for any maintenance and monitoring of the site and control of any future development post-mine completion will be developed and implemented. (ML6438 Schedule 6 – Clause 30.2.)	Closure Manager	Plan developed during closure period and enacted prior to relinquishment, evidenced by inclusion in the Final Closure Plan.

Table 5-52: Surface water – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land). (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)							
Surface water quality as pH, Total Dissolved Solids (TDS), turbidity and dissolved copper ions sampled in accordance with AS/NZS 5667.1:1998 and samples will be analysed at a NATA accredited laboratory.	Active evaporation /sediment ponds in the Hillside impact footprint and any locations immediately downstream of these locations that are safely accessible where there is flowing or ponding – refer to Figure 5-9.	Monitoring records indicate that no surface water leaving the land is contaminated when compared to upstream surface water quality at the control site (i.e., parameters are within the range of the control site monitoring data) as a result of mining operations (C, O, Cl).	Following a precipitation event that results in surface water ponding or flow throughout construction, operations and closure and post-closure. Every 12 hours in the event of an uncontrolled discharge from any mine-related water storage throughout construction, operations, closure and post-closure.	Upstream control = stilling pond on Throoka Creek. Environment Protection (Water Quality) Policy 2015	**Leading indicator criteria (SW-LIC1)** Dissolved copper ions transported by surface water from samples collected from the evaporation/sedimentation ponds are within 10% of the limits of the range of the control site monitoring data.	Sustainability Manager	Reviewed after every precipitation event that results in surface water monitoring and reported in the Annual Compliance Report.
Visual inspections of storage / distribution areas for waste and hazardous substances for compliance with standards listed in Section 5.14.2.	All storage/distribution areas for waste and hazardous substances within the Hillside impact footprint.	Inspection records indicate that waste and hazardous substances are being managed in accordance with standards listed in Section 5.14.2. (C, O, Cl)	Monthly inspections. Annual review. During construction, operations and closure.	Waste, Hydrocarbon and Reagent Management Procedures.		Sustainability Manager	Reviewed after each inspection and review. Non-compliances to be reported in Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
TSF monitoring presented in Tailings Storage Facility Section 5.17.							
ARD monitoring presented in Acid Rock Drainage Section 5.15.							
Applicable Outcome: Ensure: • no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)							
Surface water quality as pH, Total Dissolved Solids (TDS), turbidity and dissolved copper ions sampled in accordance with AS/NZS 5667.1:1998 and samples will be analysed at a NATA accredited laboratory.	Active evaporation /sediment ponds in the Hillside impact footprint and any locations immediately downstream of these locations that are safely accessible where there is flowing or ponding. Refer to Figure 5-9.	Monitoring records indicate that water quality from Hillside impact footprint landforms is no worse than the receiving environment as defined by monitoring results within the range of the upstream control site (CI, PC). In the event that precipitation events do not occur during the closure and post-closure period, proxy assessment of the potential for surface water contamination will be made through assessment of erosion of landforms as detailed in ARD Section 5.15 and TSF Section 5.17 and soil quality as detailed in Soil and Land Disturbance Section 5.8.	Following a precipitation event that results in surface water ponding or flow throughout construction, operations and closure. Every 12 hours in the event of an uncontrolled discharge as the result of a greater than 1% AEP event throughout construction, operations and closure. During closure and post-closure until such time as results show the required outcome.	Upstream control = stilling pond on Throoka Creek.		Closure Manager	Reviewed after every precipitation event that results in surface water monitoring and reported in the Final Completion Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
TSF monitoring presented in Tailings Storage Facility Section 5.17.							
ARD monitoring presented in Acid Rock Drainage Section 5.15.							
Erosion and soil quality monitoring presented in Soil and Land Disturbance Section 5.8.							
Applicable Outcome: Ensure: • no surface water contaminated prior to mine completion remains within the Land after mine completion. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)							
Visual inspection of the land and review of records of closure works of mine-related water storages by appropriate personnel – monitoring of removal of these storages or the contained contaminated surface water.	All surface water storages on the Hillside Impact footprint that could potentially contain contaminated surface water including the TSF, decant seepage collection pond (DSCP), erosion/ sedimentation ponds and RWP have been emptied of contaminated surface water.	Inspection and closure activity records indicate that no surface water contaminated prior to mine completion remains within the land (PC).	Once, prior to relinquishment.			Closure Manager	Prior to relinquishment and reported in the Final Completion Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that: • Mining operations do not cause inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). (ML6438 Schedule 2 – Condition 24, EML6439 Schedule 2 – Condition 1.)							
Visual inspections for erosion caused by surface water flows or inundation as a result of the Project.	Third-party property and infrastructure adjacent to the lease boundaries as applicable to potential inundation locations. To be inspected from site boundary or closer where access is granted.	Inspection records provide evidence that mining operations do not cause inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) as based on the inundation modelling. (See Figure 5-10.) (C, O, Cl)	Following a precipitation event that causes ponding in the evaporation/ sedimentation ponds throughout construction, operations and closure.	Inundation model – Figure 5-10.		Sustainability Manager	Reviewed after every precipitation event that results in surface water monitoring and reported in the Annual Compliance Report.
Visual inspections for erosion or other stormwater related damage, loss of containment and achievement of design specifications which verify operation in accordance with design.	Evaporation / sedimentation ponds and other surface water collection drains and control areas, including the Throoka Creek diversion, on the Hillside impact footprint.	Inspection records show no loss of containment or ponding that may influence surface inundation of surrounding third-party properties, infrastructure, public roads, agricultural land and remnant vegetation. (C, O, Cl)	Following a precipitation event that causes ponding in the evaporation / sedimentation ponds throughout construction, operations and closure.			Sustainability Manager	Reviewed after every precipitation event that results in surface water monitoring and reported in the Annual Compliance Report.
Traffic accident monitoring for accidents that may be caused by inundation – refer to Traffic Section 5.19.							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that: • inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion is not caused by mining operations; unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation). (ML6438 Schedule 2 – Condition 24, EML6439 Schedule 2 – Condition 1)							
Visual inspections for erosion caused by surface water flows or inundation as a result of the Project.	Third-party property and infrastructure adjacent to the ML and EML lease boundaries as applicable to potential inundation locations. To be inspected from site boundary or closer where access is granted.	Inspection records provide evidence that mining operations do not cause inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion (PC).	Following a precipitation event (should one occur) that causes ponding in the evaporation/ sedimentation ponds throughout the post-closure period.	Inundation model – Figure 5-10.		Closure Manager	Reviewed after every precipitation event that results in surface water monitoring and reported in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Suitably qualified independent expert (hydrology expert) will conduct visual inspections and/ or review of design and construction records for the Closure Surface Water Management System detailed in Section 3.8.7 and Figure 3-102. Review will include: 1. in the event of rainfall, that the closure surface water management system is working as per design and no third-party inundation has occurred; or 2. in the event of no rainfall events resulting in surface water flow, that the closure surface water management system has been constructed to design and design is adequate for no third-party inundation. (Method will depend on occurrence of rainfall event resulting in surface water flow during the post-closure period.)	Closure surface water management system infrastructure locations.	Independent expert verifies that there has been or will be no inundation of third-party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion as a result of the mining operations.	Once, on closure, following completion of the surface water management system and following a rainfall event that caused surface water flow. Should a rainfall event sufficient to cause surface water flows not occur within the post-closure period, this review will be based on design and construction records for the Closure Surface Water Management System.	Inundation model – Figure 5-10. Operational surface water monitoring and visual inspection results. Closure Surface Water Management System design parameters and construction records.		Closure Manager	On closure, following completion of the surface water management system.

Figure 5-9: Surface water monitoring locations

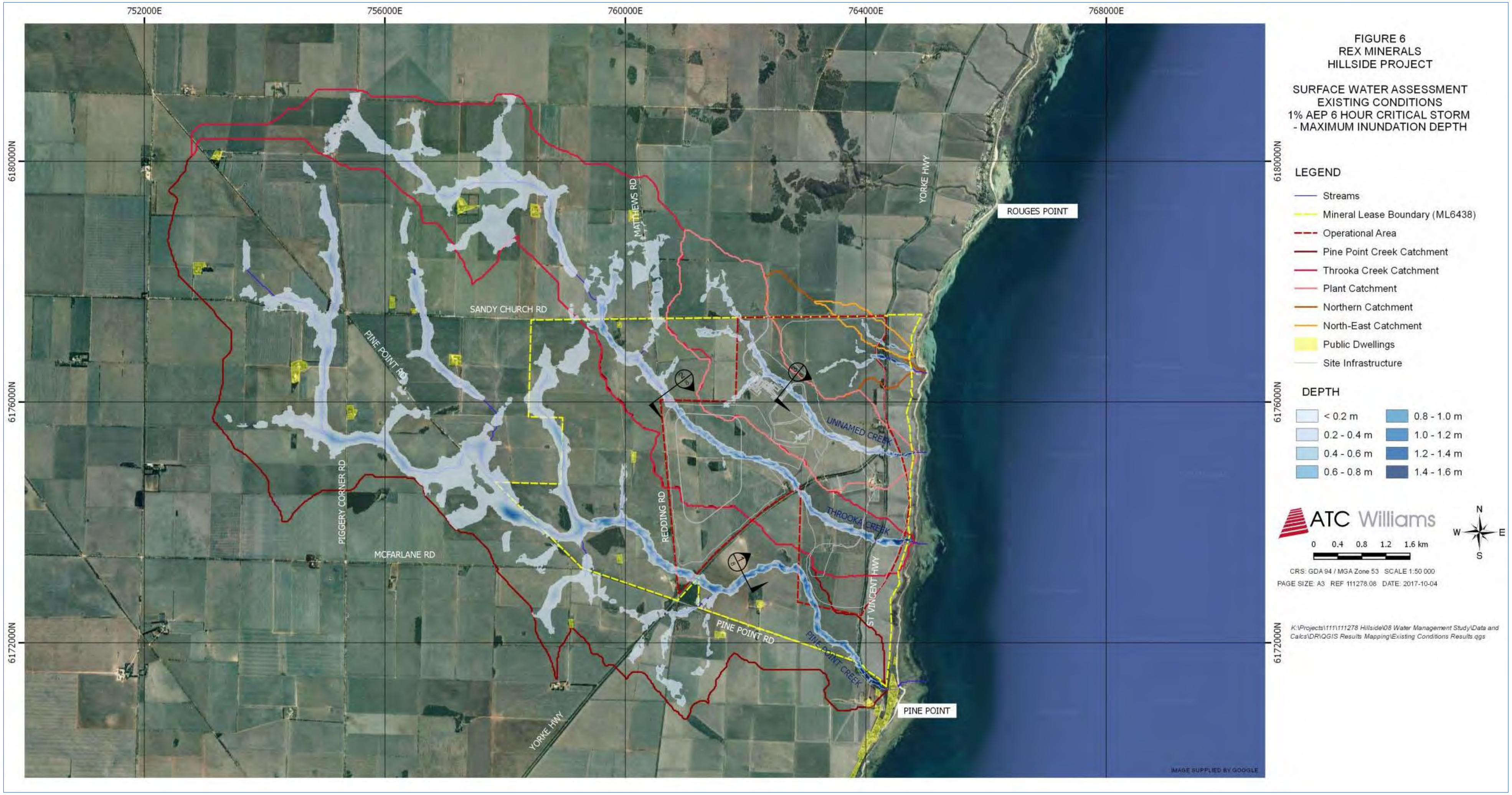

Figure 5-10: Surface water assessment – Existing conditions: 1% AEP six-hour critical storm (inundation)

5.15 Acid Rock Drainage

5.15.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438. There are no acid rock drainage conditions included in EML6439 or MPL146.

While the ML6438 conditions do not specifically identify acid rock drainage outcomes, Schedule 6 does identify strategies for management of potentially acid forming (PAF) rock and these are addressed in this section. Additionally, Schedule 2 contains a surface water condition that is relevant to PAF management and has been included in this section.

This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.15.2 Applicable Legislation and Standards

The following legislation and standards are applicable to potential environmental impacts regarding Acid Rock Drainage includes:

- *Environment Protection Act 1993* (SA);
- Environment Protection (Water Quality) Policy 2015 (SA);
- Environment Protection (Waste to Resources) Policy 2010 (SA);
- ANZECC/ARMCANZ (2000) Australian Water Quality Guidelines for Fresh and Marine Waters, Australian and New Zealand Environment and Conservation Council, October 2000; and
- Global Acid Rock Drainage (GARD) Guide Version 1 2012, International Network for Acid Prevention (INAP).

5.15.3 Acid Rock Drainage Context

Multiple phase assessments of acid rock drainage have been undertaken for the Hillside Project to assist in identifying potential impacts to the surrounding environment from mining activities. Studies include:

- Independent Technical Report , the 'Waste rock characterisation report', conducted by Mining Plus in December 2012, refer to MLP Appendix 5.8-B;
- Independent Technical Report , the 'Tailings storage facility feasibility report', conducted by ATC Williams in August 2016, Appendix 3.4-A; and
- Independent Technical Report , the 'Preliminary acid and metalliferous drainage report', conducted by Earth Systems in August 2017, Appendix 3.6-A.

These comprehensive assessments in addition to the classification of rock types conducted by Rex indicate:

- That only two rock types (of the 17 rock types identified during the initial Mining Plus study) classify as PAF;
- Only 5.2% of total waste rock material is classified as PAF;

- There will be sufficient NAF material available to encapsulate the PAF material and the potential for forming acid mine drainage is very limited, due largely to the relatively high content of carbonate minerals within the Hillside system;
- Leachate test work on samples indicate that the leachate from samples is relatively benign, and that waste rock leachate is unlikely to present a significant risk to the environment;
- The RSFs are designed for an arid climate, where high intensity rainfall events can occur, however overall rainfall is very low. The RSFs consist of integrated design features to reduce or eliminate water percolation, and retention (refer to Section 3.7.1); and
- The tailings have a low net acid production potential (NAPP) value and are unlikely to generate any significant acids if exposed to atmospheric conditions. Additionally, PAF material within the tailings is expected to be dispersed within NAF tailings material (refer to Section 3.7.1).

An 'ARD Expert Review' was conducted by GHD in November 2017 to assess the ARD Management Plan (ARDMP) (the relevant information from which is presented throughout this PEPR section). This review highlighted:

- There are no aspects of the ARDMP which are inadequate such that there remains medium or high residual risk from unknown or unmitigated acid rock drainage or neutral mine drainage generating materials. The strategy is therefore deemed appropriate to effectively manage the ARD risk at the Hillside Project.

Additional information on PAF occurrence for the project is provided in Section 3.7.1.7 and Section 3.7.1.8.

5.15.4 Acid Rock Drainage Impacts and Outcomes

Table 5-53 provides the list of potential acid rock drainage impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-53: Acid rock drainage – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: Ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20.)	
ML-SW4	Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment.
ML(C)-SW2	Leachates (AMD and dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment.
DSD ML-GW1	Impacts caused by the transport of leached copper bearing minerals through RSFs and oxide stockpiles.
Applicable Outcome: No surface water contaminated as a result of mining operations leaves the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4.)	
ML-SW4	Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment.

Potential Impact Event ID	Potential Impact Event Description
ML(C)-SW2	Leachates (AMD and dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment.
Applicable Outcome: No contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4.)	
ML-SW4	Acid mine drainage transported by surface water run-off resulting in contamination to surrounding environment.
ML(C)-SW2	Leachates (AMD and dissolved copper ions) chemically unstable at closure causing contamination to the surrounding environment.

5.15.5 Acid Rock Drainage Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential acid rock drainage impacts are detailed in Table 5-54.

Table 5-55 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-54: Acid rock drainage control and management strategies

Source	Acid Rock Drainage Control and Management Strategies	Responsibility	Timing
Applicable Outcome: Ensure that water seepage from the TSF, waste rock dumps (WRDs) or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20.) Outcome: No surface water contaminated as a result of mining operations leaves the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4.)			
Design/ Engineering Controls			
Classification of PAF/NAF in open pit (O)	Using the classification methodology outlined in Appendix 3.6-A, Rex will determine an ARD classification on a block by block basis during operations within the Hillside Grade Control Model. This classification methodology will utilise grade control analytical data collected from grade control drilling or blast hole drilling and will be run at least on a quarterly basis. All samples will be analysed by the Hillside on-site laboratory for a geochemical suite of elements which will include sulphur and copper completed by inductively coupled plasma-atomic emission spectrometry (ICP). Results from the laboratory will be incorporated into the Hillside Grade Control Block Model to ensure NAF and PAF classification is updated regularly with the block control model. (ML6438 Schedule 6 – Clause 29.1 to 29.8 (surface water.))	Mining Manager	At least quarterly as new data is available throughout mining.
Classification of PAF/NAF (O)	The PAF and NAF boundaries derived from the Hillside Grade Control Model will be incorporated into open pit bench plans and distributed to the short-term mine planning team. (ML6438 Schedule 6 – Clause 29.6 to 29.8 (surface water.))	Mining Manager	At least quarterly as new data is available during operations.

Source	Acid Rock Drainage Control and Management Strategies	Responsibility	Timing
PAF containment – TSF (O)	The NAF portion of the very low grade ore (VLGO) stockpile will be stockpiled separately and processed at the end of the operation to ensure 2m of NAF tailings on the surface of the TSF.	Process Manager	Prior to cessation of processing.
PAF and NMD containment – Stockpiles (O, Cl, PC)	Oxide material and VLGO classified as NMD risk, will be stockpiled on raised constructed clay pads to prevent any percolation of water through the ore stockpiles entering the underlying soil.	Mining Manager	Throughout mining.
Containment of ARD (O, Cl, PC)	In the event of process or management failure all potentially contaminated surface water will report to the open pit via the surface water collection drains.	Process Manager	Throughout operations and closure.
Containment of PAF – general (O)	The truck tracking system will enable tracking of material movement, (i.e., location mined, location stockpiled, location dumped) for validation of the appropriate placement of PAF material in encapsulation areas and on NAF compacted bases.	Mining Manager	Continuously throughout mining.
Containment of ARD (O)	Implementation of the surface water management system to contain runoff from RSFs, refer to Table 5-50 in Surface Water Section 5.14.		
Containment of ARD (O, Cl, PC)	Implementation of the TSF related seepage and closure design controls, refer to Table 5-62 in TSF Section 5.17.		
PAF containment –_RSFs (O, Cl, PC)	Waste Rock classified as PAF will be encapsulated in the RSF areas. The RSF construction will commence with topsoil and sub-soil clearing. Once a sufficient footprint is cleared, waste storage construction will proceed as follows • NAF/ACM with some clay will be paddock dumped and built up in 2m lifts and then dozer levelled and compacted by heavy vehicles to create a layer 4-6m in thickness. The NAF base layer is expected to have a hydraulic conductivity of 10^{-2}m/d K value, based on expected achievable compaction with the NAF materials and methods available during construction. The K value assumes saturated conditions and falling or constant head conditions; • PAF material will be paddock dumped with layers of NAF and ACM within a designated cell to ensure a NAPP value of zero or less (net NAF). Layers will be built up in nominal 2m lifts and then dozer levelled and compacted by heavy vehicle traffic. This meets the requirements of the Global Acid Rock Drainage (GARD) Guide; and • The PAF cell will be bounded by 10–20m of paddock dumped NAF/ACM material on all sides with, at minimum, 4–6m of NAF/ACM material on top. The bounding and capping material (NAF and/or ACM) will also be paddock dumped and built up in 2m lifts and dozer levelled and compacted by heavy vehicle traffic. (ML6438 Schedule 6 – Clause 29.9, 29.10 (surface water).)	Mining Manager	Throughout mining.

Source	Acid Rock Drainage Control and Management Strategies	Responsibility	Timing
PAF containment – RSFs (O, CI, PC)	No identified erodible or sodic material (as defined by Independent Technical Report, the 'Mine rehabilitation (characterisation of overburden) report', was conducted by COOE Pty Ltd in August 2012 to identify soil and land characterisation, refer to MLP Appendix 5.14-B) will be placed immediately underneath subsoil on external batters. (ML6438 Schedule 6 – Clause 29.11 (surface water).)	Mining Manager	Throughout mining.
PAF containment – RSFs (O, CI, PC)	RSFs have been designed to ensure PAF material is not exposed (refer to Section 3.7.1), to minimise erosion potential and to be stable on closure and throughout post-closure. (ML6438 Schedule 6 – Clause 29.12 (surface water).)	Mining Manager	Throughout mining.
PAF containment – RSFs (O, CI, PC)	Progressive rehabilitation of RSFs will be conducted as permitted by the mine plan in order to stabilise RSF slopes and reduce erosion potential.	Mining Manager	Throughout mining.
PAF containment – RSFs (CI, PC)	Earthworks will be undertaken to contour the RSF to ensure long-term stability, requiring no ongoing maintenance post-closure.	Mining Manager	Throughout operations and closure.
PAF containment – RSFs (O, CI, PC)	The closure cover system for the upper layer of the RSF will be a dry (soil) cover as recommended in the cover design investigation unless otherwise agreed with regulators. The cover design investigation found that the proposed cover system when modelled based on a 1m NAF thickness with vegetation, resulted in net infiltration rates approaching zero. The cover design is based on a 'store and release' cover system, which is designed to capture rainfall and store it within the rhizosphere (root zone) for uptake and evapotranspiration by plants without significant movement of moisture into lower layers of the landform.	Mining Manager	During progressive rehabilitation.
Management Controls			
PAF/NAF management (O, CI)	Development and implementation of the following procedures, covering activities identified in the ARD future works and ARD measurement criteria table. • Procedures for regularly updating the block models with new geological and sulphur assay data collected in the course of mine production operations; • Procedures for ensuring PAF and NAF boundaries derived from the block model are included in open pit bench plans; and • Procedures and recording systems for selective mining of the identified PAF and NAF materials and separate placement in accordance with the RSF design.	Mining Manager	Procedure development prior to pre-strip commences. Ongoing implementation throughout operations.
PAF/NAF management (O, CI, PC)	Implementation of the TSF related seepage and closure management controls, refer to Table 5-62 in TSF Section 5.17.		

Source	Acid Rock Drainage Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	ARD-LIC1 – Indicative response actions include: • Compare water quality results to control site to ensure it is not a result of inflow water quality; • Identification of the potential PAF-related area influencing the surface water quality through visual inspection of encapsulations and review of groundwater monitoring data; • Review adequacy of relevant control actions implemented to mitigate the identified cause; • Review weather forecast for potential for additional rainfall events to dictate timing for additional mitigation measures; and • Amend relevant mitigation measures as applicable.	Mining Manager	Ongoing throughout construction, operations and closure.
LIC trigger (C, O, CI)	ARD2-LIC2 and 3 – Indicative response actions include: • Review PAF classifications to ensure they are correct; • Review materials movement database and visually inspect the inappropriately placed material to ensure that it has occurred rather than database / entry error; • Rehandle the PAF material for appropriate placement and record in materials movement database; and • Review processes and procedures to determine where additional checks can be added to minimise the opportunity for erroneous classification or placement to occur.	Mining Manager	Ongoing throughout construction, operations and closure.
LIC trigger (C, O, CI)	The trigger response actions will be reviewed based on their effectiveness and amended with the regular update of the ARDMP throughout the life of mine.	Mining Manager	Ongoing throughout construction, operations and closure.
Applicable Outcome: No surface water contaminated as a result of mining operations leaves the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4.)			
Design/Engineering controls			
Containment of ARD (O)	Implementation of the design and engineering controls as above.		
Containment of ARD (O)	Implementation of the 'Surface water management system' to contain runoff from RSFs (refer to Table 5-50 in Surface Water Section 5.14).		
Management Controls			
Containment of ARD (O)	Implementation of the management controls as above.		

Source	Acid Rock Drainage Control and Management Strategies	Responsibility	Timing
Applicable Outcome: No contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4.)			
Design/ Engineering controls			
PAF containment – RSFs (O, CI, PC)	RSFs have been designed to ensure PAF material is not exposed (refer to Section 3.7.1 and 3.10), to minimise erosion potential and to be stable on closure and throughout post-closure. (ML6438 Schedule 6 – Clause 29.12 (surface water).)	Mining Manager	Throughout mining.
PAF containment – RSFs (CI, PC)	Earthworks will be undertaken to contour the RSF to ensure long-term stability, requiring no ongoing maintenance post-closure.	Mining Manager	Throughout operations and closure.
PAF containment – RSFs (O, CI, PC)	See closure cover system detailed above.	Mining Manager	During progressive rehabilitation.
Containment of ARD (O)	Implementation of the design and engineering controls as above.		
Management Controls			
Containment of ARD (O)	Implementation of the management controls as above.		
General			
Training and awareness (C, O, CI, PC)	Site Inductions for relevant personnel (employees, contractors and subcontractors); to ensure they understand of the Rex obligations in relation to acid rock drainage.	Safety/Training advisor	Ongoing prior to individuals commence work.
Training and awareness (C, O, CI, PC)	Training for personnel conducting block modelling and PAF/NAF identification.	Training advisor	Ongoing prior to individuals commencing monitoring.
Implementation of ARDMP (C, O CI)	Implementation of the ARDMP which will include procedures for the implementation of these controls and the associated monitoring program.	Mining Manager	Ongoing.

Note: (C) = construction (O) = operations (CI) = active closure (PC) = post-closure to relinquishment.

5.15.6 Environmental Measurement Criteria

Acid rock drainage outcome measurement criteria and leading indicator criteria are outlined in Table 5-56, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-55: Acid rock drainage – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	**Current and Future Works List**	**Responsibility**	**Timing of works**
Applicable Outcome: Ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20.)				
Refer to Table 5-54.	The ARD classification is consistent with the available mineralogy and static geochemistry data.	Classification of oxide materials during operations to identify whether a copper cut-off concentration can be used to differentiate between copper leaching and non-copper leaching oxide materials (i.e., the NMD risk posed by oxide materials). This will be conducted via a comprehensive bottle roll test work program. Based on the results of the bottle roll test work, a coper cut-off value for NMD generation in all oxide (non-ore) materials will be devised and added to the classification process in Appendix 3.6-A.	Mining Manager	Testing to start with the commencement of construction.
		Kinetic geochemical test work will be used to update the model throughout the life of the operation to understand the rate of acid production, the duration of oxidation processes, the potential lag time before the onset of acid conditions and the typical leachate chemistry of PAF and NAF materials (i.e., NMD risk). The Acid and Metalliferous Drainage risk classification methodology will be reviewed using this information throughout the life of the mine.	Mining Manager	Kinetic testing to commence at the beginning of construction. Classification method to be reviewed on an annual basis.
	The ARD classification within the block model is a good representation of real-world mining.	As the open pit progresses, analyse RC and/or blast hole samples collected daily during grade control to refine PAF/NAF classification per block.	Mining Manager	At least quarterly during mining.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of works
Refer to Table 5-54.	The ARD classification within the block model is a good representation of real-world mining.	Development and implementation of the following procedures: • procedures for regularly updating the block models with new geological and sulphur assay data collected in the course of mine production operations; • procedures for ensuring PAF and NAF boundaries derived from the block model are included in open pit bench plans; and • procedures and recording systems for selective mining of the identified PAF and NAF materials and separate placement in accordance with the RSF design.	Mining Manager	Procedure development prior to pre-strip commences. Ongoing implementation throughout operations.
	There is sufficient amounts of NAF material to encapsulate any PAF material in the RSFs.	Continue to integrate the grade control model (containing an estimate of PAF and NAF) with the geological model, including statistical validation, to provide further confidence in the definition of PAF boundaries, potential zones of high neutralising capacity and potential geological controls on mineralisation. Note this is already included in the existing Rex block model.	Mining Manager	At least quarterly during mining.
		Review the amount of NAF material expected, based on the block model, and ensure mining schedule reflects the need for the NAF material to encapsulate PAF material.	Mining Manager	Annually throughout the life of mine.
	There is a sufficient amount of clay to line the oxide ore and very low grade ore stockpiles to ensure no contamination from ARD.	Report from the block model the amount of oxide ore and VLGO expected within the EFS mine plan and ensure the mining schedule reflects the need for sufficient clay to line the oxide and VLGO stockpiles.	Mining Manager	Annually throughout the life of mine.
	The amount of soluble copper within the oxide is expected to be confined to those areas with atacamite.	Report from the block model those areas with elevated Cl ratios (>0.07% Cl) and >0.05% Cu, indicating the presence of atacamite. Ensure these materials are not used for general construction or capping purposes anywhere on site.	Mining Manager	Annually throughout the life of mine.

<table>
<tr><th rowspan="2">Control and Management Strategies</th><th colspan="4">Current and Future Works</th></tr>
<tr><th>Uncertainties and Assumptions and Sensitivity to Change of Assumptions</th><th>Current and Future Works List</th><th>Responsibility</th><th>Timing of works</th></tr>
<tr><td rowspan="5">Refer to Table 5-54.</td><td rowspan="3">Erodibility and sodicity of encapsulation and rehabilitation materials.</td><td>Validation of the information presented in the MLP Appendix 5.14-B Mine Rehabilitation (Characterisation of Overburden) on the materials stockpiled for rehabilitation.</td><td>Sustainability Manager</td><td>Prior to commencement of progressive rehabilitation.</td></tr>
<tr><td>Validation of the information presented in the MLP Appendix 5.14-B Mine Rehabilitation (Characterisation of Overburden) on the materials to be used for PAF encapsulation. (ML6438 Schedule 6 – Clause 29.11 (surface water).)</td><td>Mining Manager</td><td>As each lithology is encountered and available for testing and prior to use in encapsulation.</td></tr>
<tr><td colspan="3">Confirmation of topsoil and subsoil characteristics through soil quality and quantity monitoring as detailed in Table 5-24 of Soil and Landform Section 5.8.</td></tr>
<tr><td colspan="4">Groundwater modeling uncertainties related to drainage towards the open pit to capture any potential ARD seepage (see Table 5-59 in Groundwater Section 5.16).</td></tr>
<tr><td colspan="4">TSF permeability values for seepage uncertainties identified in Table 5-63 in TSF Section 5.17.</td></tr>
<tr><td colspan="5">Applicable Outcome: No surface water contaminated as a result of mining operations leaves the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)

No contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)</td></tr>
<tr><td>Refer to Table 5-54 and Table 5-50 in Surface Water Section 5.14.</td><td colspan="4">Surface water uncertainties identified in Table 5-51 in Surface Water Section 5.14.

TSF supernatant design control uncertainties identified in Table 5-63 in TSF Section 5.17.</td></tr>
</table>

Table 5-56: Acid rock drainage – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: Ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20.)							
Surface water pH sampled in accordance with AS/NZS 5667.1:1998 and samples will be analysed at a NATA accredited laboratory (refer to Table 5-52 in Surface Water Section 5.14).	Active evaporation /sediment ponds in the Hillside impact footprint and any locations immediately downstream of these locations that are safely accessible where there is flowing or ponding surface water – refer to Figure 5-9 in Surface Water Section 5.14.	Monitoring records indicate that pH of surface water is within the range of the pH measured upstream of the PAF encapsulation indicating that water seepage from the TSF, WRDs or ore stockpiles will not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (O, CI, PC)	Following a precipitation event that results in surface water ponding or flow, or monthly where there is any leaking or ponding of a structure observed throughout construction, operations and closure. Every 12 hours in the event of an uncontrolled discharge as the result of a greater than 1% AEP event throughout construction, operations and closure.	Upstream control = stilling pond on Throoka Creek.	**Acid rock drainage leading indicator criteria (ARD-LIC1)** Field pH measured with a calibrated pH meter in evaporation/ sedimentation ponds downstream of PAF encapsulation areas is below 6pH units, or, where upstream surface water has a lower pH, is within 10% of the range of the control site.	Sustainability Manager	Reviewed after every precipitation event that results in surface water monitoring.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Surface water sampled in accordance with AS/NZS 5667.1:1998 and samples will be analysed at a NATA accredited laboratory for sulphate and dissolved copper (refer to Table 5-52 in Surface Water Section 5.14).	Active evaporation /sediment ponds in the Hillside impact footprint and any locations immediately downstream of these locations that are safely accessible where there is flowing or ponding surface water (refer to Figure 5-9 in Surface Water Section 5.14).	Monitoring records indicate that sulphate and dissolved copper in surface water is within (or better than) the two standard deviations (or other statistical method as agreed with regulator) of that measured upstream for two consecutive events of the PAF encapsulation indicating that water seepage from the TSF, WRDs or ore stockpiles will not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (O, Cl, PC)	Following a precipitation event that results in surface water ponding or flow, or quarterly where there is any leaking or ponding of a structure observed throughout construction, operations and closure.	Upstream control = stilling pond on Throoka Creek.		Sustainability Manager	Reviewed after every precipitation event that results in surface water monitoring.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Records of separate mining and placement of NAF and PAF in RSFs, in the form of the grade control model and mining records, will be verified by a suitably qualified independent expert as approved by the Director of Mines. (ML6438 Schedule 2 – Condition 23.)	All NAF and PAF mining and placement locations within the Hillside impact footprint. (Refer to Figure 3-67 in Section 3.7.1.)	The independent expert verifies separate mining and placement of NAF and PAF in RSFs, is in accordance with the agreed PAF management controls (refer to Table 5-54) for the Project indicating that water seepage from the TSF, WRDs or ore stockpiles will not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land.	On a three-monthly basis during operations or at a frequency the Director of Mines specifies.	Material movement (truck tracking) database. Grade control block model NAF base permeability results PAF classification method Existing material PAF classification s from static testing.	**Acid rock drainage leading indicator criteria (ARD-LIC2)** Laboratory results of copper, calcium and sulphur measured from available samples (grade control or blast drill samples) using an inductively coupled plasma-atomic emission spectrometry (ICP) at the Hillside on-site laboratory by appropriately trained personnel and subsequent classification of material in PAF and NAF results in appropriate segregation and placement of PAF material; and **Acid rock drainage leading indicator criteria (ARD-LIC3)** Internal reconciliation of PAF classified material in the grade control model and the material movement database conducted by the mining department on a monthly basis indicates some PAF material was potentially misplaced.	Mining Manager	Reported to the Director of Mines within one month of the verification. Update PAF predictions in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Prior to mine completion, an ARD review conducted by a suitably qualified independent expert will be conducted to include a site inspection and review of implementation records for all controls in Table 5-54.	Hillside Project	Results of a review conducted by a suitably qualified independent expert verifies PAF management throughout the life of mine has been conducted in accordance with the ARD controls identified in Table 5-54 and has not resulted in, and is unlikely to result in future, adverse impact on adjacent land uses including, but not limited to, growth of native vegetation and cropping land.	Once, prior to lease relinquishment.	ARD Control Table 5-54.		Closure Manager	Reported in the Final Closure Plan.
Native vegetation condition monitoring as identified in Table 5-34 of Native Vegetation Section 5.10. Surface water quality monitoring, particularly copper levels, in all active evaporation/sediment ponds as identified in Table 5-52 of Surface Water Section 5.14. Groundwater monitoring shallow unconfined aquifer – quality and standing water level as identified in Table 5-64 of TSF Section 5.17. TSF saturation levels below the NAF layer as identified in Table 5-64 of TSF Section 5.17. TSF integrity and freeboard inspections as identified in Table 5-64 of TSF Section 5.17. TSF closure review / capping / cover system as identified in Table 5-64 of TSF Section 5.17. Crop yield on the crop quality monitoring area as identified in Table 5-7 of Air Quality Section 5.4.							
Applicable outcome: No surface water contaminated as a result of mining operations leaves the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)							
Surface water monitoring as above. Surface water quality monitoring, particularly copper levels, in all active evaporation/sediment ponds as identified in Table 5-52 of Surface Water Section 5.14.							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: No contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25, MPL146 Schedule 2 – Condition 4, EML6439 Schedule 2 – Condition 2.)							
ARD review as identified above.							
Suitably qualified independent expert (hydrology expert) will conduct visual inspections and / or review of design and construction records for the Closure Surface Water Management System as identified in Table 5-52 of Surface Water Section 5.14.							

5.16 Groundwater

5.16.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438. There are no relevant groundwater outcomes or conditions in EML6439 and MPL146 now that the concentrate and return water pipelines are no longer part of the project. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.16.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Groundwater includes:

- *Mining Act 1971* (SA);
- *Environment Protection Act 1993* (SA);
- *Natural Resource Management Act 2004* (SA);
- Environment Protection (Water Quality) Policy 2015 (SA);
- ANZECC/ARMCANZ (2000) Australian Water Quality Guidelines for Fresh and Marine Waters, Australian and New Zealand Environment and Conservation Council;
- ARMCANZ/ANZECC (1995) Guidelines for Groundwater Protection in Australia. Agriculture and Resource Management Council of Australia and New Zealand/ Australian and New Zealand Environment and Conservation Council, September 1995;
- Standards Australia AS/NZ, Australian/New Zealand Standard (1998) Water Quality – Sampling Part 11: Guidance on Sampling of Groundwaters (AS/NZS 5667.11:1998); and
- National Water Commission (2012) Minimum Construction Requirements for Water Bores in Australia, Third Edition, National Uniform Drillers Licensing Committee.

5.16.3 Groundwater Context

The Hillside Project is situated above groundwater that occurs in a fractured rock aquifer (basement aquifer) overlain by saprolitic basement rocks and unsaturated cover sediments. The basement aquifer occurs in rocks of highly varied lithologies, with significant north-south trending faults and numerous cross cutting shears, fractures and joint sets and has low transmissivity.

The borefield, located to the northeast of the mining footprint, accesses tidal influenced saline water in the coastal granite fractured basement aquifer. Pump tests from bores in this area indicate that drawdown is relatively small given the transmissivity of the coastal aquifer and the tidal influence (Appendix 2.3-A). Given the dewater available from the pit increases over the life of mine as the pit gets deeper and accesses the fractured rock aquifer, the water demand from the borefield will reduce over the life of mine (refer to Section 3.6.4.1).

The Project will impact groundwater through open pit dewatering and use of saline water as process water sourced from a saline water borefield. Details on the borefield are provided in Section 3.6.4 and the proposed location is presented in Figure 3-60 in Section 3.6.6.2.

Technical reports, the 'Hydrogeological Summary Report' and the 'EFS Groundwater Modelling Report', were conducted by Aldam Geoscience in February 2014 and January 2015 respectively, to assess dewatering rates, cone of depression, salinity for the pit, groundwater quality from potential contaminants entering the aquifer and to model the potentiometric surface (Appendix 2.3-A and 3.4-B). These assessments indicate:

- Baseline water quality data for the basement aquifer underlying the Project is neutral to slightly acidic pH, and contains high concentrations of sodium, chloride and magnesium, but generally low metals concentrations;
- Nutrient concentrations are also low;
- Groundwater quality is saline to hypersaline (TDS results for the bores monitored for groundwater assessments exceed 18,000mg/L TDS) and not suitable for potable or agricultural purposes. In accordance with the South Australian EPA Environment Protection (Water Quality) Policy 2015, water with a salinity exceeding 13,000mg/L TDS has no environmental value;
- There is no significant pumping or other disturbance of groundwater at present on or within several kilometres of the Project. There are no known Groundwater Dependent Ecosystems within or near the Project;
- The coastal granite aquifer, where the borefield is located, showed relatively low drawdown during pump tests, has high transmissivity and is tidally influenced;
- Potentiometric surface was modelled for Years Five, Eight and Thirteen (closure) to be used as the groundwater baseline model to assess the validity of future modelling and the accuracy of predictions with ongoing monitoring; and
- The open pit is a groundwater sink in perpetuity and will capture any unlikely seepage from the RSFs or TSF, hence no impact on existing users.

With respect to closure, the open pit will fill with groundwater once dewatering ceases. The pit lake predictions in terms of water levels and quality are presented in Section 3.10.2.4. The pit lake modelling identifies the pit lake will fill slowly, reaching equilibrium at -27mRL after 550 years. The pit lake modelling also predicted that the water pH is expected to remain around neutral, the water quality reaches the chlorinity typical of seawater by 320 years and the predicted metal concentrations are low and are not predicted to be impactful to fauna that may come into contact with the water.

The SIMEC Ardrossan mine approximately 12km to the north is the nearest known groundwater user, extracting groundwater from Cambrian age dolomites and limestone's, neither of which occur within the Hillside Project Area. A few small vineyards also occur on Yorke Peninsula, but not within 10km of the Project. These are unlikely to use groundwater due to salinity exceeding vine salt tolerances. Pastoral bores are outside the radius of influence and are located in disconnected aquifers.

5.16.4 Groundwater Impacts and Outcomes

Table 5-57 provides the list of potential groundwater impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-57: Groundwater – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: No adverse change to the environmental values of water within the basement fractured rock aquifer outside of the land as a result of mining operations. (ML6438 Schedule 2 – Condition 26.) No adverse change to the environmental values of water within the basement fractured rock aquifer within or outside of the land as a result of mining operations after mine completion. (ML6438 Schedule 2 – Condition 27.)	
ML-GW2	Contamination of groundwater from in pit and underground mining activities.
ML-TSF7	Discharge of contaminated water by excessive leakage through the embankment or base. (The impact relates to the TSF and is therefore addressed in Section 5.17.)
ML(C)-GW3	Reduction in groundwater quality for potential future users.
ML(C)-GW1	Offsite movement of contaminated groundwater from the mine.
DSD ML-GW2	Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post-completion. (The impact relates to the TSF and is therefore addressed in Section 5.17.)
ML(C)-GW1	Offsite movement of contaminated groundwater from the mine.
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20 (soil and land disturbance.))	
DSD ML-GW1	Impacts caused by the transport of leached copper bearing minerals through RSFs and oxide stockpiles. (The impact relates to the acid rock drainage and is therefore addressed in Section 5.15.)
DSD ML-GW2	Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post-completion. (The impact relates to the TSF and is therefore addressed in Section 5.17.)

5.16.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential groundwater impacts are presented below.

Groundwater control and management strategies are detailed in Table 5-58. These control strategies are proactive and will be conducted based on review of monitoring data or as part of normal operations.

Table 5-59 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-58: Groundwater control and management strategies

Source	Groundwater Control and Management Strategies	Responsibility	Timing
Applicable Outcome: No adverse change to the environmental values of water within the basement fractured rock aquifer outside of the land as a result of mining operations. (ML6438 Schedule 2 – Condition 26.) No adverse change to the environmental values of water within the basement fractured rock aquifer within or outside of the land as a result of mining operations after mine completion. (ML6438 Schedule 2 – Condition 27.)			
Design/Engineering Controls			
Hydrocarbon and reagent storage and handling (C, O, Cl)	Fuel, oil, explosives and reagents will be stored in accordance with EPA and Australian Standards and storage areas will be kept in good operating condition during operations.	Plant Operations Manager (reagents) Mining Manager (fuel and explosives)	Ongoing.
Management Controls			
Open pit dewatering (O)	Discharge rates and volumes from open pit dewatering will be recorded. This information will be used to calibrate and update the groundwater model as per Table 5-59.	Mining Manager	From commencement of dewatering.
Hydrocarbon and reagent storage and handling (C, O, Cl)	Standard Operating Procedures will be developed and implemented for hydrocarbon and reagent management procedures including spill and emergency response and clean up requirements.	Plant Operations Manager (reagents) Mining Manager (fuel and explosives)	Development prior to Construction commences. Implementation ongoing.
Hydrocarbon and reagent storage and handling (C, O, Cl)	Site inductions and training for relevant personnel (employees, contractors and subcontractors); will include the correct usage of hydrocarbon and reagent storage, spill response and clean-up protocols.	Relevant area manager Safety/Training advisor	Ongoing prior to individuals commence work.
Hydrocarbon and reagent storage and handling (C, O, Cl)	Regular inspections and housekeeping of areas will occur to ensure integrity of bunded and spill containment areas, housekeeping and correct use of hydrocarbon and reagent storage and distribution areas.	Plant Operations Manager (reagents) Mining Manager (fuel and explosives)	Ongoing.
Groundwater bores (C, O, Cl)	Backfilling, drill hole abandonment and decommissioned water wells will be rehabilitated in accordance with Regulator requirements (National Water Commission 2012).	Geology Manager	As bore holes are available for closure.

Source	Groundwater Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20 (soil and land disturbance.)			
Design/Engineering Controls			
TSF (C, O, CI, PC)	The TSF has been designed to minimise the potential for seepage (see Table 5-62 in TSF Section 5.17).	Plant Operations Manager	Construction of TSF base.
RSFs (O, CI, PC)	Encapsulation of Potentially Acid Forming (PAF) material has been designed to minimise the potential for seepage, refer to Table 5-54 for acid rock drainage controls in Acid Rock Drainage Section 5.15.	Mining Manager	During operations.
Management Controls			
TSF (C, O, CI, PC)	The TSF will be constructed, operated and closed in accordance with design to minimise the potential for seepage (see Table 5-62 in TSF Section 5.17).	Plant Operations Manager	Construction of TSF base.
RSFs (O, CI, PC)	PAF material will be encapsulated in the RSF with appropriate separation from base, top and sides of external surface, refer to Table 5-54 for acid rock drainage controls in Acid Rock Drainage Section 5.15.	Mining Manager	During operations.
General			
Implement GWMP (C, O, CI, PC)	Implement the relevant procedures to manage groundwater impacts, including the operational Groundwater Management Plan (GWMP), as reviewed regularly to ensure reflects the requirements of the site and regulatory compliance.	Sustainability Manager	Ongoing.
Training and awareness (C, O, CI, PC)	Site Inductions and Training for relevant personnel (employees, contractors and subcontractors) will be conducted on groundwater related requirements.	Safety/Training advisor	Ongoing prior to individuals commence work.
Groundwater management (O, CI)	The Tenement Holder must obtain approval from the Director of Mines in writing before developing any: • Groundwater cut-off wellfield; or • Managed aquifer reinjection (MAR) (ML6438 Schedule 2 – Condition 28.) Approval from DEW would also be required for these activities.	Sustainability Manager	Prior to the unlikely event of installing groundwater cut off well or MAR.

Note: (C) = construction (O) = operations (CI) = active closure (PC) = post-closure to relinquishment.

Table 5-59: Groundwater – Environmental outcomes, uncertainties and future works

<table>
<tr><th rowspan="2">Control and Management Strategies</th><th colspan="4">Current and Future Works</th></tr>
<tr><th>Uncertainties and Assumptions and Sensitivity to Change of Assumptions</th><th>Current and Future Works List</th><th>Responsibility</th><th>Timing of Works</th></tr>
<tr><td colspan="5">Applicable Outcome: No adverse change to the environmental values of water within the basement fractured rock aquifer outside of the land as a result of mining operations. (ML6438 Schedule 2 – Condition 26.)

No adverse change to the environmental values of water within the basement fractured rock aquifer within or outside of the land as a result of mining operations after mine completion. (ML6438 Schedule 2 – Condition 27.)</td></tr>
<tr><td rowspan="2">Refer to Table 5-58.</td><td>Baseline groundwater quality data are representative.</td><td>Install additional basement and shallow monitoring bores in locations suitable to collect potential impact data and collect groundwater quality and depth to water data for the basement fractured rock aquifer and assess against baseline data. (ML6438 Schedule 6 – Clause 35.1.)

Groundwater monitoring wells for baseline and ongoing monitoring will be of sufficient density and depth to detect movement of groundwater installed to monitor the following (refer to Figure 5-11):

• Basement aquifer (basement) – situated adjacent to lease boundaries and the open pit perimeter.
Unconfined aquifer (shallow) – situated adjacent to the primary operational areas (monitoring of which is presented in Table 5-63 in TSF Section 5.17).

Post-construction, monitoring will commence in terms of depth to groundwater and quality parameters as presented in Table 5-64 in TSF Section 5.17 and Table 5-15.</td><td>Sustainability Manager</td><td>Prior to commencement of construction to allow for over 12 months of data to be collected prior to the commencement of dewatering.</td></tr>
<tr><td>Data for compliance and leading indicator criteria assessment.</td><td>Establish compliance groundwater monitoring bores adjacent to the lease boundaries that are of sufficient density and depth to detect movement of groundwater off the Land

(ML6438 Schedule 6 – Clause 35.2.)

Locations of groundwater monitoring wells as above and Figure 5-11.</td><td>Sustainability Manager</td><td>Prior to commencement of construction.</td></tr>
</table>

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-58.	Calibrated groundwater model.	Calibrate the groundwater model against the baseline data and continue to calibrate against collected groundwater monitoring throughout the life of mine. Calibration will include review of the following model aspects: a) Redefine the model grid to assess interaction between key stresses - pit dewatering, TSF and pond seepage, and groundwater extraction for site water supply from the coastal borefield. The latter two influences are currently not captured in the model. Provide sufficient distance to ensure boundaries are not too close to stresses such as pit dewatering or groundwater pumping. b) Compare the difference between modelled and observed water elevations. d) Address recommendations made by the Groundwater Science (Appendix 7.3-H) independent hydrogeological review. e) Revise model report as a standalone document using the structure suggested in the (industry-standard) Australian Groundwater Modelling Guidelines. The report must reflect the current hydrogeological understanding and include all details around model construction, calibration, uncertainty and projections. f) Revise the language to reflect the model class and uncertainty associated with future projections. g) Revise water balance if modelled dewatering rates and volumes are significantly different from measured (operational) rates (e.g., Section 3.5.8 and 3.6.4). h) Include site configuration and tenement boundaries on all figures.	Sustainability Manager	Initial calibrated groundwater model within one year (12 months) of approval of the PEPR. (ML6438 Schedule 6 – Clause 33.) Second calibrated transient groundwater model 12 months after the commencement of open pit dewatering. Ongoing calibration of the transient groundwater model from the secondary model using data obtained from groundwater monitoring when monitoring data suggests there is deviation from the model predictions. (ML6438 Schedule 6 – Clause 32 and 34.)

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-58.		The potential period of time required post-closure for the groundwater to trend towards achievement of closure measurement criteria will be determined through operational monitoring and ongoing calibration of the transient groundwater model.	Sustainability Manager	Ongoing throughout the life of mine with more definitive prediction of the post-closure period prior to closure.
		Collect pit dewatering volumes measured by via the flow meter on flow into the DSPC from the pit dewatering (L/s) and time of pumping as input to the groundwater model calibration.	Plant Operations Manager	Daily during dewatering.
		Monitoring of the shallow unconfined aquifer and monitoring depth to water in both the shallow and fractured rock basement aquifer as detailed in Table 5-64 in TSF Section 5.17.		

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-58.	Monitoring data for inclusion in and validation of the groundwater model.	Groundwater quality of the fractured rock aquifer will be monitored in the following manner: *Monitoring parameters and method* • Salinity = Electrical conductivity (EC), total dissolved solids (TDS); • Acidity = pH; and • Metals (dissolved) = copper. Note that monitoring in the shallow aquifer covers more analytes as the shallow aquifer will be where any seepage from the TSF or RSFs reports (refer to TSF Section 5.17 and Acid Rock Drainage Section 5.15). Should the shallow aquifer monitoring identify any mine-related impact, the copper and pH monitoring in the basement aquifer will ensure that any connection is identified (noting that no connection is expected due to the impermeable layer between the two aquifers). Samples will be taken in accordance with AS/NZS 5667.11:1998 and sent to NATA accredited laboratory for analysis. *Monitoring locations* Groundwater monitoring wells locations (Figure 5-11) – Basement aquifer = 11 locations B1 to B11. *Frequency* Biannual (every 6 months) during construction, operations, closure and post-closure. *Review* Data will be reviewed annually and detailed data review will occur with each model update.	Sustainability Manager	Ongoing from commissioning of the monitoring bores, throughout construction, operations, closure and post-closure.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-58.	Baseline groundwater levels will decline as predicted by the model.	Monitoring: • Record depth to water in all active monitoring wells as per Table 5-64 in TSF Section 5.17; and • Record pump hours, pit floor level elevations pumping rates and volumes of water pumped from the pit. Modelling • Simulate pumping from the pit floor on a bench (by bench) basis of the discharge rates recorded to plot the cone of depression due to dewatering; and • Obtain field monitoring data of water elevations from monitoring wells and compare with the groundwater model results.	Sustainability Manager	Monitoring as for Table 5-15; and Modelling as per Calibrated groundwater model timing above.
	TSF seepage, if any, will be directed toward the pit.	Monitoring • Measure water levels from the unconfined aquifer monitoring wells as per the requirements in Table 5-64 in TSF Section 5.17; • If water is present in wells down gradient of the TSF, monitor water levels as per the requirements in Table 5-64 in TSF Section 5.17; • If water is present, plot water elevation contours and confirm the flow path, (which should be shown to be toward the pit); and • Verify TSF (and other) seepage will be captured by the pit.	Sustainability Manager	Monitoring as for Table 5-15; and Modelling as per Calibrated groundwater model timing above.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: No adverse change to the environmental values of water within the basement fractured rock aquifer within or outside of the land as a result of mining operations after mine completion (PC). (ML6438 Schedule 2 – No. 27.)				
Refer to Table 5-58.	Calibrated groundwater model for closure, including pit lake geochemistry.	Calibration of the groundwater model, inclusive of pit lake geochemistry and hydrogeological models. against baseline data and continue to calibrate against collected monitoring data throughout the life of mine. (ML6438 Schedule 6 – Clause 34.)	Sustainability Manager	At least 2 years prior to planned mine closure to ensure closure designs are applicable to the potential groundwater-related closure risks.
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 –Clause 20. (soil and land disturbance))				
Refer to Table 5-58.	Refer to TSF Section 5.17 and ARD Section 5.15.			

5.16.6 Environmental Measurement Criteria

Groundwater outcome measurement criteria and leading indicator criteria are outlined in Table 5-60, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period. This review will be based on the availability of required infrastructure such as power sources which may no longer exist after closure, and in consideration of the monitoring results during operations.

Table 5-60: Groundwater – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: No adverse change to the environmental values of water within the basement fractured rock aquifer outside of the land as a result of mining operations. (ML6438 Schedule 2 – Condition 26.)							
Groundwater quality data and depth monitoring is reviewed by a suitably qualified independent, expert (hydrogeology expert) during groundwater model reviews to confirm environmental values are not adversely affected by mining operations.	Groundwater monitoring wells locations (refer to Figure 5-11). Basement aquifer = 11 locations B1 to B11.	Independent expert assessment conducted at the same time as groundwater model updates, verifies no adverse change to environmental values of the water within the basement fractured rock aquifer outside of the land as a result of the mining operations.	As per future works timing: During second calibrated transient groundwater model 12 months after the commencement of open pit dewatering During ongoing calibration of the transient groundwater model when monitoring data suggests there is deviation from the model predictions. (ML6438 Schedule 6 – Clause 32 & 34.)	Environment Protection (Water Quality) Policy 2015 (SA). Groundwater monitoring data (basement aquifer and shallow aquifer.		Sustainability Manager	Report in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: No adverse change to the environmental values of water within the basement fractured rock aquifer within or outside of the land as a result of mining operations after mine completion. (ML6438 Schedule 2 – Condition 27.)							
Verification by a suitably qualified independent, expert (hydrogeology expert) that life of mine monitoring of groundwater quality and to confirm groundwater flow across the ML is towards and will continue to be towards the open pit (measured through depth to groundwater as per Table 5-64 in TSF Section 5.17) demonstrates achievement of the outcomes, assessed through review of life of mine monitoring data.	Groundwater monitoring wells locations (refer to Figure 5-11). Basement aquifer = 11 locations B1 to B11.	Independent expert assessment demonstrates achievement of the outcomes: no adverse change to environmental values of the water within the basement fractured rock aquifer outside of the land as a result of the mining operations after mining completion. (ML6438 Schedule 2 – Condition 27)	Prior to relinquishment	Control data = LOM groundwater depth and quality monitoring data unconfined and basement aquifer. TSF monitoring in the unconfined aquifer as identified in Table 5-64 in TSF Section 5.17. Acid rock drainage monitoring in the unconfined aquifer as identified in Table 5-56 in Acid Rock Drainage Section 5.15.		Sustainability Manager	In final closure report for relinquishment.
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20 (soil and land disturbance.))							
Refer to Table 5-64 in TSF Section 5.17 and Table 5-56 in ARD Section 5.15.							

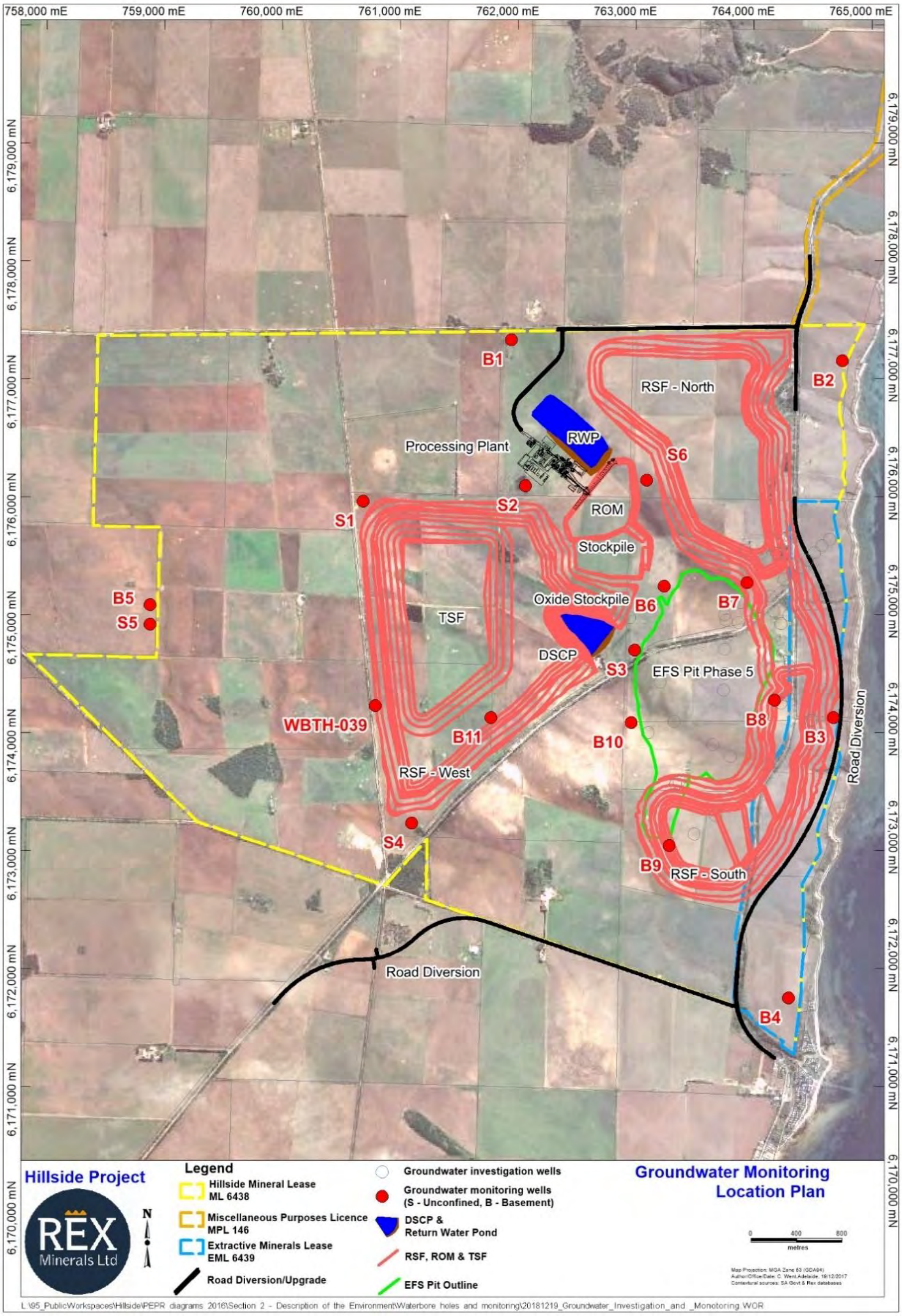

Figure 5-11: Groundwater monitoring locations

5.17 Tailings Storage Facility

5.17.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438. There are no tailings storage facility (TSF) related conditions in EML6439 or MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

In Schedule 6 of ML6438, the TSF related outcomes are included as specific Soil and Land Disturbance. Given the TSF is a large mining landform that requires specific management over the life of the mine, TSF related outcomes are addressed in this standalone section. The potential impacts, controls and monitoring relate to a number of environmental aspects such as air quality, surface water and groundwater. To avoid repetition, where possible, details relevant to the TSF are all captured in this section and cross referenced in other relevant sections.

5.17.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts relevant to the TSF includes:

- Environmental Protection (Water Quality) Policy 2015 (SA);
- Primary Industries and Resources South Australia and Environment Protection Authority (SA) 2009. Guidelines for Miners: Tailings and Tailing Storage Facilities in South Australia, Minerals Regulatory Guidelines MG5, Mineral Resources Group. v1.4. Department of Primary Industries and Resources South Australia, Adelaide;
- South Australian Environment Protection Authority, 'Guidelines for Miners: Tailings and Tailing Storage Facilities in South Australia', Minerals Regulatory Guideline (MG5), September 2009;
- Australian National Committee on Large Dams (ANCOLD), 'Guideline on Tailings Dams – Planning, Design, Construction, Operation and Closure', May 2012;
- ANCOLD (August 1998), 'Guidelines for Design of Dams for Earthquakes', Australian National Committee on Large Dams;
- Australian Standard (AS1170.4-2007), 'Structural Design Action Part 4: Earthquake Actions in Australia', October 2007; and
- ANZECC/ARMCANZ (2000) Australian Water Quality Guidelines for Fresh and Marine Waters, Australian and New Zealand Environment and Conservation Council.

5.17.3 Tailings Storage Facility Context

The proposed tailings storage facility (TSF) and associated dewatering and seepage collection pond (DSCP) and return water pond (RWP) will be located within the ML, predominantly on freehold agricultural cropping and livestock farming land.

An Independent Technical Report, the ‘Tailings Storage Facility Feasibility Level Design Report (Alternative 1 TSF – Copper Production Only)’, was conducted by ATC Williams in August 2016, revised February 2018, to design the TSF, DSCP and RWP in accordance with EPA SA Guidelines and ANCOLD Guidelines, necessary under applicable legislation and standards, refer to Appendix 3.4-A. This modelling comprises:

- the TSF is a paddock type tailings storage facility, comprising a single cell, using a ring main and spigot tailings delivery pipe network;
- a 100ML DSCP has been allowed for in the design, to efficiently remove potential seepage from the TSF via an underdrainage system and to accommodate the open pit dewatering requirements;
- a 160ML RWP has been allowed for in the design to alleviate the build-up of supernatant water on the TSF, pumped to the RWP via the TSF decant system;
- an estimated annual average of 5.73Mtpa tailings will be produced and deposited into the TSF;
- before being pumped to the TSF, the tailings are thickened to a density of ~58% solids;
- tailings thickener underflow is pumped to the TSF, while the tailings thickener overflow gravitates to the process water pond;
- the confining TSF embankment will primarily be constructed of mine waste rock/rockfill with two x 6.7m wide zones of controlled compacted waste rock and then a controlled lower permeability facing of selective waste material, constructed on the upstream side of the embankment;
- an additional 6.7m wide sand filter zone will be constructed in the area of the decant pond in order to collect potential seepage through the low permeability zone and protect against the risk of piping. This filter zone will be connected to the underdrainage system and potential seepage will be removed from the TSF area and stored in the DSCP;
- the overall final TSF embankment height will be constructed to RL 125.5m (approximately, average height being 45.5m and a maximum of 65.5m height above the grounds surface);
- the inclusion of an Emergency Spillway will isolate the overtopping risk and be directed towards the Throoka Creek diversion drainl and associated diversion pond therefore containing any potential spill within the ML boundary;
- maximum allowable volume of water contained within the TSF is presented in Table 1 of Appendix 3.6-B TSF Operating Manual;
- the maximum dimensions of the supernatant pond are consistent with the method of sub-aerial deposition of tailings; and
- in addition to the TSF decant water, water from the DSCP will be pumped to the RWP for reuse in the Processing Plant.

Tailings characterisation test work was undertaken in 2013 by ALS, Perth which showed the tailings material to be low plasticity sandy silty clay, with a P80 of 90μm, a particle specific gravity of 2.92 and geochemically benign and non-acid forming.

To verify this work, a tailings classification approach was assessed by Rex in 2017 to assess the acid rock drainage potential of the tailings on a block by block basis. This work determined that 25% of the tailings are classified as PAF, however this material has an ANC/MPA ratio of 2.16 indicating the there is a high probability that all of the tailings material will remain circum-neutral in pH (Australian Government 2016, AMIRA 2002).

PAF material within the tailings will be dispersed with NAF material. Prior to mine completion, Rex is proposing to place 1m of NAF only tailings over the entire TSF to create an oxygen consuming layer which will prevent any acid generation from occurring within tailings post-closure.

Section 3.7.1.21 discusses the seepage analysis results for the TSF with results presented in Table 3-56.

5.17.4 Tailings Storage Facility Impacts and Outcomes

Table 5-61 provides the list of potential tailings storage facility impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-61: Tailings storage facility – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must ensure that the TSF final landform will be physically stable post-mine completion (ML6438 Schedule 6 – Clause 19 (soil and land disturbance).)	
ML(C)-TSF1	Discharge of solids after closure as possible as a result of failure or excess deformation of the embankment.
ML(C)-TSF3	Discharge of solids after closure as a result of a breach of the capping layer (which may include erosion damage at the spillway).
ML-TSF2	Discharge of solids from failure or excess deformation of the embankment (embankment instability and settlement) causing damage to third-party property, reduced public safety and flooding of surrounding low-lying areas.
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20 (soil and land disturbance).)	
ML-TSF7	Discharge of contaminated water by excessive leakage through the embankment or base.
DSD ML-GW2 / DSD ML – S1	Mounding of seepage under the TSF impacting on adjoining land uses (including cropping) during operations and post-completion.
ML(C)-TSF4	Discharge of water after closure from leakage through the capping layer, embankment and base (affecting fauna).

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25 (surface water).)	
ML-TSF5	Discharge of contaminated water from tailings or return water pipeline failure.
ML-TSF6	Discharge of contaminated water by discharge through the spillway.
iML-TSe7	Discharge of contaminated water by excessive leakage through the embankment or base.
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15 (soil and land disturbance).)	
ML-TSF1	Discharge of solids from the tailings due to pipeline failure.
ML-TSF3	Discharge of solids from overfilling or overtopping of the storage.
ML-TSF4	Discharge of solids due to flooding.
ML(C)-TSF2	Discharge of solids after closure as a result of flooding.
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 23 (native fauna).)	
ML-TSF8	Fauna injuries and/or deaths from interactions with the TSF (including fauna entrapment and bird death).
Applicable Outcome: Various air quality related outcomes. (ML6438 Schedule 6 – Clause 1, 2 and 3 (air quality).)	
ML-A1 to A7	Discharge of TSF solids as dust emissions.** *(The impact relates to Air quality and is therefore addressed in Section 5.4.)*

5.17.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential TSF impacts are detailed in Table 5-62.

Table 5-63 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-62: Tailings storage facility control and management strategies

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must ensure that the TSF final landform will be physically stable post-mine completion. (ML6438 Schedule 6 – Clause 19 (soil and land disturbance).)			
Design/Engineering Controls			
TSF design and construction (C, O)	The TSF has been designed by an independent expert (Appendix 3.4-A) in accordance with the most recent ANCOLD Guidelines (ML6438 Schedule 6 – Clause 21.1) and includes: • paddock type tailings storage with ring main and spigot tailings deliver pipe network; • tailings slurry control; • continual rotation of the tailings deposition spigots; • reduced ponded supernatant water; • TSF decant system; • 100ML DSCP to remove potential seepage; and • 910ML RWP to hold supernatant water pumped via the TSF decant system.	Construction Manager (Construction) Plant Operations Manager (operations)	During construction and ongoing for operations.
TSF design (O, CI)	Flattening of the downstream slope during rehabilitation to prevent rill erosion.	Plant Operations Manager	As embankments are available for progressive rehabilitation.
TSF design and construction (C, O)	The TSF will be armoured with inert waste rock.	Plant Operations Manager	Progressively during operations as TSF is lifted.
Management Controls			
TSF design and construction (C, O)	The construction and operation of the TSF will be verified by a suitably qualified independent expert (geotechnical engineering expert) as per details in Table 5-64. (ML6438 Schedule 2 – Condition 22.)	Plant Operations Manager	As per details in Table 5-64.
TSF design and construction (C, O)	Implementation of construction procedures that include quality control arrangements for all stages of construction of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping (ML6438 Schedule 6 – Clause 21.7.)	Construction Manager (Construction) Plant Operations Manager (operations)	Developed prior to construction, implemented during construction and ongoing throughout operations.

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	TSF-LIC1 indicative response actions include: • review recent process and TSF activities and meteorological conditions to identify a potential cause; • identification of the potential activity influencing the results; • review adequacy of relevant control actions implemented to mitigate the identified cause and identify suitable amendments where required; • obtain expert advice as and when necessary; • assess the requirement to shut down the plant or reduce throughput; • implement additional control measures as applicable (ensure review weather forecast for potential for additional rainfall events to dictate timing for additional mitigation measures). Control measures may be temporary or permanent and may include: – assess the requirement to shut down the plant or reduce throughput; – closure of roads or restricted access near the TSF; and – deployment of pumps to move tailings water to other portions of the TSF or to the underdrain pump, which can pump to the process water dam; • document trigger investigation and response; and • amend Tailings Operating Manual and personnel training as applicable.	Plant Operation Manager	Ongoing throughout operations.

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20 (soil and land disturbance).)			
Design/Engineering controls			
TSF design and construction (C, O)	The design of the TSF to manage water seepage includes: • TSF embankment designed and constructed using the downstream construction method. (ML6438 Schedule 2 – Condition 21.); • The base and sides of the TSF will be lined using reworked in situ clays to minimise excessive seepage; • Rework and compact materials will be used to construct the base and sides of the TSF to achieve a permeability value of 1 x 10^{-9}m/s; • Covering of the constructed clay base with a thin layer of waste rock or sand to prevent cracking of the base layer during construction prior to commissioning; • The TSF emergency spillway has been designed to overflow to the Throoka Creek diversion drainl and pond, which would ultimately overflow to the open pit; • Installation of the DSCP downstream of the TSF to be discharged into the RWP, both of which are clay lined; • Installation of supernatant ponds to collect all surface run-off and bleed water to be pumped back into the RWP; • Outlining minimum freeboard height and maximum supernatant pond dimensions for the TSF will be managed by monitoring information obtained from Supernatant Pond Guideline Markers; • The TSF has been designed to ensure minimum 600mm freeboard and accounts for 1-in-100-year rainfall. (ML6438 Schedule 6 – Clause 21.2.); • TSF design incorporates barriers to prevent seepage below the tailings and drainage for effective removal of leachate on top of seepage barrier; and • Bunding of pipelines to contain spills.	Construction Manager (Construction) Plant Operations Manager (operations)	During construction and ongoing for operations.
TSF operation (O)	Tailings entering the TSF will be thickened to minimise the amount of water requiring reclaiming from the TSF (target solids content between the range of 54% to 59% at discharge). (ML6438 Schedule 6 – Clause 21.4, 21.5.)	Plant Operations Manager	Ongoing through operations.
TSF operation (O)	Implementation of the Leak Detection Program for monitoring potential seepage through the base and walls of the TSF per details in Table 5-64. (ML6438 Schedule 6 – Clause 21.8.)	Plant Operations Manager	Ongoing through operations.
TSF design and closure (O, Cl)	A store release cover will be installed on the TSF to prevent ingress of surface water to penetrate the cover system, unless a more technically suitable closure option is identified and agreed with regulators prior to closure (see below).	Closure Manager	At closure.

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
TSF design and closure (O, Cl)	TSF closure system designed to minimise ongoing ingress of rainwater. The closure system design will be confirmed by trials prior to closure. (ML6438 Schedule 6 – Clause 21.9.)	Sustainability Manager	Trials to commence at least 7 years prior to TSF closure (i.e., to commence no later than Year 6).
TSF design and closure (O, Cl)	On project completion, a suitably qualified independent expert (mine waste closure system expert) will be commissioned to certify that the TSF closure is in accordance with the design and plans adopted for the TSF.	Closure Manager	Prior to relinquishment.
Management Controls			
TSF operation (O)	Daily inspections show no integrity issues with TSF embankment as defined by minor areas (<1m^2) of embankment wall slumping and/or damp spots less than 10m^{2,} ground staining coloured, no evidence of tailings fines.	Plant Operations Manager	Daily during operations.
TSF operation (O)	Daily inspections show no integrity issues with TSF pipeline.	Plant Operations Manager	Daily during operations.
TSF operation (O)	Monthly monitoring of saturation levels measured as static pressure by Vibrating Wire Piezometers show seepage is below 50% of dry baseline conditions throughout operations. Where this is exceeded the following will be implemented: • Review recent process and TSF activities and meteorological conditions to identify a potential cause; • Identification of the potential activity influencing the results; and • Review adequacy of relevant control actions implemented to mitigate the identified cause and identify suitable amendments where required.	Plant Operations Manager	Monthly during operations.

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	TSF2-4-LIC indicative response actions include: • Review recent process and TSF activities and meteorological conditions to identify a potential cause; • Review surrounding land use activities for any changes which may have influenced monitoring data; • Review surface water and groundwater monitoring data for extent of potential impact; • Assess the requirement to shut down the plant or reduce throughput; • Review adequacy of relevant control actions implemented to mitigate the identified cause and identify suitable amendments where required; • Obtain expert advice as and when necessary; • Implement additional control measures as applicable (ensure review weather forecast for potential for additional rainfall events to dictate timing for additional mitigation measures). Control measures may be temporary or permanent and may include: – assess the requirement to shut down the plant or reduce throughput; – implementation of seepage control bores to pump groundwater; and – deployment of pumps to move tailings water to other portions of the TSF or to the underdrain pump, which can pump to the process water dam; • Document trigger investigation and response; and • Amend Tailings Operating Manual and personnel training as applicable.	Plant Operation Manager	Ongoing throughout operations.
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25 (surface water.))			
Design/Engineering Controls			
TSF design and closure (O, CI)	Design of the TSF emergency spillway on closure to ensure overflow reports the Throoka Creek diversion drain and pond, which ultimately would report to the open pit. (amended from ML6438 Schedule 6 – Clause 29.1.)	Closure Manager	During closure of the TSF.

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
Management Controls			
Refer to surface water controls as identified in Table 5-50 of Surface Water Section 5.14.			
Refer to ARD controls as identified in Table 5-54 of ARD Section 5.15.			
TSF operation (O)	Deposition of tailings to the TSF will cease if the limits for freeboard height or supernatant pond dimensions specified are exceeded, and notification to the Director of Mines will be within 24 hours of becoming aware of it. (ML6438 Schedule 6 – Clause 21.3.) Pond dimensions include its location, depth and level below the embankment crest.	Plant Operations Manager	In the event that freeboard heights or supernatant pond dimensions are exceeded.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	TSF5-LIC – indicative response actions include: • review recent process and TSF activities and meteorological conditions to identify a potential cause; • assess the requirement to shut down the plant or reduce throughput; • review adequacy of relevant control actions implemented to mitigate the identified cause and identify suitable amendments where required; • obtain expert advice as and when necessary; • implement additional control measures as applicable (ensure review weather forecast for potential for additional rainfall events to dictate timing for additional mitigation measures). Control measures may be temporary or permanent and may include: – assess the requirement to shut down the plant or reduce throughput; – implementation of seepage control bores to pump groundwater; and – deployment of pumps to move tailings water to other portions of the TSF or to the underdrain pump, which can pump to the process water dam; • document trigger investigation and response; and • amend Tailings Operating Manual and personnel training as applicable.	Plant Operation Manager	Ongoing throughout operations.
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15 (soil and land disturbance.))			
Refer to above TSF stability controls.			
Refer to Soil and Land Disturbance controls as identified in Table 5-23 of Soil and Land Disturbance Section 5.8.			

Source	Tailings Storage Facility Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 23 (native fauna.))			
Management Controls			
Refer to Native Fauna controls as identified in Table 5-36 of Native Fauna Section 5.11.			
TSF design and closure (C, O, CI)	The Hillside Project site will be fenced, inclusive of the TSF, to minimise entry of fauna.	Construction Manager to construct	Constructed during construction.
TSF operation (C, O, CI)	Opportunistic fauna sightings in or around the TSF will be recorded and regularly reviewed. Where there is potential for this occurrence of fauna in a specific area to result in injury or death, the fauna will be removed from the area. Should this continue to occur, further controls will be investigated.	Plant Operation Manager	Ongoing throughout operations.
Applicable Outcome: Various air quality related outcomes (ML6438 Schedule 6 – Clause 1, 2 and 3 (air quality.))			
Refer to Air Quality controls as identified in Table 5-4 of Air Quality Section 5.4.			
General			
Implementation of appropriate management plans (C, O, CI)	Implementation of the Tailings Storage Facility Operating Manual (Appendix 3.6-B) which includes quality control arrangements for all stages of operation of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping.	Plant Operations Manager	Ongoing.
Training and awareness (C, O, CI, PC)	Site Inductions for relevant personnel (employees, contractors and subcontractors); to ensure they understand of the Rex obligations in relation to the TSF.	Safety/Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (CI) = active closure (PC) = post-closure to relinquishment.

5.17.6 Environmental Measurement Criteria

Tailings storage facility outcome measurement criteria and leading indicator criteria are outlined in Table 5-64, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-63: Tailings storage facility – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-62.		Ensure the dam within 150m of the LOM TSF embankment design toe is relocated or a waiver is in place prior to the LOM design toe being constructed.	Operations Manager	Prior to commencement of the second TSF lift (nominally Year 2).
Applicable Outcome: The Tenement Holder must ensure that the TSF final landform will be physically stable post-mine completion. (ML6438 Schedule 6 – Clause 19 (soil and land disturbance.))				
Refer to Table 5-62.	Assumes that EFS design, based on ANCOLD guidelines, is sufficient and appropriate for this TSF design and can be implemented on site during construction and subsequent lifts. Failure of TSF design and safety controls and procedures could lead to injury or fatality to a member of the public (i.e., environmental outcome not being met).	Verification of construction and operation of TSF to EFS design parameters by a suitably qualified independent expert (geotechnical engineering expert) approved by the Director of Mines: • for the initial stage of TSF construction; • for each subsequent stage of TSF construction including the closure system; and • on an annual basis for operations or at a frequency specified by the Director of Mines. (ML6438 Schedule 2 – Condition 22.)	Plant Operations Manager	• Post-construction, prior to placement of tailings. • Post-construction of each subsequent lift. • Post-implementation of the closure system. • Annually during operations or at frequency otherwise specified by the Director of Mines.
	Stability of TSF for any future land use.	Evidence of a legal encumbrance stating that the area of the TSF and a buffer on all sides will be protected in perpetuity from development that may affect the integrity of the TSF design and will be provided to the regulators at the time of lease relinquishment.	Closure Manager	At project completion, i.e., relinquishment.

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20.)				
Refer to Table 5-62.		Development of construction procedures that include quality control arrangements for all stages of construction of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping. (ML6438 Schedule 6 – Clause 21.7.)	Plant Operations Manager	Developed prior to the commencement of construction of the TSF.
	Permeability values of the compacted base of the TSF - A conservative permeability value of 1 x 10^{-8}m/s (in-situ material) and 1 x 10^{-9}m/s (reworked and compacted material) was utilised for the low permeability material for all seepage analyses. The in-situ and re-compacted clay permeability values obtained from laboratory tests were in the order of 1.2 x 10^{-10}m/s to 3.15 x 10^{-10}m/s.	Verification of TSF base compaction achievement by a suitably qualified independent expert (geotechnical engineering expert.)	Plant Operations Manager	Post-construction, prior to operations.
		Dry static pressure will be measured from piezometers installed in the TSF during the second lift as a baseline for further operational monitoring comparison.	Plant Operations Manager	Post-construction of second lift, prior to operations.
	Tailing densities are based on samples derived from the pilot plant tests. Tailing density variation depends on many factors such as fluctuations in feed rate, flocculent behaviour, ore type, and operational decisions.	Monitoring of tailings slurry density as per Table 5-64.		

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Refer to Table 5-62.	Ability to recreate pre-mining land uses on the TSF.	• 'Field Trials' of alternative closure options for the TSF to determine the optimum closure based on actual waste rock and the relevant potential post-closure land uses identified at the time, inclusive of the base case post-closure land use as identified in this PEPR; • Development of a detailed field trial program which identifies: – the parameters to be trialed based on the likely closure requirements at the time (to be informed by operational monitoring of TSF behavior and ongoing stakeholder consultation); – the monitoring requirements for the duration of the trial; and – the criteria that will be used to assess the success of the trial; and • The results of the trial will then inform the detailed closure monitoring plan relevant to the TSF cover, i.e., what parameters will provide the relevant information on the effectiveness of the TSF closure.	Sustainability Manager	Field trial program to be agreed with regulators prior to commencement. Trials to commence at least 7 years prior to TSF closure (i.e., to commence no later than Year 6).

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25.)				
Refer to Table 5-62.	Design and controls are sufficient for potential supernatant and rainfall events to avoid overtopping or any potentially contaminated runoff from the TSF and associated water storages.	Refer to Surface Water uncertainties, assumptions and current and future work relating to calibration of the surface water model post-storm events as identified in Table 5-51 of Surface Water Section 5.14.		
	Refer to Acid Rock Drainage uncertainties, assumptions and current and future work as identified in Table 5-55 of Acid Rock Drainage Section 5.15.			
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15.)				
Refer to Table 5-62.	Refer to Soil and Land Disturbance uncertainties, assumptions and current and future work as identified in Table 5-24 of Soil and Land Disturbance Section 5.8.			
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 23.)				
Refer to Table 5-62.	Refer to Native Fauna uncertainties, assumptions and current and future work as identified in Table 5-37 of Native Fauna Section 5.11.			
Applicable Outcome: Various air quality related outcomes. (ML6438 Schedule 6 – Clause 1, 2 and 3.)				
Refer to Table 5-62	Refer to Air Quality uncertainties, assumptions and current and future works as identified in Table 5-5 of Air Quality Section 5.4.			

Table 5-64: Tailings storage facility – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that the TSF final landform will be physically stable post-mine completion. (ML6438 Schedule 6 – Clause 19.)							
Long term geotechnical stability assessment of the TSF by a suitably qualified independent expert (Geotechnical Engineering Expert) – refer to this measurement in Table 5-25 of Soil and Land Disturbance Section 5.8 prior to relinquishment.							
Verification of construction and operation of TSF to PEPR EFS design parameters (as defined in Section 3.7.1 and relevant TSF appendices) and TSF integrity assessed by a suitably qualified independent expert (geotechnical engineering expert) .	TSF	Verification assessment identifies that the TSF has been constructed and operated to PEPR EFS design as detailed Section 3.7.1 and relevant TSF design appendices.	Annual during operations, closure and post-closure to relinquishment; and Once within 12 months of relinquishment (to be addressed through the geotechnical stability assessment above).	TSF design – as detailed Section 3.7.1 and relevant TSF appendices. Density specifications range of 54–59% averaged daily.	**Leading Indicator Criteria (TSF-LIC1)** Tailings density log records indicate that the tailings density is consistently within the required density specifications of range of 54% to 59% averaged daily. (ML6438 Schedule 6 – Clause 21.6.)	Plant Operations Manager	Daily destiny review. Annual review. Reported to regulator annually.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land. (ML6438 Schedule 6 – Clause 20.)							
Refer to verification of TSF construction and operation and integrity inspections above.							
Depth to water using electronic dip meters.	Groundwater monitoring wells locations (Figure 5-11 in Groundwater Section 5.16). Basement aquifer = 11 locations B1 to B11. Unconfined aquifer = 5 locations S1 to S5.	Depth to water in the basement and unconfined aquifer identifies groundwater levels are not increasing more than two standard deviations of monitoring location mean (or other statistical method as agreed with regulators) conditions for six consecutive events as a result of mining activity.	Monthly during construction, operations and closure.	Control site location S5.	**Leading Indicator Criteria (TSF2-LIC)** Monthly groundwater depth in the basement and unconfined aquifer differs more than 2 standard deviations from the monitoring location mean (or other statistical method as agreed with regulators) conditions for four consecutive events. **Leading Indicator Criteria (TSF3-LIC)** Monthly groundwater depth monitoring in the unconfined aquifer identifies water in the shallow aquifer that is not present in the control site (Monitoring location S5).	Sustainability Manager	Quarterly review. Report in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Groundwater quality: Unconfined (shallow) aquifer: • cations and anions = calcium, magnesium, potassium, sodium, sulphate, chloride, nitrate; • salinity = electrical conductivity (EC), total dissolved solids (TDS); • acidity = pH; • hydrocarbons = total recoverable hydrocarbons (TRH) – site S2 (processing plant) only; • metals (total) = arsenic, boron, copper, iron, manganese, zinc, uranium; and • metals (dissolved) = copper. Samples will be taken in accordance with AS/NZS 5667.11:1998 and sent to NATA accredited laboratory for analysis.	Groundwater monitoring wells locations (Figure 5-11 in Groundwater Section 5.16) Unconfined aquifer = 5 locations S1 to S5	Groundwater quality in the unconfined aquifer is not changing for any particular parameter more than two standard deviations of the control mean (or other statistical method as agreed with regulators) conditions for three consecutive events as a result of seepage.	Biannual (every 6 months) during construction, operations, closure and post-closure.	Control site = S5.	**Leading Indicator Criteria (TSF4-LIC)** Monthly groundwater quality monitoring in the unconfined aquifer identifies water in the shallow aquifer that is not present in the control site (Monitoring location S5).	Sustainability Manager	Annual review. Report in the Annual Compliance Report.
Refer to Groundwater measurement criteria for groundwater quality in the basement aquifer as identified in Table 5-60 and Figure 5-11 in Groundwater Section 5.16.							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
A suitably qualified Independent expert verification of the final TSF closure design against the relevant reports and sections of leading practice guidance including (but not limited to) MEND, GARD and ANCOLD.	TSF	Provision of a report prepared by a suitably qualified independent expert that verifies the final TSF closure design has been developed in accordance with leading practice guidance including (but not limited to) MEND, GARD and ANCOLD.	Once – after completion of the detailed TSF closure design.	Closure trials – see future works.		Sustainability Manager	Reviewed during closure trials and reported to regulators prior to closure of the TSF.
A suitably qualified independent expert will assess that the TSF has been constructed and closed in accordance with the TSF design (included final closure design) and the results of life of mine monitoring of groundwater and surface water for potential impact to surrounding land uses as a result of seepage from the TSF.	TSF and surrounding land uses. Groundwater and surface water monitoring results.	Post-TSF closure, a suitably qualified Independent expert verifies that: 1. the TSF has been closed in accordance with the final TSF closure design; and 2. seepage has not had an adverse impact and is not predicted to have an adverse impact on adjacent land uses including, but not limited to, growth of native vegetation and cropping land.	Once - On completion of cover implementation.	The design and plans adopted for the TSF design Sections 3.6.1 and 3.9.2 and associated TSF appendices or as otherwise approved. Groundwater and surface water monitoring results.		Closure Manager	Prior to relinquish-ment.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: Ensure no surface water contaminated as a result of mining operations leaves the Land; and no contamination of surface water occurs after mine completion as a result of mining operations within the Land. (ML6438 Schedule 2 – Condition 25.)							
Daily visual inspections of the supernatant pond limits and freeboard against the guideline markers and monthly mine survey of the supernatant pond area, RL and freeboard by operational personnel.	Supernatant pond on the operational TSF	Records of monitoring show supernatant pond operation is consistently within the design requirements (Table 1 of Appendix 3.6-B TSF Operating Manual) for: 1. maximum pond area 2. maximum pond RL and 3. maximum freeboard (ML6438 Schedule 6 – Clause 21.2.)	Daily for visual inspections. Monthly survey. During operation of the TSF.	Supernatant maximum pond area specifications. Freeboard specifications.	**Leading Indicator Criteria (LIC–TSF5)** Daily visual inspection of the supernatant pond relative to the guideline markers shows that: • pond area and pond RL is within 15% of the design maximum limit as defined by Table 1 of Appendix 3.6-B TSF Operating Manual.	Plant Operations Manager	Daily review, reporting in Annual Compliance Report. Reporting within 24 hours if maximum pond area is exceeded.
A suitably qualified independent expert will assess the TSF closure design and life of mine monitoring of groundwater and surface water for potential impact to surrounding land uses – see above.							
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained. (ML6438 Schedule 6 – Clause 15.)							
Refer to Soil and Land Disturbance measurement criteria (soil quality, crop yield, copper levels in grain and geotechnical stability assessment of TSF) as identified in Table 5-25 of Soil and Land Disturbance Section 5.8.							

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control/ Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations or mine related activities that could reasonably have been prevented. (ML6438 Schedule 6 – Clause 23.)							
Refer to Native Fauna measurement criteria (injuries and death) as identified in Table 5-38 of Native Fauna Section 5.11.							
Applicable Outcome: Various air quality related outcomes. (ML6438 Schedule 6 – Clause 1, 2 and 3.)							
Refer to Air Quality measurement criteria as identified in Table 5-6 of Air Quality Section 5.4.							

5.18 Public Safety

5.18.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. There are no public safety second schedule conditions.

This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.18.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Public Safety includes:

- *Mines and Works Inspection Act 1920* (SA);
- *Work Health and Safety Act 2012* (SA);
- *Fire and Emergency Services Act 2005* (SA);
- *Public and Environmental Health Act 1987* (SA);
- Australian Standard AS1725-2003; Chain-link fabric security fences and gates; and
- Australian Standard 2187.2-2006; Explosives – storage and use.

5.18.3 Public Safety Context

The Hillside Project is located approximately 12 km from the town of Ardrossan and located within 4km of three coastal townships: James Well, Pine Point and Rogues Point. The Project is well supported with sealed national and regional highway systems, which connect the operation to the capital city of Adelaide, South Australia.

As the mining operation is located in proximity to residential areas and public roads, public safety must be considered. Public safety receptors are those individuals who are impacted by the Project or who legally or illegally gain or attempt to gain access to the Project.

Rex will ensure the safety of staff, contractors and visitors of the Project through safety inductions, personal protective equipment and safe work procedures as part of the *Work Health and Safety Act 2012* (SA).

5.18.4 Public Safety Impacts and Outcomes

Table 5-65 provides the list of potential public safety impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-65: Public safety – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented. (ML6438 Schedule 6 – Clause 36, EML6439 Schedule 6 –Clause 12, MPL146 Schedule 6 – Clause 10.)	
ML-P1	Injury and/or death to members of the public through unauthorised access to the mine site.
Applicable Outcome: The Tenement Holder must demonstrate that post-mine completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable. (ML6438 Schedule 6 – Clause 38, MPL146 Schedule 6 – Clause 12)	
ML(C)-P1	Injury and/or death to members of the public due to access vertical openings and unsafe final landforms.
MPL(C)-P1	Unsafe final landforms resulting in reduced public safety.
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37, EML6439 Schedule 6 - Clause 13, MPL146 Schedule 6 – Clause 11.)	
ML-P2	Reduced public safety from fire originating from the mine site resulting in injury and/or death.
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)	
ML-T3	Increased vehicle accidents as a result of dragout carried from mine entrances onto public roads. *(The impact relates to the Traffic and is therefore addressed in Section 5.19)*.
ML-T4	Increased traffic incidents at the mine entry and exit point from the Project. *(The impact relates to the Traffic and is therefore addressed in Section 5.19).*
ML-BV3	Reduced public safety and damage to third-party property (including stock) from fly rock. *(The impact relates to the Blasting and is therefore addressed in Section 5.6.)*
MPL-T1	Increased traffic accidents while entering and leaving the Yorke Highway during pipeline and infrastructure construction. *(The impact relates to the Traffic and is therefore addressed in Section 5.19.)*
MPL-T5	Reduced public safety and increased vehicle accidents as a result of dragout onto public roads. *(The impact relates to the Traffic and is therefore addressed in Section 5.19.)*

5.18.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential public safety impacts are detailed in Table 5-66.

Table 5-67 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-66: Public safety control and management strategies

Source	Public Safety Control and Management Strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented. (ML6438 Schedule 6 – Clause 36, EML6439 Schedule 6 - Clause 12, MPL146 Schedule 6 – Clause 10.)			
Design/Engineering strategies			
Access prevention (C, O, CI)	The Hillside Project will be enclosed by a security fence which complies with AS1725-2003 standards.	Construction Manager Safety and Security Manager	During construction. Maintained throughout operations.
Access prevention (C, O, CI)	Boom gates to be installed at the main entrance whilst all other perimeter gates within the security fence will be locked.	Construction Manager Safety and Security Manager	During construction. Maintained throughout operations.
Access prevention (C, O, CI)	Installation of on-site security including cameras and fence controls.	Construction Manager Safety and Security Manager	During construction. Maintained throughout operations.
Access prevention (C, O, CI)	Installation of adequate warning signs.	Construction Manager Safety and Security Manager	During construction. Maintained throughout operations.
Access prevention (C, O, CI)	The surface explosives magazine will be fenced in a separate security compound and restricted to authorised persons holding appropriate permits.	Construction Manager Safety and Security Manager	During construction. Maintained throughout operations
Management Strategies			
Access prevention (C, O, CI)	Regular inspections and maintenance procedures of on-site security, fences and signage.	Safety and Security Manager	Ongoing.
Access prevention (C, O, CI)	Regular internal auditing of the magazine records and use of non-cuttable keys to ensure all explosives, detonators and magazine keys are accounted for.	Safety and Security Manager	Ongoing.
Access prevention (C, O, CI)	Regular inspections of areas or infrastructure/structures posing safety risks and the provision of timely notification of mining progress to the community and any other relevant stakeholders where management of public safety is required.	Safety and Security Manager	Ongoing.
Access prevention (C, O, CI)	Maintain good community relations to assist in reporting of trespassers.	Operations Manager	Ongoing.

Source	Public Safety Control and Management Strategies	Responsibility	Timing
Access prevention (C, O, CI)	Investigation of any unauthorised public access onto operational areas, resulting in review of control measures as applicable.	Safety and Security Manager	Ongoing.
Reporting (C, O, CI, PC)	Reporting notifiable incidents in accordance with Safework SA.	Safety and Security Manager	Ongoing.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC Trigger (C, O, CI)	PS-LIC1 – Indicative response actions include: • Identify potential reasons for integrity issues with boundary gates, fences and site access infrastructure; • Investigate public access methods and reasons; • Update controls as applicable to the outcomes of the above; and • Conduct public awareness campaigns in local communities as applicable.	Safety and Security Manager	In response to trigger events.
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37, EML6439 Schedule 6 - Clause 13, MPL146 Schedule 6 – Clause 11.)			
Management Strategies			
Fire management (C, O, CI)	A fire management system with a trained mine firefighting team will be implemented to protect mine equipment, personnel and property. Mock emergency response drills will also be conducted.	Safety and Security Manager	Ongoing.
Fire management (C, O, CI)	Fire breaks around the site will be maintained.	Safety and Security Manager	Ongoing.
Fire management (C, O, CI)	Onsite water trucks and earthmoving equipment will be setup so they can respond to surface fires as required.	Safety and Security Manager	Ongoing.
Fire management (C, O, CI)	Dry chemical fire extinguishers will be fitted to all vehicles.	Safety and Security Manager	Ongoing.
Fire management (C, O, CI)	Implement hot work procedures.	Safety and Security Manager	Ongoing.
Fire management (C, O, CI)	Regular slashing and if required, control burns in conjunction with the CFS.	Safety and Security Manager	Ongoing.

Source	Public Safety Control and Management Strategies	Responsibility	Timing
Fire management (C, O, Cl)	Regular fire hazard inspections.	Safety and Security Manager	Ongoing.
Fire management (C, O, Cl)	Regular maintenance of fire equipment.	Safety and Security Manager	Ongoing.
Fire management (C, O, Cl)	Designated smoking areas away from high fire risk areas.	Safety and Security Manager	Ongoing.
Fire management (C, O, Cl)	On-going training with the CFS.	Safety and Security Manager	Ongoing.
Fire management (C, O, Cl)	All vehicles will be equipped with appropriate fire response equipment.	Safety and Security Manager	Ongoing.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC Trigger (C, O, Cl)	PS-LIC3 - Indicative response actions include: • Identify potential reasons for poor housekeeping, or for lack of fire equipment on vehicles and mobile equipment; • Increase training and awareness of workforce as applicable; • Liaise with CFS for additional control advice as applicable; and • Update controls as applicable to the outcomes of the above.	Safety and Security Manager	In response to trigger events
Applicable Outcome: The Tenement Holder must demonstrate that post-mine completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable. (ML6438 Schedule 6 – Clause 36, MPL146 Schedule 6 – Clause 12.)			
Design/Engineering Strategies			
Design = Final landform stability (PC)	All final landforms have been designed and will be constructed and closed to either be stable (TSF and RSFs) or made safe (open pit) post-closure – refer to Sections 3.6 and 3.9. (ML6438 Schedule 6 – Clause 39.1.4.)	Mining Manager Plant Operations Manager Closure Manager	Constructed during operations, closed during closure.
Design = Final landform safety (PC)	The TSF and RSFs final landforms have been designed to have slopes embankments to removal the risk of fall from the top – refer to Section 3.10. (ML6438 Schedule 6 – Clause 39.1.1.)	Mining Manager Plant Operations Manager Closure Manager	Constructed during operations, closed during closure.

Source	Public Safety Control and Management Strategies	Responsibility	Timing
Management Strategies			
Management = Post-closure safety (PC)	During closure, the following activities will be conducted to ensure no reasonable risk to public safety post-closure (refer also to Section 3.10 for closure designs): • Processing plant area: any concrete, compacted clay, asphalt, plastic liners or any materials used to cover or seal the ground will be removed and recycled or disposed in an approved manner; • ROM pad: the high wall will remain and the base of the walls will be filled in and contoured to be stable; • HDPE lined process water dams: dams will be drained and dam walls will be removed; • TSF: closure controls implemented as identified in TSF Section 5.17; • RSFs: closure controls implemented as identified in Section 3.7 and 3.10; • Open pit: access to the open cut pit will be restricted by the construction of a stock proof fence and abandonment bund, constructed and positioned in accordance with WA mine guidelines document (ZMA048HA 1997) taking into account potential breakback zones; and • Borefield: all surface infrastructure will be removed, bore holes will be plugged below surface and covered. The buried section of the pipeline will remain in place.	Closure Manager	During closure.
Management = Post-closure safety (PC)	On mine closure access to the open cut will be minimised by construction of a stock proof fence around the entire pit with relevant signage. (ML6438 Schedule 6 – Clause 39.1.1 and 39.1.2.)	Closure Manager	During closure.
Management = Post-closure safety (PC)	Infill of all excavations and trenches created during infrastructure removal. (ML6438 Schedule 6 – Clause 39.1.1.)	Closure Manager	During closure.
Management = Post-closure safety (PC)	Abandonment bund construction as follows: • Earth abandonment bunds will be constructed around the open pit, placed based on geotechnical slope failure risk, to a height of two metres within the fenced area to prevent access by light vehicles, post-closure; • Earth abandonment bund will be constructed around the Throoka Creek diversion drain to a height of one metre, post-closure; and • A pit ramp access abandonment bund 2m in height with a with 1:2 slope will be placed at the access point to the pit to prevent easy access down the ramp to the pit lake. (ML6438 Schedule 6 – Clause 39.1.1 - 39.1.4.)	Closure Manager	During closure.

Source	Public Safety Control and Management Strategies	Responsibility	Timing
Landform stability control (O, CI, PC)	Implementation of the TSF stability and seepage and closure management controls, refer to TSF Section 5.17.		
Landform stability control (O, CI, PC)	Implementation of the RSF PAF/NAF related seepage and closure management controls, refer to Acid rock drainage Section 5.15.		
Management = Post-closure safety (PC)	The provision of a caveat on the land title post-closure stating that all fencing and bunding around the open void is maintained for the custodian. (ML6438 Schedule 6 – Clause 39.2.)	Closure Manager	During closure.
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC Trigger (C, O, CI)	PS-LIC1 - Indicative response actions include: • Identify potential reasons for integrity issues with abandonment bund, retained excavations or other security infrastructure; • Investigate and identify potential long term rectification actions for the integrity issues; • Implement rectification actions; and • Continue monitoring as applicable.	Closure Manager	In response to trigger events during closure and post-closure.
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)			
Design/Engineering and Management Strategies			
Traffic safety (C, O, CI)	*The impact relates to the Traffic and is therefore addressed in Section 5.19.*		
General			
LIC Trigger (C, O, CI)	The trigger response actions will be reviewed based on their effectiveness and amended as applicable based on investigations into applicable events.	Safety and Security Manager	In response to trigger events.
Training and awareness (C, O, CI, PC).	Site Inductions and Training for relevant personnel (employees, contractors and subcontractors) to include training in emergency response procedures for uncontrolled fires and other public safety issues as appropriate.	Safety/Training advisor	Ongoing prior to individuals commence work.

Note: (C) = construction (O) = operations (CI) = active closure (PC) = post-closure to relinquishment.

5.18.6 Environmental Measurement Criteria

Public safety outcome measurement criteria and leading indicator criteria are outlined in Table 5-68, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

Table 5-67: Public safety – Environmental outcomes, uncertainties and future works

Control and management strategies	Current and future works			
	Uncertainties and assumptions and sensitivity to change of assumptions	Current and future works list	Responsibility	Timing of works
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented. (ML6438 Schedule 6 – Clause 36, EML6439 Schedule 6 –Clause 12, MPL146 Schedule 6 – Clause 10.)				
Refer to Table 5-66.	Assumes that controls, such as erected signage and site access protocols will deter unauthorised access.	Investigations into all and any unauthorised access to ensure prevention and response procedures are adequate. Where they are deemed inadequate, controls and response procedures will be amended.	Safety and Security Manager	In response to any unauthorised access during construction, operations and closure.
Applicable Outcome: The Tenement Holder must demonstrate that post-mine completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable. (ML6438 Schedule 6 – Clause 38, MPL146 Schedule 6 – Clause 12.)				
Refer to Table 5-66.		Drafting and implementation of a legal caveat on the land title post-closure stating that all fencing and bunding around the open void is maintained for the custodian. (ML6438 Schedule 6 – Clause 39.2.)	Closure Manager	Valid caveat in place prior to relinquishment.
	Erodibility and sodicity of rehabilitation materials uncertainties and assumptions as detailed in Acid Rock Drainage Section 5.15.			
	Stability of TSF uncertainties and assumptions as detailed in TSF Section 5.17.			
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37, EML6439 Schedule 6 – Clause 13, MPL146 Schedule 6 – Clause 11.)				
Refer to Table 5-66.	Likelihood of fires caused by mining activities to be uncontrolled on site.	Investigations into all and any uncontrolled on-site fires to ensure prevention and response procedures are adequate. Where they are deemed inadequate, controls and response procedures will be amended.	Safety and Security Manager	In response to any uncontrolled fires on site during construction, operations and closure.

Control and management strategies	Current and future works			
	Uncertainties and assumptions and sensitivity to change of assumptions	Current and future works list	Responsibility	Timing of works
	Ability to control fires caused by surrounding land users and/or extreme weather events.	Emergency response procedures to be developed and implemented, including responding to fires on and off the land	Safety and Security Manager	Developed and implemented prior to construction.
		Implement pre-start vehicles checklist system which includes checking of fire control equipment	Safety and Security Manager	Implemented prior to construction.
		Liaison with local Country Fire Service	Safety and Security Manager	Ongoing.

Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)

The impact relates to the Traffic and is therefore addressed in Section 5.19.

Table 5-68: Public safety – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented. (ML6438 Schedule 6 – Clause 36, EML6439 Schedule 6 –Clause 12, MPL146 Schedule 6 – Clause 10.)							
Any public injuries or deaths on the ML, EML or MPL, associated with unauthorised access to mining operational areas will be investigated by trained personnel in conjunction with SAPOL. Investigation will include access type and method, resultant injuries and timeline, related mining activities and any resultant rectification activities.	Wherever there is unauthorised access into the operational areas that result in public injuries or death.	Records of public injury or death investigations provide evidence that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented.	In response to public injury or death during construction, operations and closure.	Investigation records	**Leading indicator criteria (LIC – PS1)** • Monthly visual inspections of the integrity and condition of lease boundary gates, fences and site access infrastructure will be visually inspected; and/or • Investigation of unauthorised public access that does not result in injury or death.	Safety and Security Manager	Internally in investigation records External report by exception in the Annual Compliance Report.
Applicable Outcome: The Tenement Holder must demonstrate that post-mine completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable. (ML6438 Schedule 6 – Clause 36, MPL146 Schedule 6 – Clause 12.)							
Visual inspection that all trenches and excavations from infrastructure removal (should it occur) have been filled in and made safe.	Infrastructure removal areas within MPL, EML and ML area.	Records of visual inspection of infrastructure removal areas within the MPL, EML and ML lease area provides evidence that post-mine completion, trenches and excavations from infrastructure removal have been filled in hence the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.	Once, post-removal of infrastructure during the closure period.	Infrastructure as built records. Infrastructure removal records. Closure works records.		Closure Manager	Final closure report prior to relinquishment.

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Visual inspection and closure records record that that all abandonment bunds, security fencing, pit perimeter fencing and warning signage is in place, constructed as per design and maintained	All locations of abandonment bunds and fencing on ML including open pit and Thooka Creek diversion	Visual inspection and closure records of abandonment bund and security infrastructure areas within the lease area provides evidence that post-mine completion, retained excavations that may pose fall or drowning hazard such as the open pit and Thooka Creek diversion, have been made safe hence the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.	Once for construction and implementation as per design – post-construction of bunds and fences. Once, prior to relinquishment.	Visual inspection records Closure works / bund as built records	**Leading indicator criteria (LIC – PS2)** Annual visual inspection during the closure and post-closure period until relinquishment identifies potential erosion of integrity of abandonment bund, excavations or other security infrastructure that may pose a risk to public safety.	Closure Manager	Final closure report prior to relinquishment .
Geotechnical stability assessment of the TSF and RSF on closure by a suitably qualified independent expert (i.e., geotechnical engineering expert) as identified in Soil and Land Disturbance Section 5.8. Geotechnical stability assessment of the open pit on closure by a suitably qualified independent expert (geotechnical engineering expert) as identified in Adjacent Land and Third-Party Property Section 5.21.							
TSF closure review and closure system as identified in TSF Section 5.17.							
Suitably qualified independent expert (hydrology expert) will conduct visual inspections and/or review of design and construction records for the Closure Surface Water Management System as identified in Surface Water Section 5.14.							
Post-closure TSF integrity inspections in TSF Section 5.17.							

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37, EML6439 Schedule 6 – Clause 13, MPL146 Schedule 6 – Clause 11.)							
All uncontrolled fires within the Project, including those with adverse impact on adjacent land use or third-party property, will be investigated by trained personnel, including likely ignition source, response conducted and visual observation and recording of extent of damage of third-party property. Any rectification activities will also be recorded. The CFS will be involved in investigations as appropriate.	Wherever there is an uncontrolled fire as a result of mining operations on the EML, MPL and ML.	Records of uncontrolled fire investigations provide evidence that fires were appropriately managed and controlled and there were no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations, or that any damage has been rectified.	In response to an uncontrolled fire during construction, operations and closure.	AS 1940-2004: The Storage and Handling of Flammable and Combustible Liquids. Pre-start checklists. Investigation records.	**Leading indicator criteria (LIC – PS3)** • Monthly housekeeping inspections of lease area by visual observations show some integrity concerns related to extraneous flammable/combustible materials stored in accordance with AS 1940-2004; and/or • Pre-start checklists identify omissions of fire control equipment in vehicles and mobile equipment	Safety and Security Manager	Internally in investigation records. External report by exception in Annual compliance Report.
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)							
The impact relates to the Traffic and is therefore addressed in Section 5.19.							

5.19 Traffic

5.19.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146. This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.19.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Traffic includes:

- *Road Traffic Act 1961* (SA);
- *Roads (Opening and Closing)* Act 1991 (SA);
- *Highways Act 1926* (SA);
- *Dangerous Substances Act 1979* (SA);
- *Development Act 1993* (SA);
- Dangerous Substances (Dangerous Goods Transport) Regulations 2008 (SA); and
- Australian Standard AS:1742 Manual of Uniform Traffic Control Devices.

5.19.3 Traffic Context

The Project is located at the junction of two of Yorke Peninsula's main arterial roads, the Yorke Highway and St Vincent Highway, both of which will be affected by development of the Project. There are a number of minor roads (Pine Point Road and Sandy Church Road) which surround the ML and a minor road (Redding Road) that lies within the ML. These minor roads are unsealed roads and are under the control of Yorke Peninsula Council (YPC) and are used for local traffic, grain haulage and school bus routes.

The size and location of the proposed mine development will require a number of modifications to roads in the vicinity of the site which can be summarised as:

- Realignment of the coastal section of Yorke Highway / St Vincent Highway to be outside the Blast Exclusion Zone surrounding the pit;
- Closure and relocation of the inland section of the Yorke Highway;
- Upgrading sections of Sandy Church and Pine Point Roads; and
- Sandy Church Road is proposed to serve as the main access road to the mine site and will need to be upgraded to adequately service this purpose.

The engineering group Tonkin Consulting has been engaged to prepare options for road modifications to meet the project design requirements in accordance with Department for Planning Transport and Infrastructure (DPTI) technical standards for road and intersection upgrades.

In the MLP the size of the operation was considerably larger than the EFS requiring the permanent closure of Redding Road as the TSF and RSF would overlay it. The smaller EFS operation (Stage 1) does not require as much area and consequently Redding Road can remain open during the first stage of the mining operation. If the economic conditions warrant an expansion of the operation to the MLP (Stage 2) size then it will be necessary to close Redding Road as per the MLP. Light and medium mining related traffic may use Redding Road during Stage 1.

The responsibility of managing traffic on Redding and Sandy Church Road during Stage 1 of mining operations will remain with the YPC. There has been no objection from the YPC to keeping Redding Road open and managing all traffic during Stage 1. The YPC will be notified if the Company intends to develop Stage 2, at which time will require the road to be permanently closed to allow the construction of the expanded RSF and TSF.

An Independent Report, the 'Traffic and Transport Impact Assessment Report', was conducted by Hatlar Group in March 2013.

to assess impacts on local traffic through increased heavy and oversize vehicle traffic and through increased local traffic as a result of mining activities, see MLP Appendix 5.3-A.

An internal assessment of traffic volumes was conducted by Rex in 2012 to compliment data available from the DPTI and concludes:

- Agricultural activities and tourism have major impacts on vehicle numbers using the highways at various times of year; and
- With light vehicle traffic increasing approximately 100% above normal levels during peak holiday periods, with medium and heavy vehicle numbers increasing by a factor of two or more during the peak harvest period.

The EFS estimated a construction workforce of 550 people and an estimated operational production workforce of about 500 people. During the construction period, the annualised vehicle movements are anticipated to be similar to the operation production phase. However, it will include short isolated periods for the delivery of large components of the processing plant and buildings by heavy vehicles. Based on a workforce of 500-550 people, the estimated increased traffic movements per day to and from the Project are outlined in Table 5-69.

Table 5-69: Vehicle movements per day to and from the Project

Traffic type	Vehicle movements (per day)		
	Light vehicles	Medium vehicles	Heavy vehicles
Passenger	260		
Buses		16	
Delivery trucks		4	
Concentrate trucks			14
Blasting agent trucks			2
Fuel trucks			10
TOTAL	**260**	**20**	**26**

The majority of medium and heavy vehicles movements associated with the Project will occur north of Sandy Church Road and the Yorke Highway intersection. It is estimated that two thirds of the light vehicle movements associated with the Project will travel north and one third will travel south of this intersection.

5.19.4 Traffic Impacts and Outcomes

Table 5-70 provides the list of potential traffic management impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts. There are no potential impacts associated with traffic post-mine closure as all required road changes are permanent

Table 5-70: Traffic management – Potential impacts and relevant outcome

Potential impact event ID	Potential impact event description
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)	
ML-T2 & SEI-11	Increased traffic incidents as a result of increased vehicles on roads (including on school bus routes near the site for the proposed ML).
ML-T3 & MPL-T5	Increased vehicle accidents as a result of dragout carried from mine entrances onto public roads.
ML-T4	Increased traffic incidents at the mine entry and exit point from the Hillside Project.
EML-T1	Increased traffic incidents at the Highway entry and exit point for the transport of extractive material.
MPL-T1	Increased traffic accidents while entering and leaving the Yorke Highway during pipeline and infrastructure construction.
DSD EML- T1	Increased vehicles accidents as a result of drag out carried from mine entrances onto public roads.
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that no public impacts off the Land are caused by, noise, dust and/or dragout to and from the Land associated with mine related traffic. (ML6438 Schedule 6 – Clause 40, EML6439 Schedule 6 – Clause 14).	
ML-T5	Public nuisance due to changes in road network resulting from road diversions and closures.
ML-N2	Public nuisance impacts on surrounding residential receptors from noise emanating from increase in road traffic from road diversions required for the Hillside Project. *(This potential impact relates to Noise and has been addressed in* Section 5.5*).*
ML-TTP2	Public road damage due to the increase of traffic to and from the mining operations. (*This potential impact relates to Adjacent Land Use and Third-Party Property and has been addressed in Section 5.21).*
ML-T3 & MPL-T5	Increased vehicle accidents as a result of dragout carried from mine entrances onto public roads.
ML-NF2	Increased native animal mortality as a result of more collisions with vehicles. (*This potential impact relates to Fauna and has been addressed in Section 5.11).*

5.19.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential traffic management impacts are detailed in Table 5-71.

Table 5-72 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-71: Traffic control and management strategies

Source	Traffic management control and management strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)			
Design/Engineering Controls			
Road design (C)	Road upgrades, realignments and intersections will be conducted in accordance with technical standards (Australian road design criteria) provided in writing by the relevant regulator (ML6438 Schedule 2 – Condition 29) and will optimise traffic flow and safety.	Construction manager	During construction.
Road design and activities (C, O, CI)	Rex will ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure (MPL146 Schedule 2 – Condition 7.)	Safety and Security Manager	Ongoing.
Road design (C)	Signage and publication of road changes and detours resulting from road changes and closures. All traffic signs will comply with Australian Standard AS:1742 Manual of Uniform Traffic Control Devices.	Construction manager	During construction.
Road design (C)	Design the plant and other components to remain within regulator load size limits.	Study team	During design.
Road design (C)	Stop signs and security boom gates at entry and exit points of the Project.	Construction manager	During construction.
Operational traffic (C, O)	Transport staff to/from site by bus as much as possible.	Construction manager Mining Manager	Ongoing.
Management Controls			
Dust suppression (C, O, CI)	Dust suppression sealant on non-sealed mine roads.	Construction manager Mining Manager	Ongoing.
Traffic incidents (C, O, CI, PC)	'Traffic Scheduling' of deliveries to minimise heavy vehicle operation to minimise disruption to local traffic (i.e., during peak traffic periods and at night).	Construction manager Mining Manager	Ongoing.

Source	Traffic management control and management strategies	Responsibility	Timing
Traffic incidents (C, O, Cl, PC)	'Traffic Control Personnel' will manage heavy vehicles at access roads.	Construction manager Mining Manager	Ongoing.
Traffic incidents (C, O, Cl, PC)	Traffic incidents will be investigated and recorded and where necessary reported in accordance with SAPOL reporting requirements.	Safety and Security Manager	Ongoing.
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that no public impacts off the Land are caused by, noise, dust and/or dragout to and from the Land associated with mine related traffic. (ML6438 Schedule 6 – Clause 40, EML6439 Schedule 6 – Clause 14.)			
Design/Engineering Controls			
Road design (C)	Sealing of designated internal roads will decrease any potential drag out from entry/exit from the mine site.	Construction manager	During construction.
Road design (C)	Design the plant and other components to remain within regulator load size limits.	Study team	During design.
Concentrate transport (O)	Transport copper concentrate to port by enclosed containers on road trucks.	Plant Operations Manager	Ongoing during concentrate transport.
Public road condition (C, O, Cl)	Installation of wheel wash to be used for all vehicles exiting the operational areas of the mine.	Construction manager Mining Manager	Installed during construction. Use ongoing.
Management Controls			
Dust suppression (C, O, Cl)	Dust suppression sealant on non-sealed mine roads.	Mining Manager	Ongoing.
Public road condition (C, O, Cl)	Planned cleaning schedules; street sweeping to remove dragout sediment and general vehicle cleaning procedures to remove carryover sediment from mine access intersection onto public roads as required.	Construction manager Plant Operations Manager	Ongoing.
General			
Community complaints (C, O, Cl, PC)	Implementation of the 'Community Response Process' to record and respond to complaints in relation to traffic activities via the 24-hour response line.	Sustainability Manager	Ongoing.
Implementation of TMP (C, O, Cl).	Implementation of the Traffic Management Plan (TMP) and Traffic Response Procedures	Mining Manager	Ongoing.
Training and awareness (C, O, Cl, PC).	Site Inductions for relevant personnel (employees, contractors and subcontractors); to ensure they have an understanding of the Rex obligations in relation to traffic management.	Safety/Training advisor	Ongoing prior to individuals commence work

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.19.6 Environmental Measurement Criteria

Traffic management outcome measurement criteria and leading indicator criteria are outlined in Table 5-73, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-72: Traffic management – Environmental outcomes, uncertainties and future works

Control and management strategies	Current and future works			
	Uncertainties and assumptions and sensitivity to change of assumptions	Current and future works list	Responsibility	Timing of works
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)				
Refer to Table 5-71.		Design and implement road upgrades, realignments and intersections in accordance with technical standards (Australian road design criteria) provided in writing by the relevant regulator and all activities are conducted in accordance with the written requirements of DPTI (ML6438 Schedule 2 – Condition 29 and Condition 32).	Construction Manager	During construction and realignment and upgrade of public roads.
		Post-construction sign-off by DPTI show that all road and intersection upgrades are conducted in accordance with technical standards provided in writing by DPTI as per approved Development Plan.	Construction Manager	Immediately post-construction and realignment and upgrade of public roads.
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that no public impacts off the Land are caused by, noise, dust and/or dragout to and from the Land associated with mine related traffic (ML6438 Schedule 6 – Clause 40, EML6439 Schedule 6 – Clause 14.)				
Refer to Table 5-71.	Assumptions made during the traffic assessments are: • tsurvey period is representative of future traffic movements; and • general site deliveries are handled through a central depot.	There are no future works relative to the assumptions.		

Table 5-73: Traffic management – Measurement criteria and leading indicator criteria

What will be measured and form (method)	Locations	Outcome achievement	Frequency	Control / baseline data	Leading indicator criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder. (ML6438 Schedule 6 – Clause 41, MPL146 Schedule 6 – Clause 13, EML6439 Schedule 6 – Clause 15.)							
All incidents and accidents involving Rex operational traffic are to be investigated by the site safety team, involving other internal and external parties as appropriate to the incident or accident.	As applicable to all traffic incidents and accidents involving Rex operational traffic.	Investigation outcomes show evidence that no incidents or accidents resulting from Rex operational traffic that could have reasonably been prevented.	Incidents to be investigated as they occur. Incident investigations to be closed out within 30 days or as otherwise agreed with the Regulator. Implemented during construction, operations, closure and post-closure until relinquishment.	Incident reports.		Safety and Security Manager	Internal incident reports. SAPOL reports as applicable.
Visual inspections of dragout (as a potential cause of accidents) at mine access road locations and York Highway as identified below.							
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that no public impacts off the Land are caused by, noise, dust and/or dragout to and from the Land associated with mine related traffic. (ML6438 Schedule 6 – Clause 40, EML6439 Schedule 6 – Clause 14.)							
Air quality monitoring as per Air Quality Section 5.4 Noise monitoring as per Noise Section 5.5							
Visual inspections of the mine access roads and records of inspections.	Mine access roads at the point of access to public roads (see Figure 5-12) (ML).	Visual inspections identify there is no dragout to and from the Hillside Project access road.	Daily during construction, operations and closure.			Security personnel	Internal reporting where dragout is identified.
Visual inspections of public road access point and records of inspections.	Public road access points adjacent to road diversion works (EML).	Visual inspections identify there is no dragout to public roads as a result of road diversion works.	Daily during road diversion works (C).			Construction Manager	Internal reporting where dragout is identified.

What will be measured and form (method)	Locations	Outcome achievement	Frequency	Control / baseline data	Leading indicator criteria	Accountability	Reporting
Visual inspections of public road access points from power line installation works by installation contractor	Public road access points adjacent to power line installation works (MPL).	Visual inspections identify there is no dragout to public roads as a result of power line installation works.	Daily during power line installation works. (C)			Construction Manager	Internal reporting where dragout is identified
Number of and response to public complaints received in relation to traffic.	Monitored via the Community Response Process, a 24-hour community complaints response line that will receive, report and respond to any complaints from the public in relation to traffic in accordance with the Complaints Management Procedure EC PRO 320.	Community complains register identifies all complaints relating to public impacts from mine related traffic are address in accordance with the Complaints Management Procedure EC PRO 320.		Control = Complaints Management Procedure EC PRO 320.		Sustainability Manager	Reporting of number of traffic complaints and performance of response in Annual Compliance report.

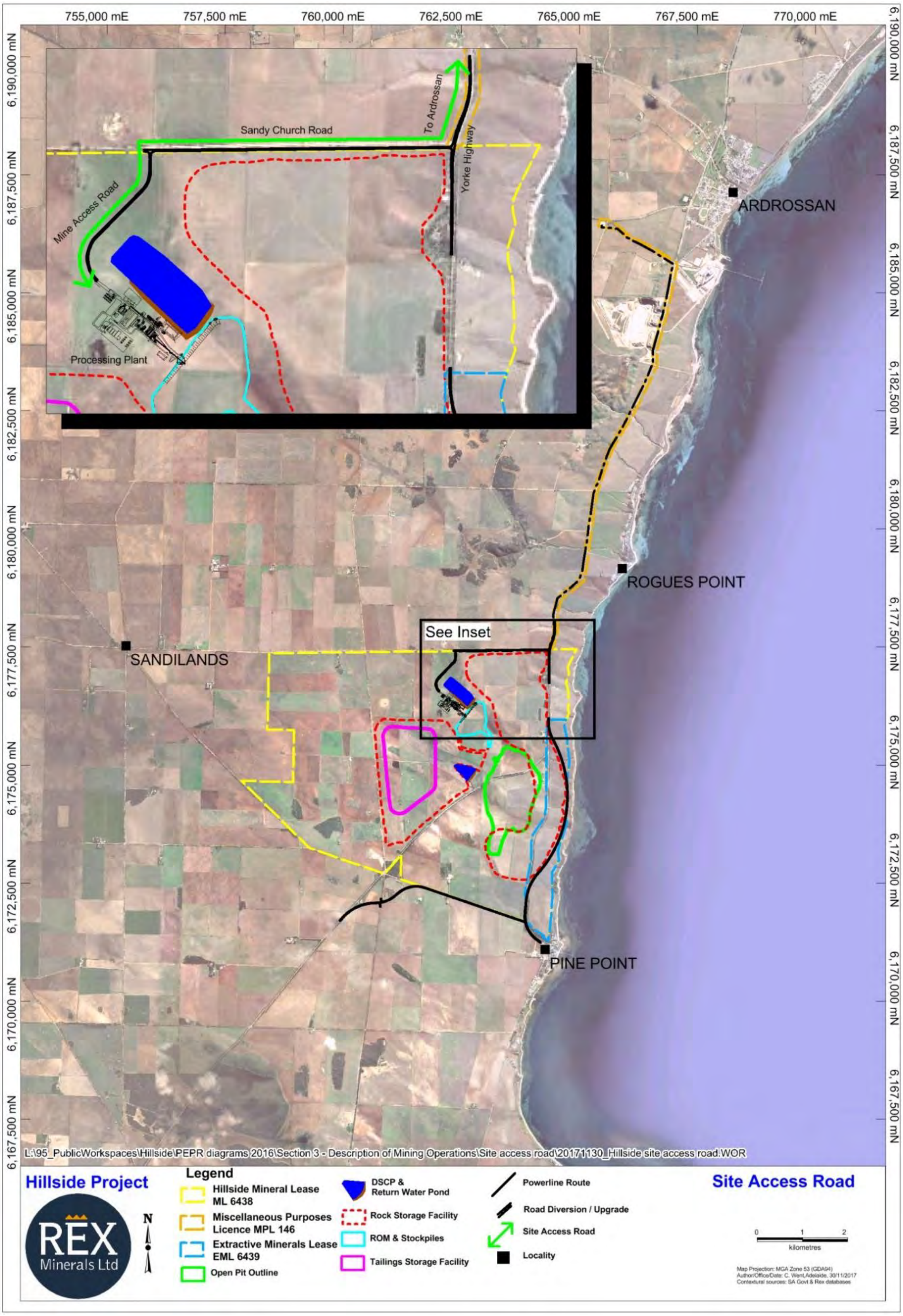

Figure 5-12: Hillside site road access

5.20 Commercial and Industrial Waste

5.20.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions to be complied with and the outcomes to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438 only (there are no commercial and industrial waste related requirement in EML6439 and MPL146). This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

There are no ML outcomes (Sixth Schedule) that relate to commercial and industrial waste management.

Note mining and processing waste disposal are addressed separately in the Acid Rock Drainage Section 5.15 and Tailings Storage Facility Section 5.17.

5.20.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding commercial and industrial waste includes:

- *Environment Protection Act 1993* (SA);
- Environment Protection (Waste to Resources) Policy 2010;
- Standard for the Construction, Installation and Operation of Septic Tank Systems in South Australia, National Plumbing and Drainage Code (AS3500-2);
- Sanitary Plumbing and Sanitary Drainage and any South Australian Health Commission (SAHC) variations prescribed by the Public and Environmental Health (Waste Control) Regulations and South Australian Water Corporation amendments; and
- *Plumbers, Gasfitters and Electricians Act 1995* (SA).

5.20.3 Commercial and Industrial Waste Context

Due to the locality of the Project, an on-site landfill is not required. All commercial and industrial waste and recyclables will be removed from site by contractors and disposed of at a local EPA approved facility.

The types of industrial and commercial waste which will be generated by the mine site includes, but is not limited to, putrescible waste, recyclables, waste oil, oil filters, oily rags, tyres, petrochemicals, chemical containers and sewage.

Materials currently able to be recycled, such as glass, bottles, aluminium and metal cans, paper, plastics, cardboard and other packaging will be collected in separate bins and transported off-site for recycling.

Spent oils will be collected and placed in sealed drums temporarily stored in a bunded area to contain potential spills and ultimately transported for off-site disposal or recycling at an EPA licensed liquid waste treatment facility.

Used batteries will be stored on pallets in specific enclosures and subsequently transported off-site for disposal or recycling at an EPA licensed facility.

The mining operations will generate tyres that are no longer useable. EPA exemptions may be sought on an annual basis for large tyres from heavy mining equipment to be buried in the RSF in accordance with any subsequent EPA requirements. Until such time as exemption is granted all tyres will be disposed off-site by an EPA licensed contractor.

5.20.4 Commercial and Industrial Waste Impacts and Outcomes

Table 5-74 provides the list of potential commercial and industrial waste management impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-74: Commercial and industrial waste management – Potential impacts and relevant outcome

Potential impact event ID	Potential impact event description
Applicable Outcome: The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. (ML6438 Schedule 2 – Condition 20 (soil and land disturbance.))	
ML-W1	Soil or water contamination due to incorrect commercial and industrial waste management.
ML-W2	Contamination due to incorrect management of sewage plants.
ML-W3	Incorrect tyre storage which can cause fires and present a fire hazard.
ML-W4	Contamination of soils due to incorrect storage of hazardous waste substances (i.e., hydrocarbons, vehicle batteries).
ML-W5	Attraction of pest animals to waste stored on site.
ML-VA4	Reduction in aesthetic and recreational value of area from increase in general solid waste and litter. *(The impact relates to Visual Amenity and is therefore addressed in Section 5.7.)*
ML(C)-W1	Waste remaining onsite at closure resulting in loss of land capability to future user.
Applicable Outcome: The Tenement Holder must ensure that any waste temporarily stored on the Land is not visible by any third-party from any land-based viewpoint. (ML6438 Schedule 2 – Condition 17 (visual amenity.))	
ML-VA4	Reduction in aesthetic and recreational value of area from increase in general solid waste and litter
Applicable Outcome: The Tenement Holder must, ensure that no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations ((ML6438 Schedule 2 – Condition 19 (soil and land disturbance.))	
ML-W1	Soil or water contamination due to incorrect commercial and industrial waste management.
ML-W2	Contamination due to incorrect management of sewage plants.
ML-W4	Contamination of soils due to incorrect storage of hazardous waste substances (i.e., hydrocarbons, vehicle batteries).
ML(C)-W1	Waste remaining onsite at closure resulting in loss of land capability to future user.

5.20.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential commercial and industrial waste management impacts are detailed in Table 5-75.

Table 5-76 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-75: Commercial and industrial waste management control and management strategies

Source	Commercial and industrial waste management control and management strategies	Responsibility	Timing
Applicable Outcome: The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. (ML6438 Schedule 2 – Condition 20 (soil and land disturbance.))			
Design and Engineering Controls			
Waste management (C, O, CI)	EPA exemptions may be sought on an annual basis for large tyres from heavy mining equipment to be buried in the RSF in accordance with any subsequent EPA requirements. Until such time as exemption is granted all tyres will be disposed off-site by an EPA licensed contractor.	Supply team Mining Manager	Ongoing.
Management Controls			
Waste management (C, O, CI)	Concrete waste will be disposed in the pit, TSF or RSFs depending on the location and availability at the time of removal, subject to appropriate approvals.	Sustainability Manager Closure Manager	Ongoing.
Waste management (C, O, CI, PC)	All metals, plastics and cardboard/wood and containers will be recycled where possible, some non-recyclable materials will be sent in a closed truck to the nearest available EPA approved landfill.	Sustainability Manager	Ongoing.
Applicable Outcome: The Tenement Holder must ensure that any waste temporarily stored on the Land is not visible by any third-party from any land-based viewpoint (ML6438 Schedule 2 – Condition 17 (visual amenity.))			
Design/Engineering Controls			
Purchasing (C, O, CI)	To reduce waste that requires to be sent to landfill, when purchasing products, preference will be given to: • products which are reusable and/or recyclable; • suppliers which recycle their products and packaging; • suppliers who offer return of unused product; • suppliers who offer to collect used products or empty containers; and • suppliers of products with packaging minimisation programs.	Supply team	Ongoing.
Waste management design (C, O)	Temporary waste storage will be to the south of the process plant to minimise visual intrusion from the lease boundary – refer also to Visual Amenity Section 5.7.	Sustainability Manager	Ongoing.

Source	Commercial and industrial waste management control and management strategies	Responsibility	Timing
Management Controls			
Waste management (C, O, Cl)	A program for separating domestic rubbish into bottles and cans, recyclables and organic waste established during the operational phase will be continued through to mine closure.	Sustainability Manager	Ongoing.
Waste management (C, O, Cl, PC)	All waste will be stored in an orderly manner, not accessible to pest animals or wind blow, prior to disposal.	Sustainability Manager	Ongoing.
Applicable Outcome: The Tenement Holder must, ensure that no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations ((ML6438 Schedule 2 – Condition 19 (soil and land disturbance.))			
Design/Engineering Controls			
Waste management (C, O, Cl, PC)	Waste oils and hydrocarbons will be stored in approved containers on-site and removed by an EPA licenced hydrocarbon re-cycling and disposal group.	Sustainability Manager	Ongoing.
Management Controls			
Waste management (Cl)	On closure sewage will be processed through the treatment plant at the processing site and it will remain in place until all other rehabilitation works have been completed. After completion of rehabilitation activities on the Project site, the sewerage treatment plants will be removed.	Closure Manager	Ongoing.
Waste management (C, O, Cl, PC)	All waste materials will be disposed of off-site unless appropriate approval is obtained.	Sustainability Manager	Ongoing.
General			
Training and awareness (C, O, Cl, PC)	Site Inductions for relevant personnel (employees, contractors and subcontractors); to ensure they have an understanding of the Rex obligations in relation to commercial and industrial waste management.	Safety/Training advisor	Ongoing prior to individuals commence work.
Complaints (C, O, Cl, PC)	Complaints controls as detailed in Air Quality Section 5.4.		

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.20.6 Environmental Measurement Criteria

Commercial and industrial waste management outcome measurement criteria and leading indicator criteria are outlined in Table 5-77, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

The monitoring plan is to be in place for construction, operations and the active closure period unless otherwise stated. The monitoring locations and frequency for the post-closure monitoring and maintenance period will be reviewed in consultation with the Regulator during the active closure period.

Table 5-76: Commercial and industrial waste management –- Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties And Assumptions And Sensitivity To Change Of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. (ML6438 Schedule 2 – Condition 20 (soil and land disturbance.))				
Refer to Table 5-75.	There are specific uncertainties or assumptions related to commercial and industrial waste management.	Installation of 'Designated Waste Facilities' as proposed.	Construction Manager	Prior to the commencement of construction.
		Prepare and implement waste management procedures including storage and disposal requirements for each waste stream.	Sustainability Manager	Prior to the commencement of construction.
Applicable Outcome: The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility (ML6438 Schedule 2 – Condition 20 (soil and land disturbance.))				
Refer to Table 5-75.	Approval to bury used tyres on site throughout operations and inert concrete demolition waste on site at closure.	Obtain approval from the Director of Mines and/or EPA for alternative disposal arrangements for infrastructure demolition and used tyre waste as applicable and as required.	Sustainability Manager	As required.
Applicable Outcome: The Tenement Holder must, ensure that no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations. ((ML6438 Schedule 2 – Condition 19 (soil and land disturbance.))				
Refer to Table 5-75.	There are no specific uncertainties or assumptions for this outcome related to commercial and industrial waste management.			

Table 5-77: Commercial and industrial waste management – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an EPA licensed facility. (ML6438 Schedule 2 – Condition 20 (soil and land disturbance.))							
Records of waste type, volumes, date removed from site and disposal site.	Hillside operational area.	Records provide evidence that all commercial or industrial waste is disposed of in an EPA licensed facility (other than that approved for other disposal).	Ongoing as waste is removed from site or disposed of on site as approved during construction, operations and closure. There will be no waste post-closure, hence no monitoring.	Accepting EPA facility records.		Sustainability Manager	Internal records of waste disposal.
Applicable Outcome: The Tenement Holder must ensure that any waste temporarily stored on the Land is not visible by any third-party from any land-based viewpoint. (ML6438 Schedule 2 – Condition 17 (visual amenity.))							
Visibility of temporary waste storage areas will be monitored through visual observation by a suitably trained person and photographic records.	Potential view points along public roads adjacent to the Hillside impact footprint during operations - Six photo monitoring viewpoint locations listed in Table 5-16 and Figure 5-5 in Visual Amenity Section 5.7.	Photo monitoring provides evidence that no waste temporarily stored on the Land is visible by any third party from indicative land-based viewpoints along public roads adjacent to the Hillside impact footprint.	Monthly visual inspection and photographic record during construction and the first 12 months of operations. Quarterly from Year 2 to the completion of closure activities. There will be no waste post-closure, hence no monitoring.			Sustainability Manager	Indicative photos will be included in the Annual Compliance Report.

What Will Be Measured and Form (Method)	Locations	Outcome Achievement	Frequency	Control / Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Number of and response to public complaints received in relation to commercial and industrial waste recorded in the public complaints register.	Monitored via the Community Response Process, a 24-hour, 7 day per week community complaints response line that will receive, report and respond to any complaints from the public in relation to commercial and industrial waste in accordance with the Complaints Management Procedure EC PRO 320.	Any complaints relating to waste disposal are investigated and demonstrate that no waste temporarily stored on site is visible by any third-party from any land-based viewpoint off-site.	When complaints are received.	Control = Complaints Management Procedure EC PRO 320. (Appendix 4.7)		Sustainability Manager	Reporting of number of commercial and industrial waste complaints and performance of response in Annual Compliance Report. Public complaints register will be publicly available.
Applicable Outcome: The Tenement Holder must, ensure that no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations ((ML6438 Schedule 2 – Condition 19 (soil and land disturbance.))							
Disposal of demolition waste during closure – recorded information will include waste type, volumes, date buried (concrete) or removed from site and disposal site.	Hillside impact footprint.	Records provide evidence that all commercial or industrial waste is disposed of in an EPA licensed facility apart from that approved otherwise by the Director of Mines and/or the EPA.	Ongoing as waste is removed or otherwise disposed of as approved site during closure.	Accepting EPA facility records.		Closure Manager	Reported in final closure report.
Refer to soil monitoring in Soils and Landform Section 5.8 relevant to this outcome.							

5.21 Adjacent Land Use and Third-Party Property

5.21.1 Lease and Licence Conditions, Clause Outcomes, Strategies and Criteria

The tenement conditions and outcomes related to adjacent land use and third-party property to be achieved over the life of the project are detailed in the relevant tenements, i.e., ML6438, EML6439 and MPL146.

This section of the PEPR provides details relating to how those conditions and outcomes will be met throughout the life of mine and the monitoring to be implemented to provide evidence of achievement and compliance.

5.21.2 Applicable Legislation and Standards

The following legislation applicable for potential environmental impacts regarding Adjacent Land Use and Third-Party Property includes:

- the *Local Government Act 1999* (SA) sets out a number of relevant legislation with respect to adjacent land use: zoning, access to quarrying material, use of public roads and easements. NV Act and NRM Act relate to various environment and vegetation management controls including of plant and/or animal pests and diseases, soil conservation which may impact on adjacent land use;
- the *Aboriginal Heritage Act 1988* (SA) protects Aboriginal sites, objects and remains and is also of relevance to adjacent land use;
- *Fire and Emergency Services Act 2005* (SA); and
- *Mining Act 1971* (SA).

5.21.3 Adjacent Land Use and Third-Party Property Context

5.21.3.1 General context

Within the Project, current land use predominantly comprises a combination of cultivated agricultural land with a small percentage of remnant vegetation in those areas that are less suitable for agricultural activities and major and minor road networks.

Land use surrounding the Project is dominated by agriculture including broad acre cropping of cereals, pulses and grazing. Residential and tourism land use occur in the nearby settlement of Pine Point. Tourism, salt production and the mining of dolomite, limestone and sand also occurs in the wider area surrounding region on the Yorke Peninsula. There are a number of small conservation reserves and some council owned and managed land including areas for service provision, roads and other infrastructure. Air Services Australia also owns a small parcel of land near Ardrossan.

The MPL comprises major and minor roads and associated road verges and adjacent cultivated land. Power lines are located along road verges and within some farming land between the Ardrossan West facility and the site.

For the purposes of assessing the impacts of mining activities on adjacent land, the land is divided into three groups, agricultural land off the lease, agricultural land on the lease owned by a third-party and agricultural land on the Lease owned by Rex. Rex will operate in consultation with these three groups regarding ongoing construction and mining activities specific to the group until satisfaction of the owner of the Land is achieved.

5.21.3.2 Mining landform siting and stability context

The Hillside RSFs and TSF were designed to ensure:

- encapsulation of any PAF material;
- long term stability;
- maximise agricultural land use after mine completion; and
- no significant impact from shading on agricultural productivity for third-party land users on or off the Land.

Rock storage facility

Rock storage facility (RSF) design considerations and design parameters for encapsulation and environmental management includes:

- The RSF designs were selected to ensure they could contain the total volume of waste for the project and where possible have the least amount of disruption on local infrastructure, roads and native vegetation;
- The design concept involves the development of the RSFs to establish final faces to facilitate the early commencement of rehabilitation, and continual progressive rehabilitation during further development; and
- This construction approach is to avoid negative visual impact on the public.

As discussed in Section 3.7.1.10, Ground Control Engineering conducted a rock storage facility stability assessment for the Hillside Project. The analysis indicated that a storage with an overall slope angle of 28.7° will be stable to at least 240m overall storage height.

Tailings storage facility

The TSF stability analysis is presented in Section 3.7.1.20. The analysis was conducted for the TSF embankment, RWP and DSCP and included assessment, based on the construction and operational parameters of the facility, of a static loading case, seismic analysis and a long term stability assessment. The analysis concluded a factor of safety greater than the allowable factor of safety in all cases, including the long term analysis.

Open pit

The open pit design based on geotechnical assessment is presented in Section 3.5.2. The design takes into account the different stability requirements for the different geology to be intersected. The pit has been designed for long term stability during the mining operation. Any instability post-mining and subsequent infilling of water is not expected to have any long-term impact on surrounding infrastructure or third-party property due to the large separation.

Independent expert review

In accordance with ML6438 Second Schedule Condition 33.2.8 an Independent Technical Review Report, the ‘Stage 5 Open Pit Design Review and Boundary Stability Assessment’, was conducted by AMC Consultants in October 2017 to assess the 2013 geotechnical assessment of the Stage 5 pit slope design and assess the impacts of the proposed pit on adjacent land users (Appendix 7.3-I). This review concludes that:

- the collected geotechnical data is sufficient for the current feasibility study level;

- the overall pit slope and the mine boundary will be stable during construction and operation; and
- the stability of the Stage 5 pit slopes will improve after closure when the pit is flooded.

Landform shading of adjacent land

Section 3.10.1.2 provides information on the shading of adjacent agricultural land. As identified in that section, the maximum time impact immediately adjacent to areas of high relief equates to a 7% loss of direct sunlight, 40 minutes, during short winter days. The average loss of direct sunlight in shaded areas is less than 20 minutes which equates to a loss 3.5% and 2% of daily sunshine between winter and summer respectively. Figure 3-101 in Section 3.10.1.2 provides the potential shading area on adjacent land.

5.21.4 Adjacent Land Use and Third-Party Property Impacts and Outcomes

Table 5-78 provides the list of potential adjacent land use and third-party property impacts identified and the relevant outcomes to be achieved during the mine life to ensure mitigation of the impacts.

Table 5-78: Adjacent land use and third-party property – Potential impacts and relevant outcome

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must during construction, operation and post-mine completion, ensure that there are no adverse impacts to third-party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user. (ML6438 Schedule 6 – Clause 42.)	
ML-AL1	Blast exclusion zone restricting access to adjacent land user for normal faming activities and aerial spraying.
ML-AL3	Reduced access to land parcels as a consequence of blast exclusion zone and road changes.
ML-BV7	Impact on agricultural aircrafts flying over the clearance zone during a blast. *(This potential impact relates to Blasting activities and has been addressed in Section 5.6).*
ML-BV3	Reduced public safety and damage to third-party property (including stock) from fly rock. (*As this potential impact relates to Blasting it has been addressed in Section 5.6).*
ML-BV4	Structural damage to roads and houses caused by blast activities. *(As this potential impact relates to Blasting it has been addressed in Section 5.6).*
ML(C)-AL1	Reduced land available to agriculture post-closure.
ML-TSF2	Discharge of solids from failure or excess deformation of the embankment (embankment instability and settlement) causing damage to third-party property, reduced public safety and flooding of surrounding low-lying areas. (*As this potential impact relates to the TSF it has been addressed in* Section 5.17*).*
ML-PPA1	Introduction of new pest plant and animal species and plant pathogens in the proposed ML area. *(This potential impact relates to Pest Plants and Animals and has been addressed in Section 5.12).*
ML-PPA2	Sustained increase in abundance of existing pest plant and animal species in the proposed ML area. *(This potential impact relates to Weeds, Pests and Pathogens and has been addressed in Section 5.12).*
ML-TTP2	Public road damage due to the increase of traffic to and from the mining operations. (*This potential impact relates to Adjacent Land Use and Third-Party Property and has been addressed in Section 5.21).*

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome:	The Tenement Holder must, in construction, operation and post-mine completion, ensure no impacts to agricultural productivity for third-party land users on or off the Land as a result of mining operations, including; 43.1. reduction in crop yield; 43.2. reduction in grain quality; or 43.3. adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 43.)
ML-AL5	Reduced productivity resulting from shading of farmland by changed landscape (waste rock dumps).
ML-BV6	Disturbance to livestock on neighbouring properties as a result of blasting activities. *(This potential impact relates to Blasting activities and has been addressed in Section 5.6 of this report).*
ML-A6	Reduced agricultural crop growth rates/yields from increased dust deposition on leaves. *(This potential impact relates to Air Quality and has been addressed in Section 5.4).*
ML-S8	Decreased soil quality due to potentially contaminated airborne dust emanating from the mining operation. *(This potential impact relates to Air Quality and has been addressed in Section 5.4).*
ML-PPA1	Introduction of new pest plant and animal species and plant pathogens in the proposed ML area. *(This potential impact relates to Pest Plants and Animals and has been addressed in Section 5.12).*
ML-PPA2	Sustained increase in abundance of existing pest plant and animal species in the proposed ML area. *(This potential impact relates to Weeds, Pests and Pathogens and has been addressed in Section 5.12).*
DSD ML-AL1	Aviation exclusion zone impacting on agricultural management practices.
Applicable Outcome:	The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37 and 44, EML6439 Schedule 6 – Clause 13, MPL146 Schedule 6 – Clause 11 and 14.)
ML-A6	Fires damaging to agricultural crops and native vegetation (*As these potential impacts relates to Native Vegetation they have been addressed in Section 5.10).*
ML-AL6, ML-NV5, **ML-TTP1**	Fires damaging to agricultural crops and native vegetation. *(This potential impact also relates to Native Vegetation and has been addressed in Section 5.10).*
ML-TTP1	Uncontrolled fires from mining operation resulting in damage to third-party property.
ML-W3	Incorrect tyre storage which can present a fire hazard. (*As this potential impact relates to Commercial and Industrial Waste it has been addressed in Section 5.20).*
DSD-MPL-TTP1	Fire caused during construction and operation due to mine related activities related to the pipelines and powerline.

Potential Impact Event ID	Potential Impact Event Description
Applicable Outcome: The Tenement Holder must, during construction, operation and post-mine completion, ensure that as a result of a geotechnical failure caused by mining; 45.1. there are no adverse impacts to adjacent land use; and 45.2. there is no unauthorised damage to public or private property and infrastructure. (ML6438 Schedule 6 – Clause 45.)	
DSD-ML-TTP1 / DSD-ML(C)-TTP1	Disturbance to adjacent third-party property and infrastructure as a result of the following mechanisms: • open pit wall failure during operations and post-completion; • open pit wall cut-back following wall failure during operations; • surface subsidence from underground mining operations (no longer applicable); and • open pit wall failure induced by underground mining operations (no longer applicable).
Applicable Outcome: The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure. (ML6438 Schedule 2 – Condition 32, MPL146 Schedule 6 – Clause 7.)	
ML-AL2	Interference with grain transport and machinery movements on adjacent roads.
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations (ML6438 Schedule 6 – Clause 46.)	
DSD-ML-TTP2	Effect of light spill on livestock. (*As this potential impact relates to the Visual Amenity it has been addressed in Section 5.7).*

5.21.5 Environmental Outcomes and Controls

The mitigation measures that will be implemented throughout the life of mine to mitigate potential adjacent land use and third-party property impacts are detailed in Table 5-79. No potential impacts for EML6439 were identified.

Table 5-80 then provides comment on the uncertainties and sensitives associated with the impacts and provides the future works committed to by Rex to address these uncertainties and sensitivities over the life of mine.

Table 5-79: Adjacent land use and third-party property control and management strategies

Source	Adjacent Land Use and Third-Party Property Control and Management Strategies	Responsibility	Timing
Outcome: The Tenement Holder must during construction, operation and post mine completion, ensure that there are no adverse impacts to third-party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user. (ML6438 Schedule 6 – Clause 42.)			
Design /Engineering Controls			
Minimising land use disruption (C, O, CI, PC)	Implementation of mine closure designs and controls to minimise impact on adjacent land users and third-party property (refer to Section 3.10).	Sustainability Manager Closure Manager	Ongoing as areas are available. Final implementation during closure with monitoring during post-closure.
Management Controls			
Minimising land use disruption (C, O, CI, PC)	Implementation of the mine closure management plan, the content of which will be sourced from mine closure commitments and designs included in this PEPR, which will be progressively updated over the life of mine as new site-based data is available to ensure the most efficient and effective closure is achieved.	Sustainability Manager Closure Manager	Ongoing as areas are available. Final implementation during closure with monitoring during post-closure.
Land access (C, O, CI, PC)	Land access agreements, compensation agreements and waiver of exempt land in place as required.	Operations Manager	Ongoing and timing as agreed with DEM.
Minimising land use disruption (C, O, CI, PC)	Minimise areas excluded from agriculture during operation by maintaining agricultural land use on all areas not required for direct mining activity.	Operations Manager	Ongoing.
Minimising land use disruption (C, O, CI, PC)	Progressive rehabilitation to include returning land to agricultural land use as soon as practical (refer to Section 3.7.5 and 3.10 for details on progressive rehabilitation).	Sustainability Manager	Ongoing as areas are available.
Minimising land use disruption (C, O, CI, PC)	Using agricultural crops as a key progressive rehabilitation and stabilisation vegetation cover during operation.	Sustainability Manager	Ongoing as areas are available.
Impact management on adjacent land (C, O, CI, PC)	Implementation of exclusion zone, blast notification and fly rock controls to minimise impact on adjacent land users and third-party property (refer to Blasting Section 5.6).		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to contamination of soils off the land (ML6438 Schedule 2 – Condition 19) as identified in Soils and Land Disturbance Section 5.8.		

Source	Adjacent Land Use and Third-Party Property Control and Management Strategies	Responsibility	Timing
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to recommencement of pre-mining land post-mining where practicable (ML6438 Schedule 6 – Clause 16) as identified in Soils and Land Disturbance Section 5.8.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to seepage impacting adjacent land uses (ML6438 Schedule 6 –Clause 20.) as identified in Soils and Land Disturbance Section 5.8.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to surface water inundation of third-party property (ML6438 Schedule 2 – Condition 1) as identified in Surface Water Section 5.14.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to surface water contamination off the land (ML6438 Schedule 2 Condition 25) as identified in Surface Water Section 5.14.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to TSF management and stability as identified in TSF Section 5.17.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to RSF, particularly PAF material, management and stability as identified in ARD Section 5.15.		
Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no impacts to agricultural productivity for third -party land users on or off the Land as a result of mining operations, including; 43.1. reduction in crop yield; 43.2. reduction in grain quality; or 43.3. adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 43 and 3.)			
Design /Engineering Controls			
Reduction in shading adjacent land (O, CI, PC)	Designing the shape, slope and height of RSFs to optimise the cropping area and to minimise hours of shading of agricultural land. Refer to Section 3.7 for design and Section 3.10.1.2 for potential impact.	Mining Manager	During design of RSF.
Impact management on adjacent land (C, O, CI, PC)	Implementation of mine closure designs as detailed in Section 3.10 to minimise impact on adjacent land users and third-party property.	Mining Manager Plant Operations Manager	During construction of RSF and TSF.

Source	Adjacent Land Use and Third-Party Property Control and Management Strategies	Responsibility	Timing
Management Controls			
Impact management on adjacent land (C, O, CI, PC)	Implementation of the mine closure management plan, which will be progressively updated over the life of mine as new site-based data is available to ensure the most efficient and effective closure is achieved.	Sustainability Manager Closure Manager	Ongoing.
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to dust impact on adjacent land use and livestock (ML6438 Schedule 6 – Clause 3) as identified in Air Quality Section 5.4.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to contamination of soils off the land (ML6438 Schedule 2 – Condition 19) as identified in Soils and Land Disturbance Section 5.8.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to surface water contamination off the land (ML6438 Schedule 2 – Condition 25) as identified in Surface Water Section 5.14.		
Impact management on adjacent land (C, O, CI, PC)	Controls relevant to surface water inundation of third-party property (ML6438 Schedule 2 – Condition 1) as identified in Surface Water Section 5.14.		
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37 and 44, EML6439 Schedule 6 - Clause 13, MPL146 Schedule 6 – Clause 11 and 14.)			
Management Controls			
Fire prevention and management (C, O, CI)	Fire management and response controls as identified in Public Safety Section 5.21.		
Fire prevention and management (C, O, CI)	Emergency Response procedures for the operations have been developed. These will be implemented and regularly updated over the life of mine, particularly in response to emergency event investigations.	Safety and Security Manager	Ongoing.
Fire prevention and management (C, O, CI)	Ongoing liaison with local emergency services.	Safety and Security Manager	Ongoing.

Source	Adjacent Land Use and Third-Party Property Control and Management Strategies	Responsibility	Timing
Outcome: The Tenement Holder must, during construction, operation and post-mine completion, ensure that as a result of a geotechnical failure caused by mining; 45.1. there are no adverse impacts to adjacent land use; and 45.2. there is no unauthorised damage to public or private property and infrastructure. (ML6438 Schedule 6 – Clause 45.)			
Management Controls			
Geotechnical failure avoidance (O, CI, PC)	Refer to RSF and TSF stability controls in Soils and Landform Section 5.8 and TSF Section 5.17.		
Geotechnical failure avoidance (O, CI, PC)	Conduct and update ‘Structural and Geotechnical Domain Mapping’ (refer to Table 5-37).	Mining Manager	Ongoing during operations.
Geotechnical failure avoidance (O, CI, PC)	Pit wall depressurisation strategies to be developed in response to monitoring data and update of the structure and geotechnical domain mapping. Strategies may include horizontal drain holes, drainage galleries, in wall dewatering and passive drainage.	Mining Manager	Ongoing during operations.
Geotechnical failure avoidance (O, CI, PC)	The provision of a caveat on the land title post-closure stating that all fencing and bunding around the open void is maintained for the custodian (this is included as future works in Public Safety Section 5.21).		
Leading Indicator Criteria (LIC) Trigger Response Measures			
LIC trigger (C, O, CI)	AL-LIC1 - Indicative response actions include: • document areas and parameters of concern; • review potential reasons for instability, e.g., seepage from TSF or lithology or extreme weather events; • obtain expert assistance to investigate and identify potential causes and rectification; and • implement as applicable.	Mining Manager	In response to prism displacement monitoring trigger.
Applicable Outcome: The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure. (ML6438 Schedule 2 – Condition 32 and 29, MPL146 Schedule 6 – Clause 7.)			
Road design (C)	Refer to control measures applicable to traffic including road design in Traffic Section 5.19.		
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operation.s (ML6438 Schedule 6 – Clause 46.)			
Light emission control (C, O, CI)	Refer to control measures applicable to light emissions in Visual Amenity Section 5.7.		

Source	Adjacent Land Use and Third-Party Property Control and Management Strategies	Responsibility	Timing
General			
Training and awareness (C, O, Cl, PC).	Site Inductions and Training for relevant personnel (employees, contractors and subcontractors) to include training in emergency response procedures for uncontrolled fires and other adjacent land use and third-party property issues as appropriate.	Safety / Training advisor	Ongoing prior to individuals commence work.
LIC Trigger (C, O, Cl)	The trigger response actions will be reviewed based on their effectiveness and amended as applicable based on investigations into applicable events.	Safety and Security Manager	In response to trigger events.
Complaints (C, O, Cl, PC)	Refer to complaint controls in Air Quality Section 5.4.	Sustainability Manager	Ongoing.
Consultation (C, O, Cl, PC)	Implement the Community Engagement Plan (communications with adjacent land use and third-party stakeholders), including the communication and operating protocol for land holders adjacent to and within the tenements. Update this plan as applicable throughout the life of mine.	Sustainability Manager	Ongoing.

Note: (C) = construction (O) = operations (Cl) = active closure (PC) = post-closure to relinquishment.

5.21.6 Environmental Measurement Criteria

Adjacent land use and third-party property outcome measurement criteria and leading indicator criteria are outlined in Table 5-81, along with the monitoring plan and operational compliance plan required throughout the life of mine to ensure these criteria are met.

Table 5-80: Adjacent land use and third-party property – Environmental outcomes, uncertainties and future works

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must during construction, operation and post-mine completion, ensure that there are no adverse impacts to third-party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user. (ML6438 Schedule 6 – Clause 42.)				
Refer to Table 5-79.	Effectiveness in meeting compliance being accepted by adjacent land users as 'no adverse impacts'.	Implement Landowner Communication and Operating Protocol (communications with adjacent land use and third-party stakeholders), including the communication and operating protocol for land holders adjacent to and within the tenements. The communication and operations protocol includes: 43.1. interaction with landholder operations; 43.2. emergency procedures; 43.3. communications and issue management processes; 43.4. land management; 43.5. dispute resolution; 43.6. ongoing communication about the Tenement Holder's operations; 43.7. receiving and considering feedback; 43.8. safety procedures; 43.9. access protocols; and 43.10. any matters identified by the Director of Mines in writing. (see Appendix 4.1-C). (ML6438 Schedule 2 – Condition 43, EML6439 Schedule 2 – Condition 8, MPL146 Schedule 2 – Condition 16.) This plan will be maintained and implemented to the satisfaction of the Director of Mines for the duration of the tenement holding. (ML6438 Schedule 2 – Condition 44, EML6439 Schedule 2 – Condition 9, MPL146 Schedule 2 – Condition 17.)	Sustainability Manager	Plan to be developed prior to the commencement of Construction. Reporting in the Annual Compliance Report.
	Refer to Blasting Section 5.6.			

<table>
<tr><th rowspan="2">Control and Management Strategies</th><th colspan="4">Current and Future Works</th></tr>
<tr><th>Uncertainties and Assumptions and Sensitivity to Change of Assumptions</th><th>Current and Future Works List</th><th>Responsibility</th><th>Timing of Works</th></tr>
<tr><td rowspan="4">Refer to Table 5-79.</td><td colspan="4">Refer to Soil and Land Disturbance Section 5.8.</td></tr>
<tr><td colspan="4">Refer to Surface Water Section 5.14.</td></tr>
<tr><td colspan="4">Refer to TSF Section 5.17.</td></tr>
<tr><td colspan="4">Refer to ARD Section 5.15.</td></tr>
<tr><td colspan="5">Applicable Outcome: The Tenement Holder must, in construction, operation and post-mine completion, ensure no impacts to agricultural productivity for third-party land users on or off the Land as a result of mining operations, including;
43.1. reduction in crop yield;
43.2. reduction in grain quality; or
43.3. adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 43.)</td></tr>
<tr><td rowspan="3">Refer to Table 5-79.</td><td colspan="4">Refer to Air Quality Section 5.4.</td></tr>
<tr><td colspan="4">Refer to Soil and Land Disturbance Section 5.8.</td></tr>
<tr><td colspan="4">Refer to Surface Water Section 5.14.</td></tr>
</table>

Control and Management Strategies	Current and Future Works			
	Uncertainties and Assumptions and Sensitivity to Change of Assumptions	Current and Future Works List	Responsibility	Timing of Works
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37 and 44, EML6439 Schedule 6 - Clause 13, MPL146 Schedule 6 – Clause 11 and 14.)				
Refer to Table 5-79.	Pressure on local emergency services and CFS.	Implement Community Engagement Plan (including local emergency service providers). (Appendix 4.1-B)	Sustainability Manager	Ongoing.
	Refer to Public Safety Section 5.18.			
Applicable Outcome: The Tenement Holder must, during construction, operation and post-mine completion, ensure that as a result of a geotechnical failure caused by mining; 45.1. there are no adverse impacts to adjacent land use; and 45.2. there is no unauthorised damage to public or private property and infrastructure. (ML6438 Schedule 6 – Clause 45.)				
Refer to Table 5-79.	Whether seepage from the TSF and RSF will influence pit wall stability in the long term.	Groundwater seepage modelling future works as identified in TSF Section 5.17.		
	Accuracy of pre-mining geotechnical predictions.	Conduct and update 'Structural and Geotechnical Domain Mapping'. Once mining commences the structural model and geotechnical domains will be updated annual based on the monitoring data from monitoring as per Table 5-81.	Mining Manager	Annually.

<table>
<tr><th rowspan="2">Control and Management Strategies</th><th colspan="4">Current and Future Works</th></tr>
<tr><th>Uncertainties and Assumptions and Sensitivity to Change of Assumptions</th><th>Current and Future Works List</th><th>Responsibility</th><th>Timing of Works</th></tr>
<tr><td>Refer to Table 5-79.</td><td>Which option will be implemented to allow for mining of the current pit design, which extends west of a plane dipping down at 35 degrees to the east from the property boundary of CT5707/273- Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N.</td><td>Mining of Phase 5 of the open pit will not commence until one of the following options is satisfied: The tenement holder:
30.1. obtains ownership of CT 5707/273; or
30.2. obtains a registered Waiver of Exemption under the Act to undertake mining operations (inclusive of future geotechnical subsidence) on CT 5707/273; or
30.3. satisfies the Director of Mines that there is no risk that the proposed mining operations below that plane could impact on third-party property and the Director of Mines has approved the proposed operations in writing (subject to such conditions as he thinks fit). (ML6438 Schedule 2 – Condition 30.)
The appropriate option will be determined through consultation with the Department, legal advice and the land holder. The open pit as designed will not exceed this requirement until Phase 5 is mined at depth. This provides the time for verifying the geotechnical structural model and gathering appropriate information to inform the most appropriate option to be implemented.</td><td>CEO Rex</td><td>Option fully implemented prior to the open pit cutback (Phase 5) in Year 7 of the EFS design. (Figure 3-4 in Section 3.2.2).</td></tr>
<tr><td colspan="5">Applicable Outcome: The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure. (ML6438 Schedule 2 – Condition 32, MPL146 Schedule 6 – Clause 7.)</td></tr>
<tr><td>Refer to Traffic Section 5.19</td><td colspan="4">Refer to Traffic Section 5.19.</td></tr>
<tr><td colspan="5">Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations (ML6438 Schedule 6 – Clause 46.)</td></tr>
<tr><td>Refer to Visual Amenity Section 5.7.</td><td colspan="4">Refer to Visual Amenity Section 5.7.</td></tr>
</table>

REX Minerals Ltd

Table 5-81: Adjacent land use and third-party property – Measurement criteria and leading indicator criteria

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Applicable Outcome: The Tenement Holder must during construction, operation and post mine completion, ensure that there are no adverse impacts to third-party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user. (ML6438 Schedule 6 – Clause 42.)							
Number of and response to public complaints received in relation to adverse impacts on third-party land use as a result of mining. Monitored via the Community Response Process, a 24-hour community complaints response line that will receive, report and respond to any complaints from the public in relation to adverse impacts on third-party land use as a result of mining in accordance with the Complaints Management Procedure EC PRO 320.	Location on adjacent land or on the land as applicable to the complaint.	Investigation of complaints identify that there are no verified impacts outside compliance criteria (i.e., outcome achievement for noise, air quality, water quality, surface water inundation and light intrusion) to third-party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user.	In response to specific complaints.	Control = Complaints Management Procedure EC PRO 320 (Appendix 4.7). Technical impact assessments associated with this project presented in the MLP and this PEPR.		Sustainability Manager	Reporting of number of adverse impacts on third-party land use as a result of mining complaints and performance of response in Annual Compliance report.
Refer to air quality monitoring in Air Quality Section 5.4, including post-closure monitoring ‘Residual impacts to agricultural productivity and health impacts to livestock over LOM’.							
Refer to blast monitoring in Blasting Section 5.6.							
Refer to soil quality monitoring in Soil and Land Disturbance Section 5.8, including post-closure verification of final TSF, RSF and open pit landform stability.							
Refer to surface water quality and inundation monitoring in Surface Water Section 5.14, including post-construction verification of the Closure Surface Water Management System for inundation potential post-closure.							
Refer to facility stability monitoring during operations in TSF Section 5.17 including post-closure criteria.							

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control Baseline Data	Leading Indicator Criteria	Accountability	Reporting
ll monitoring data relevant to potential impacts moving off site, including air quality, groundwater quality and depth, fires impacting on third party property, weed and pest data and surface water quality and inundation will be reviewed by a suitably qualified person, along with all third-party expert reviews of similar data.	All relevant monitoring locations off site.	Review of all relevant monitoring data and expert reports identifies that there has been and is unlikely to be adverse impacts to third party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user post-mine completion.	Once, prior to relinquishment.	Air quality, groundwater quality and depth, fires impacting on third-party property, weed and pest data and surface water quality and inundation monitoring data and associated third-party expert reviews.		Closure Manager	Reported in the final completion report.
Applicable Outcome: The Tenement Holder must, in construction, operation and post mine completion, ensure no impacts to agricultural productivity for third-party land users on or off the Land as a result of mining operations, including; 43.1. reduction in crop yield; 43.2. reduction in grain quality; or 43.3. adverse health impacts to livestock. (ML6438 Schedule 6 – Clause 43.)							
Survey of RSF and TSF heights and slopes – surveyed by mine survey methods as part of operational mine survey requirements.	RSFs and TSF.	The RSF and TSF are being constructed to design thereby ensuring no impacts to agricultural productivity for third party land users on or off the Land as a result of mining operations, including; • reduction in crop yield; • reduction in grain quality; or adverse health impacts to livestock.	Annual throughout operations and closure. Once post-closure.	EFS RSF and TSF design (refer to Section 3.7.)		Mining Manager Closure Manager	Annual survey reports. Externally reported by exception in the Annual Compliance Report.
Refer to air quality and crop yield monitoring in Air Quality Section 5.4, including post-closure monitoring 'Residual impacts to agricultural productivity and health impacts to livestock over LOM'.							

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Refer to soil quality and landform stability monitoring in Soil and Landform Section 5.8.							
Refer to surface water quality and inundation monitoring in Surface Water Section 5.14 including post-closure criteria.							
Applicable Outcome: The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations. (ML6438 Schedule 6 – Clause 37 and 44, EML6439 Schedule 6 - Clause 13, MPL146 Schedule 6 – Clause 11 and 14.)							
Refer to fire investigation monitoring in Public Safety Section 5.18.							
Applicable Outcome: The Tenement Holder must, during construction, operation and post-mine completion, ensure that as a result of a geotechnical failure caused by mining; 45.1. there are no adverse impacts to adjacent land use; and 45.2. there is no unauthorised damage to public or private property and infrastructure. (ML6438 Schedule 6 – Clause 45.)							
Geotechnical failure of the open pit and the geographical extent of the failure will be assessed by appropriately trained geotechnical personnel using relevant survey and geotechnical monitoring and assessment methods.	Open pit walls and failures.	Open pit stability monitoring indicates that any failures have had no adverse impacts to adjacent land use or public or private property or infrastructure.	In response to any pit wall failures during operations and closure.		Leading Indicator Criteria (AL1-LIC) The velocity alarm trigger level is 1.5mm/h as measured by the prism displacement monitoring of the open pit walls conducted on a monthly basis during the operational period.	Mining Manager	Internal geotechnical monitoring reports. Reporting by exception in Annual Compliance Report.

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Pit wall geometry surveyed by mine survey methods as part of operational mine survey requirements.	Open pit walls.	The open pit is progressing in accordance with the mine plan which ensures the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT5707/273- Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N until Stage 5 is mined at depth, at which time appropriate documentation will be in place as per ML6438 Schedule 2 – Condition 30.	Annual throughout operations.	EFS open pit design (refer to Section 3.2.2).		Mining Manager	Annual survey reports.

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Assessment of final open pit wall geometry through review of survey data, or review of appropriate documentation such as ownership paperwork, waiver paperwork or correspondence with the Director of Mines.	Open pit.	The independent geotechnical assessment identifies that: 1. There is unlikely to be an adverse impact to adjacent land use or unauthorised damage to public or private property or infrastructure AND 2. The following condition relating to potential adverse impacts on adjacent land is met: The Tenement Holder must ensure that the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT5707/273-Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder: 30.1. Obtains ownership of CT 5707/273; or 30.2. obtains a registered Waiver of Exemption under the Act to undertake mining operations (inclusive of future geotechnical subsidence) on CT 5707/273; or 30.3. satisfies the Director of Mines that there is no risk that the proposed mining operations below that plane could impact on third party property and the Director of Mines has approved the proposed operations in writing (subject to such conditions as he thinks fit). (ML6438 Schedule 2 – Condition 30.)	Once, prior to relinquishment.	As built survey data. Open pit geotechnical monitoring = prism displacement monitoring over the operational and closure period.		Closure Manager	Final Closure Report.

What Will Be Measured and Form (method)	Locations	Outcome Achievement	Frequency	Control Baseline Data	Leading Indicator Criteria	Accountability	Reporting
Geotechnical assessment of final landforms (RSFs and TSF) - refer to Soils and Landform Section 5.8.							
Applicable Outcome: The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure. (ML6438 Schedule 2 – Condition 32, MPL146 Schedule 6 – Clause 7.)							
Refer to traffic monitoring in Traffic Section 5.19.							
Applicable Outcome: The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations (ML6438 Schedule 6 – Clause 46.)							
Refer to light emissions monitoring in Visual Amenity Section 5.7.							

5.22 Operator Compliance Monitoring Plan

The monitoring program addressing the measurement criteria and leading indicator criteria for each mine area and environmental aspects is presented throughout this chapter in the individual measurement criteria and leading indicator criteria tables. These tables also provide information on the responsibility, i.e., who will be conducting the monitoring as well as the position responsible for the monitoring, the data that will be retained as a result of the monitoring and the method and frequency through which the results will be reported externally.

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Section 6

Operator Capability

6. Operator Capability and Management Systems

Sufficient information must be provided on each of the factors listed under Regulation 89(1)(a-j) to demonstrate these have been implemented to an appropriate standard to provide confidence that the operator has appropriate experience, processes and procedures in place to be able to operate the tenement(s) to achieve compliance with the regulatory requirements and relevant environmental outcomes under the Act.

6.1 Leadership and Commitment

Rex Minerals Ltd (Rex or the Company) is committed to achieving best practice environmental outcomes through demonstrated visible leadership. Commitment to meeting a high level of environmental performance is demonstrated through the Environmental Policy which, through approval of the Rex's Board of Directors (Board) and the authority of its Chief Executive Officer (CEO).

Visible and committed leadership is demonstrated by the CEO and senior management team's actions in:

- demanding high operating standards in all aspects of its activities to minimise environmental impact and to prevent environmental harm;
- continually communicating and consulting with all stakeholders;
- ensuring employee and contractor awareness of sound environmental practice is part of all day-to-day activities;
- seeking continuous improvement of the Environment Management System;
- conducting regular audits and review of policies, systems and procedures; and
- ensuring compliance with applicable legislation and commitments.

Compliance with the Policy is emphasised in the Company's employee contracts, induction program and is demonstrated through the Company's corporate governance principles.

6.1.1 Company and Senior Management

Details outlining the skills of the Rex's Board and Management are set out on the Company's website and summarised here.

The members of Rex's Board have substantial corporate and technical expertise and experience with a successful track record in developing mining operations.

Rex's Board and Management have developed a unique understanding of the Hillside Project's assessment, permitting and development process in South Australia, supported by:

- a strong network of contacts within State and local governments and stakeholder groups; and
- a broad group of industry experts who have undertaken extensive evaluation of all aspects associated with the Hillside Project from the commencement of the Project to its planned closure.

Summary resumes of the directors and senior managers of the Company are set out below.

Dr David Carland
Non-Executive Chairman

PhD (Econometrics); Masters of Economics; Bachelor of Economics (Honours); Member of the Australian Institute of Company Directors

Dr Carland has over 35 years' of investment banking and commercial experience in both the private sector and government. He is the Executive Director of Australian Resources Development Limited, a company focused on the provision of specialised advice and assistance on the structuring, financing and developing of energy and resource projects.

Dr Carland was the co-founder and part-owner of BurnVoir Corporate Finance Limited (BurnVoir), an independent specialist investment banking firm focusing on the energy, resource and infrastructure sectors. Prior to establishing BurnVoir, Dr Carland was Executive Vice President and Head of Energy and Power at Bankers Trust, and prior to that, he was Deputy Managing Director and Head of Corporate Finance at UBS Australia. He was previously a Non-Executive Director of Indophil Resources NL. Dr Carland has held senior executive roles with the CRA Group (now Rio Tinto), including management of the commercial arrangements for the purchase of the Gladstone Power Station. His roles have seen him based in the United States and London.

Mr Richard Laufmann
Managing Director and Chief Executive Officer

Bachelor of Engineering (Mining); Member of AusIMM; Member of the Australian Institute of Company Directors

Mr Richard Laufmann is a founding Director of Rex Minerals and was formerly a Non-Executive Director (since 2007). He was appointed Managing Director and CEO of the Company on 23 April 2015.

Mr Laufmann is a mining engineer with broad experience in the resources sector, both corporate and operational.

Mr Laufmann's most recent engagement was for seven years as chief executive officer of Indophil Resources NL (until January 2015, an ASX-listed company with a large copper-gold Joint Venture in the Philippines) and prior to that, five years as CEO of Ballarat Goldfields NL. Mr Laufmann also previously led WMC Resources Limited's gold business as General Manager – operations.

Mr Alister Maitland
Non-Executive Director

Bachelor of Commerce; Fellow of the Australian Institute of Company Directors, Fellow of the Australian Institute of Management, Senior Fellow Finance

Mr Maitland is a former Executive Director of ANZ Banking Group with a background in international finance. His banking experience extended beyond Australasia to cover Asia, the sub-continent, the Middle East, Europe and America. His professional experience has included global business expansion, internal and external consulting, treasury projects and international political agendas. As Chief Executive of ANZ Bank for New Zealand, he was responsible to the local board for the country's operations.

He has been a Non-Executive Director of a number of publicly-listed ASX companies and Government bodies covering a wide range of activities including property services, mining, banking, asset management and health. He is a former Chairman of Ballarat Goldfields NL, Director of Lihir Gold Ltd and Malayan Banking Berhad (Maybank).

Mr Mitch Hooke AM
Non-Executive Director

Bachelor of Rural Science; Member of Australian Institute of Agriculture; Member of the Australian Institute of Company Directors

Mr Hooke is globally-recognised for his in-depth knowledge and strategic leadership in Australian and global public policy advocacy, as well as delivering on practical operational issues in the development of economic, social and environmental policy and practice across the minerals, agriculture and food and grocery industries in Australia and internationally.

Mr Hooke was the chief executive officer of the Minerals Council of Australia from mid-2002 until the end of 2013. He is the Chairman of Partners in Performance International, a Director of The Menzies Research Centre Ltd and with a long and strong rural background, he is an Independent Director of Grain Producers Australia Limited, the national not-for-profit body representing Australia's broadacre grain, pulse and oilseed producers. He is also a Non-Executive Director of coal-based technology company GTL Energy Ltd, and was formerly a Non-Executive Director of Elgin National Industries – a then private equity minerals resources engineering and construction management and mining equipment company based in the USA. Mr Hooke is also a member of the Advisory Boards of Micromine Ltd and The University of New England Advisory Group.

Mr Ian Smith
Non-Executive Director

Bachelor of Engineering (Honours, Mining), Bachelor of Financial Administration; Fellow of the Institute of Engineers Australia; Fellow of AusIMM, Member of the Australian Institute of Company Directors

Ian Smith is a mining engineer with more than 40 years' experience in the mining and services sector. He has held some of the most senior positions in the Australian resources industry, most recently Managing Director (MD) and CEO of Orica. Prior to that, he was MD and CEO of Newcrest, growing the business to what has become Australia's biggest, and globally one of the largest, gold mining companies. Ian is a Fellow of both the Australasian Institute of Mining and Metallurgy and the Institute of Engineers.

In prior roles Ian was Global Head of Operational and Technical Excellence with Rio Tinto, London and Managing Director – Comalco Aluminium Smelting with Rio Tinto in Brisbane. He has technical, operational, financial and strategic expertise, having also held senior and executive positions with WMC Resources, Pasminco and CRA. Ian is a past president of the Australian Mines & Metals Association and is a past chairman of the Minerals Council of Australia.

Mr Ron Douglas
Non-Executive Director

Bachelor of Engineering; Fellow of the Australian Institute of Management; Member of AusIMM, Member of the Australian Institute of Company Directors

Ron Douglas is an engineer by qualification and has extensive experience leading owners' teams for major projects located around the world. Ron is the Executive Vice President, Project Delivery for Ausenco and he has over 35 years' global experience in project delivery and resources sector management. His previous roles have included Global Head of Projects and Technology for Orica; Executive General Manager Projects and Studies for Newcrest;

CEO of Australian Solomons Gold; Managing Director for Anglesey Aluminium Metal (part of Rio Tinto); and General Manager for Rio Tinto's aluminium and coal projects.

Ron is a Fellow of the Australian Institute of Management, a Member of the Australasian Institute of Mining and Metallurgy and a Member of the Australian Institute of Company Directors. He has extensive and well-recognised expertise in industrials, minerals and metals, as well as oil and gas.

Ms Kay Donehue
Company Secretary

Graduate Diploma of Applied Corporate Governance; Certificate of Governance & Risk Management; Certificate of Governance Practice & Administration; Associate of Governance Institute of Australia; Member of International Chartered Secretaries and Administrators; Affiliate of Australian Institute of Company Directors; Chartered Secretary

Ms Donehue has over 25 years' experience in the mining and banking industries, and most recently has focused extensively on company secretarial and governance roles in the mining sector. Ms Donehue is also Company Secretary of Indophil Resources Pty Ltd (previously Indophil Resources NL) which was delisted from the ASX following completion of a Scheme of Arrangement with its major shareholder. Ms Donehue is an Associate of the Governance Institute of Australia and holds a Graduate Diploma in Applied Corporate Governance.

Ms Amber Rivamonte
Chief Financial Officer

Chartered Professional Accountant (CPA), Bachelor of Business (Accounting)

Ms Rivamonte has over 20 years' experience in the resources industry covering the fields of commercial, strategic and risk management, corporate governance and financial management experience. Ms Rivamonte has a background in accounting and is a Certified Practising Accountant (CPA) in Australia. She has previously held the roles of CFO and Company Secretary at Ballarat Goldfields NL, Company Secretary at Indophil Resources NL, White Rock Minerals Ltd and Rex Minerals.

Ms Rivamonte's experience covers all aspects of setup and managing the operations of resources companies, including project acquisition, mergers, de-mergers, takeovers, schemes and various forms of fund raisings.

Mr Greg Hall
Project Director

Bachelor of Engineering, Fellow of AusIMM

Mr Hall is a Mining Engineer with over 35 years' experience in the resources, marketing and corporate sectors. Mr Hall was previously CEO of copper-gold producer Hillgrove Resources, which operates the Kanmantoo Mine and has restarted brownfields exploration targeted to expand the mine's resource base. His previous experience in South Australia includes 11 years on the Olympic Dam project from conceptual studies in the early 1980s through to operations as Manager, Mining.

Mr Hall has a wealth of experience from a career that includes operations, technical and marketing roles in copper, uranium, nickel, bauxite and alumina, gold and iron ore for WMC and Rio Tinto. In 2006, he joined uranium company Toro Energy as its inaugural Managing Director. Toro Energy's activity and growth saw it achieve approval for WA's first uranium mine at Wiluna.

Mr Hall is currently CEO of ASX listed explorer Alligator Energy on a half time basis, and is Director of Swedish listed Copperstone Resources, as well as Director of the unlisted uranium company, Torch Energy. Since November 2017 Mr Hall has been President of the South Australian Chamber of Mines and Energy.

Mr John Burgess
Project Manager Hillside

Bachelor of Science; Bachelor of Applied Economics, Bachelor of Science (Environmental Management), Masters of Business Administration (MBA), Fellow of AusIMM

Mr Burgess is a Process and Environmental Engineer with 40 years' base metal experience in operations within Australia and Northern Africa.

Mr Burgess consulted to Zinifex Limited in relation to optimising processing performance at the Century Mine and on various nickel, copper and gold operations and has held positions as Manager of Metallurgy and Environment at Broken Hill and General Manager of the Renison Tin Mine.

Mr Burgess has extensive experience both nationally and internationally in project management, statutory approvals, commissioning lead, zinc, silver, tin, nickel, copper and gold plants.

Mr Charles McHugh
Chief Mining Engineer

Bachelor of Engineering (Mining) (Honours); Bachelor of Science (Geology, Member of AusIMM, Member of Institute of Engineers Australia

Mr McHugh is a Mining Engineer with over 25 years' experience in the resources industry with extensive experience in open pit mining, underground mining and mining technology development. His experience includes operations, resource development and technology roles in commodities such as copper, gold, iron ore, nickel and coal for WMC Resources Ltd and Rio Tinto.

Mr McHugh achieved several world firsts in the development and implementation of automated surface production drilling and automated underground production loaders. He was previously a Director for the Cooperative Research Centre for Mining based in Australia.

Wojciech Ozga
Chief Advisor Operational and Technical

Masters of Science (Mining Engineering)

Mr Ozga is a Mining Engineer with 45 years' of operational and project management experience.

Key positions held over the last 20 years include:

- Manager of the Olympic Dam Mine expansion – South Australia;
- General Manager, Central Norse Gold Corporation – Western Australia;
- Group Manager, Mining Projects with Western Corporation – Australia, Canada, Peru, Kazakhstan, Uzbekistan, China;

- Managing Director, Zarmitan Gold – Kazakhstan;
- Director of Operations, Ballarat Goldfields – Victoria, Australia; and
- Chief Engineer, Indophil Resources – Philippines.

Mr Patrick Say
Chief Geologist

Bachelor of Science (Honours); Graduate Certificate Applied Finance; Member of AusIMM

Mr Say is a Geologist and Manager with over 16 years' experience in the resources industry managing and developing projects predominantly in Western Australia and South Australia.

Mr Say has worked on a number of large-scale projects including WMC Resources Limited's Mt Keith nickel operation and Oz Minerals Limited's Prominent Hill copper/gold project. Mr Say's career includes three years with WMC, where he held positions as an exploration and mine geologist and four years with Oxiana/OZ Minerals, where he worked on the Prominent Hill copper/gold project, where significant additions to the mineral resource were achieved under his leadership.

Mr Say has been Geology Manager and Chief Geologist for Rex Minerals Ltd since 2009, leading the geological team from the early prospect delineation of the Hillside copper mine's orebody through to a fully audited Mineral Resource at a Bankable Feasibility Study (BFS) level.

Miss Kim Ferguson
Sustainability Advisor

Bachelor of Environmental Science (Honours), Graduate Certificate Sustainable Development

Miss Ferguson has 20 years' experience in resources, with national and international experience in environmental and social permitting, including impact assessments, monitoring and management plans, stakeholder engagement, mine closure planning, compliance and annual reporting and due diligence.

Miss Ferguson has worked on large-scale projects such as WMC Resources Limited's St Ives Gold operation, OZ Minerals Limited's Prominent Hill copper/gold project and AngloGold Ashanti's Obuasi gold operation in Ghana.

Miss Ferguson held the position of Chair of the International Council of Mines and Metals (ICMM) Closure Working Group January 2017 to June 2018.

6.1.2 Management System Framework

The achievement of Rex's HSE outcomes will be through the administration of the Health, Safety and Environment Management System (HSE MS) and associated Environmental Management Plans (EMPs).

The Rex's HSE MS provides a framework of policies, systems, procedures, plans, personnel and resources which combine to achieve stated objectives and outcomes.

Rex is committed to ensuring that it's HSE MS:

- improves overall HSE performance;
- achieves continual improvement;

- is appropriate for Rex's operations;
- Integrates with other systems and core processes;
- achieves legal compliance and meets obligations; and
- meets the requirements of the Rex's Environment Policy.

Rex's HSE MS elements are aligned with the ISO standards and principles of Commit, Plan, Do, Check, Act as depicted in Figure 6-1 below. Elements of the HSE MS include:

- leadership and commitment;
- accountability and responsibility;
- legal obligations'
- objectives and targets;
- hazard and risk management;
- operational control;
- consultation and communication;
- training and competency;
- document and record management;
- contractor selection and management;
- emergency and crisis management;
- hazard and incident reporting and investigation;
- systems audit and review; and
- management review and improvement.

The interaction of these elements is shown in Figure 6-1 and is briefly described in the following sections.

The EMPs provide the framework for:

- ensuring compliance with all relevant statutory requirements and Rex's policies and standards;
- implementing tools and practices to manage and minimise the impact of environmental impacts;
- providing details on environmental impact management responsibilities; and
- maintaining an effective response mechanism to deal with issues and complaints.

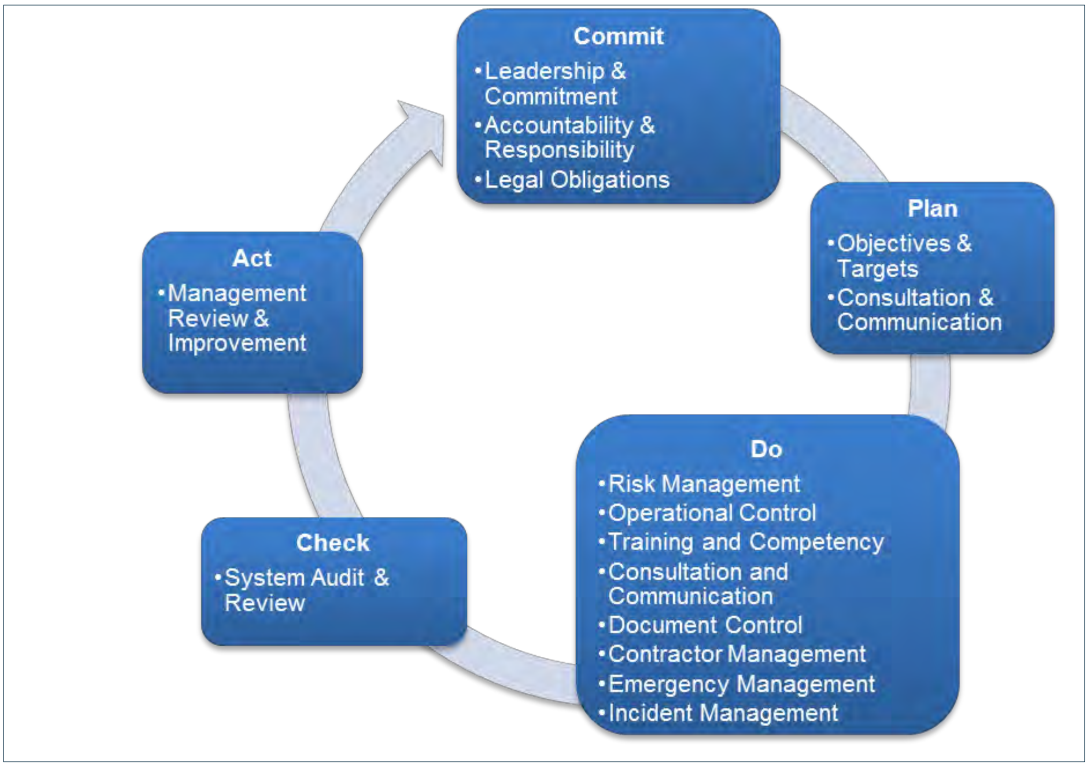

Figure 6-1: Rex's integrated MS framework

The current HSE MS is based on the activities and risks associated with the exploration, rehabilitation and environmental baseline activities that have been conducted by Rex to date. Prior to any commencement of the Hillside Project, Rex will review the HSE MS and ensure that all aspects are consistent with the planned operational activities, lease conditions and commitments made in this PEPR.

6.2 Accountability and Responsibility

Accountabilities and responsibilities for achieving environmental outcomes for all Rex personnel are defined, documented and communicated. Rex Minerals recognises that senior management leadership is a key factor in achieving outcomes and targets, and requires that senior managers provide the necessary drive through their actions and commitment.

The Operations Manager, with support from the management team shown in Figure 6-2 below, will have the primary responsibility for ensuring:

- compliance with the associated Hillside Project's leases and licence conditions and implementation of any actions required to ensure that compliance;
- environmental and community relations aspects of the Company's environmental policy, systems and management measures are effectively implemented at the Hillside Mine;
- the implementation of the Hillside Project's EMPs;
- contractors meet their contractual obligations in relation to safety and environment; and
- adequate resources are available to achieve environmental outcomes.

When the Operations Manager is not on site, authority for the above actions will be delegated to a nominated manager to ensure rapid operational response and decision making as required.

Responsibilities for specific environmental outcomes are outlined in Section 5 and will be reiterated in the Project's EMPs.

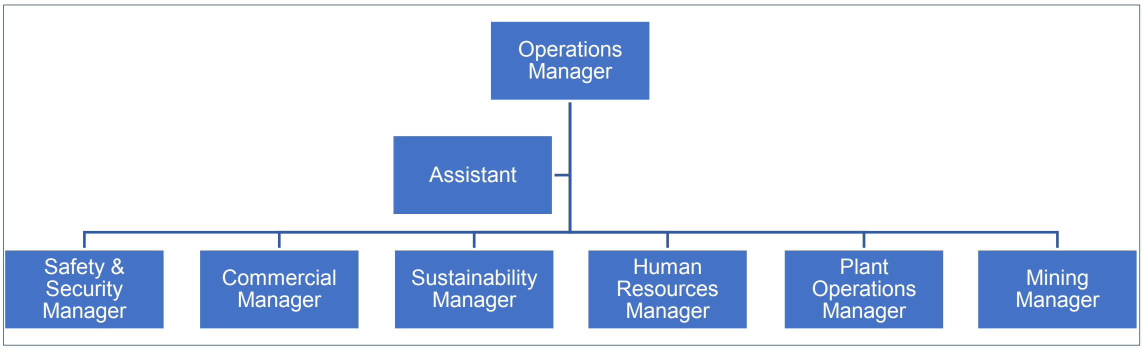

Figure 6-2: Hillside's indicative management organisational structure

6.3 Legal Obligations

Rex's statutory obligations and commitments will be identified in a legal compliance register that will be routinely reviewed to ensure compliance continues to be achieved.

Deviations and non-conformances will be captured in the incident reporting process and reported in accordance with both Rex Minerals' internal and external requirements.

Compliance with the requirements of the PEPR will be through the implementation of the EMPs and the HSE MS.

6.4 Objectives and Targets

Rex will establish objectives and targets to achieve policy commitments and ensure risk-based EMPs are developed for the Hillside Project, based on the information agreed with community in the original management plans which are now integrated into Section 5 of this PEPR.

Objectives and targets will be directly linked to the PEPR commitments and Compliance Monitoring Programs and will be recorded in an Annual Compliance Report (ACR) along with other HSE initiatives for improving HSE performance.

The objectives and targets will be established with a balance of lead and lag indicators. They will be reviewed with consideration of previous environmental performance, identified weaknesses in the HSE MS, non-conformances and other factors to ensure environmental outcomes continue to be met.

6.5 Hazard and Risk Management

To ensure a systematic approach to managing risks associated with environmental, health and safety activities, Rex Minerals has in place a risk management process aligned with ISO standards.

Risk assessment will be carried out using Rex's risk matrix of probability and consequence rating. Appropriate actions will be taken to control risks either by reducing the consequence or the probability/likelihood of it occurring. The hierarchy of controls will be applied. That is, the priority of controls to be established will be to eliminate the risk as the most preferred (being the most effective), followed by substitution, engineering, administration, then as the least preferred (being the least effective), personal protective equipment (PPE). The Rex's risk management process is triggered via several operational processes, including:

- formal risk assessments – including a detailed assessment of environmental aspects and impacts associated with the Hillside Project;
- management of change – identification of the environmental impacts associated with change and an assessment of the associated risk with particular regard to critical structures;
- contractor management – a determination of risk posed by contractor activity and an assessment of the contractor and Rex's systems required to mitigate the risk;
- operational activity – part of task pre-planning to ensure risks and environmental impacts are identified and mitigated, such as job hazard analysis; and
- construction of major structures – Rex will commission accredited experts to verify that structures are constructed to the approved design.

The Rex risk management process involves the planning and implementation of activities designed to meet the environmental outcomes, goals and commitments established in Rex's policies. Hazard management will be achieved through implementation of procedures and training of the workforce to identify and report hazards, and to continuously undertake risk assessments before commencing work tasks.

The elements of the hazard and risk assessment process is as follows:

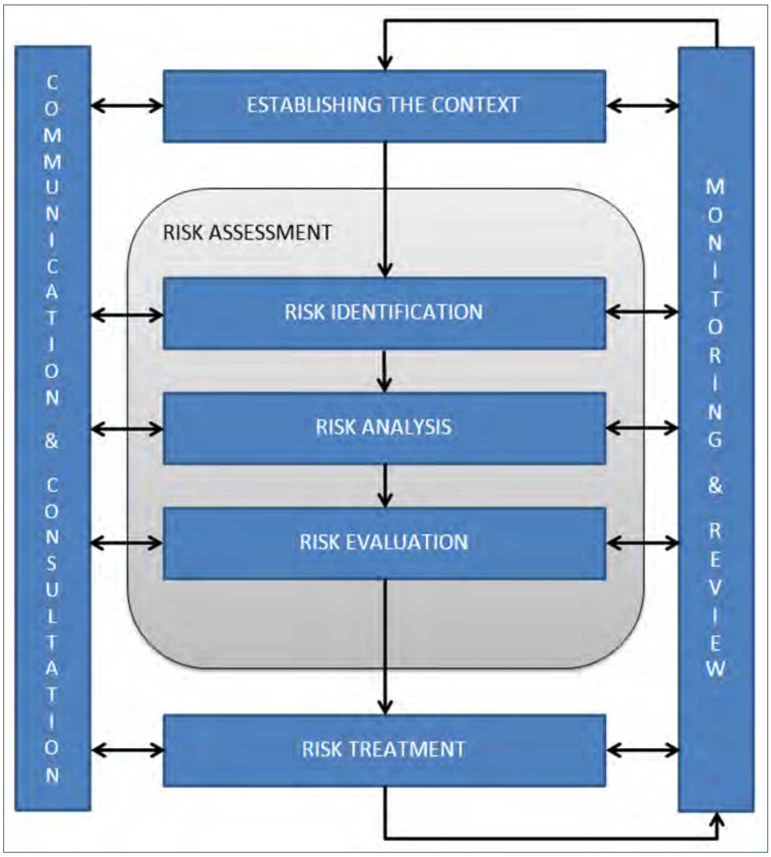

Figure 6-3: Risk management framework

Rex will continue to have a detailed risk register for the Hillside Project that documents environmental and safety hazards and associated risks, and includes detail of the control measures, strategies and responsibilities.

Risk evaluation at the Hillside Project site has routinely taken place involving employees and management to ensure a consultative and continual improvement approach to hazard and risk awareness and to ensure risks continue to be effectively managed.

6.6 Operational Control

The Company's operating methods and requirements are documented in procedures and other documents, including environmental management plans, as part of the HSE MS that include measures to avoid health and safety and environmental events.

Procedures are revised as part of the continuous improvement program including ongoing hazard identification and control.

Standards will define the procedures and requirements for managing specific site environmental impacts, hazards and compliance as identified in environmental impact assessments and are applicable to all areas of the site.

Where controls and strategies to achieve environmental outcomes are management system controls, such as procedures, they will clearly outline the way the activity is to be conducted by personnel. For example, procedures will be developed for:

- permit to work;
- farmland management;
- water monitoring;
- weed management;
- bush fire safety;
- waste management;
- chemical selection and management, and
- dust monitoring.

Effective implementation of the HSE MS documents is through training and competency. Monitoring compliance to the HSE MS documents will be through supervision, document review and update and performance reviews.

6.7 Consultation and Communication

Rex has processes in place that allow for the participation and consultation with the workforce (employees and contractors) and stakeholders, in the development and implementation of HSE practices and the HSE MS.

Consultation occurs through a number of formal forums including:

- HSE committee meetings;
- Project community group meetings;
- Toolbox meetings and site inductions; and
- participation in risk assessments, investigations and inspections.

Rex has also developed a Community Engagement Plan (CEP) that clearly identifies the community and stakeholder groups and outlines the framework for how it will engage with these groups during all phases of the Hillside Project.

The local community consultation group, the Hillside Mine Community Voice (HMCV), meets monthly and discusses the ongoing mine development process. Records of the HMCV meetings and other documents pertaining to the mine development are available on the Yorke Peninsula council website.

Rex Minerals will report on the performance of the EMPs in the Annual Compliance Report (ACR) and will also provide regular updates to members of the HMCV. The ACR will be provided to the HMCV and made available for public information on the Rex Minerals website.

Rex Minerals has also developed a Social Management Plan (SMP) (Appendix 4.1-A). The SMP outlines the Company's commitment to the local community and other stakeholders, and provides a description of the measures that Rex Minerals will take to fulfil this commitment. The SMP is part of a broader process of identifying and assessing the potential social impacts of the mine and ensuring the framework is in place to effectively mitigate and/or enhance the mine's effects and monitor performance. Further detail on the SMP is provided in Section 4.1.1.

6.8 Training and Competency

Position descriptions identify the minimum competencies required for each position and require adherence to the environment and health and safety standards.

Rex's training and competency process includes:

- identifying training and competency gaps and requirements;
- developing training programs;
- ensuring quality and effectiveness in training delivery;
- competency assessment; and
- evaluating training effectiveness.

Specific skills and competencies required of all Rex personnel are administered through a training matrix. Validation of the training and competency process occurs through individual performance review and is tracked as an indicator in the Company's annual HSE Improvement Plan.

The Company's induction program includes information about the regulatory framework within which the mine operates.

The Hillside Project workforce will undergo a project-specific induction before commencing work. Inductions will include environmental and workplace, health and safety awareness training and an outline of general requirements related to activities and operator responsibilities on site, including compliance to corporate standards and associated policies and procedures, and to the Project's PEPR and lease/licence conditions.

This will address the key environmental issues and outcomes as well as the responsibilities individuals have to ensure compliance with the Hillside Project ML, EML and MPL, and PEPR conditions and commitments. In addition to health and safety information, the induction will include:

- legislative obligations of both individuals and the Company;
- Rex environmental policy;
- key environmental impacts associated with the Project (i.e., those requirements as outlined in the PEPR);
- environmental management arrangements and key procedures; and
- emergency response arrangements.

6.9 Document and Record Management

Rex has a document and record management system to ensure documents and data containing information critical to achieving environmental and safety outcomes is:

- approved for relevance and appropriateness prior to issue;
- reviewed, updated and re-issued in response to significant changes, learnings or routine review;
- identified with current revision status, with obsolete revisions removed;
- legible and readily identifiable; and
- available to stakeholders.

6.10 Contractor Selection and Management

Contractor management is a critical control to enable Rex to achieve environmental and safety outcomes. The Company recognises environmental obligations cannot be abdicated to a third party.

Contractor management arrangements are described in detail in a contractor management process that includes:

- the classification of contracts based on risk;
- considers the complexity, dollar value, duration, location, degree of risk and other factors to determine the type of contract documentation to be used;
- supplier/contractor pre-qualification and selection;
- integrity of contractor equipment and materials through pre-inspection against Rex's standards;
- communication mechanisms including meetings and reporting;
- monitoring and reporting against performance and other criteria assessed in accordance with the contract risk classification;
- training and competency of Rex Minerals contract owners;
- audits and reviews against HSE requirements and standards included in the contract; and
- completion review and close out.

The contractor management process includes ongoing review and monitoring to ensure contractor performance is in compliance with contract arrangements.

6.11 Emergency and Crisis Management

Rex has in place emergency management arrangements including a Project Emergency Response Plan that establishes specific actions to manage significant events including environmental impacts and safety incidents such as:

- bush fire;
- significant chemical spills; and
- off-site contamination.

The emergency management arrangements include:

- details of site emergency response arrangements;
- a documented process for managing identified emergency and crisis situations as contained in emergency management plans;
- details of specific emergency and crisis management duties and responsibilities;
- levels of competency and training of employees and management;
- details of emergency response resources and equipment;
- clean up and recovery;
- additional plans and documents, such as charts, plans etc., to aid emergency response;
- details of outside and/or mutual aid resources and how they may be used to assist an emergency; and
- the internal and external communication arrangements including liaison with external agencies and the media.

Rex's emergency management readiness is routinely tested through drills, exercises and training. The emergency management plan will be updated prior to commencement of construction to ensure it addresses all potential project emergencies.

The Company also meets with the emergency services local to the Hillside Project site to ensure these emergency services are familiar with the site and Rex Minerals is aware of any limitations of their ability to respond.

Rex will have in place arrangements, including trained personnel and suitable equipment, to respond to and mitigate the impact of all environment and safety incidents.

Contractors will be required to maintain site specific emergency response plans, and bridging arrangements will be in place to ensure clarity of roles and responsibilities for emergency response and management.

6.12 Hazard and Incident Reporting and Investigation

The Company's hazard and incident reporting process outlines requirements that ensure that all hazards, environmental impacts, near misses, incidents and injuries are reported and responded to in a timely manner, are investigated to identify root causes, and appropriate control measures are implemented to prevent recurrence.

Hazard and incident reporting and investigation procedure defines the:

- method to record, report, investigate and analyse hazards, environmental impacts, near misses, incidents and injuries;
- statutory reporting requirements for environmental impacts and safety incidents;
- process for escalating reports to senior management and Rex's CEO;
- methodology for investigation and determining root cause;
- responsible persons to undertake investigation;
- classification and analysis of incidents;
- recording and close out of corrective actions;
- issuing learnings on particular incidents; and
- protocols for reporting hazard and incident performance.

The contractors' systems will be reviewed to ensure compliance with Rex's HSE MS.

6.13 System Audit and Review

The management system is critical in meeting its environmental outcomes, HSE targets and objectives and in implementing the requirements of the PEPR and environmental plans.

In order to ensure that the HSE MS remains fit for purpose, is effective in meeting objectives and outcomes and is being implemented, Rex will prepare a systematic program of internal and external audits and reviews. To demonstrate the auditor's independence, the Company will ensure that the internal auditors are free from responsibility for the area/activity being audited and the external auditor has declared their independence.

The audit and review program will provide for:

- full assessment of the Rex Minerals HSE MS;
- monitoring of progress against environment and safety plans;
- compliance against commitments and outcomes; and
- determination of the extent to which HSE MS expectations are being met.

The HSE MS audit program will ensure each management system element is audited at least every three years. Additional review and audits may be undertaken in response to non-conformances or incidents.

Routine review and monitoring of Rex Minerals' environmental performance and compliance also occurs as a routine part of the Company's management meetings and HSE meetings. Review and monitoring includes:

- verification of the effectiveness of environmental control performance standards;
- progress against the EMP and improvement initiatives;
- review of the environmental compliance register;
- hazards and incidents;
- incident investigations; and
- corrective actions.

Additionally, to achieve compliance with ML6438 Second Schedule Condition 33.1 and MLP 146 Second Schedule Condition 8.1, Rex will ensure that a suitably qualified independent expert has assessed the HSE MS and confirms the capacity of the tenement holder to achieve compliance with the Act and the PEPR in light of its management systems, personnel, policies, procedures, practices and resources. This will occur prior to the commencement of construction. Additional information on this is provided in Section 7.4.

6.14 Management Review and Improvement

Control and management strategies for achieving environmental outcomes required are described in Section 5 of this PEPR.

Control and measurement strategies are an integral part of the HSE MS which is regularly reviewed by Rex's management to ensure compliance and the ongoing suitability to meet the requirements of the environmental and safety policy.

The management review is formal, structured and includes:

- results of HSE MS audits;
- compliance with relevant legal requirements;
- compliance with lease conditions;
- suitability of objectives and targets;
- environmental and safety performance of the organisation; and
- identification of opportunities to improve the level of risk or reduction in impact through applying more robust controls;

6.15 Previous Experience of Operator

The Company's management team has extensive industry experience and is appropriately qualified to manage the construction and operation of the Project. Similarly, the major contractors that Rex will engage on the Project have established reputations and appropriate experience.

Rex uses contractors with extensive industry experience in mining and related fields. The following contractors have already been selected using the HSE system compliance and management key selection criteria, and this included an audit of contractor systems:

- Process Plant Engineering, Procurement, Construction Management Contractor – Amec Foster Wheeler Pty Ltd; and
- TSF Design and Construction Supervision – ATC Williams Tailings Engineers.

HSE, infrastructure, geotechnical and other specialist organisations have been selected based on their competence and industry experience to assist with the Hillside Project (e.g., Pacific Environment Ltd (now ERM), AMC, AECOM, Resonate Acoustics, Saros, and Golder Associates Pty Ltd). The composition of the project management team reflects corporate and operational experience relevant to all project phases including exploration, feasibility studies, project development, and will ensure a smooth transition into operations.

6.16 References

No references.

Section 7

Lease/Licence Conditions and Waivers

7. Lease/Licence Conditions and Waivers

7.1 Introduction

This section of the PEPR sets out how Rex Minerals Ltd (Rex) will demonstrate compliance with the lease and licence conditions for Mineral Lease (ML) 6438, Extractive Minerals Lease (EML) 6439 and Miscellaneous Purposes Licence (MPL) 146, where the lease or licence includes specific conditions or requirements that are not environmental outcomes.

This section includes a table that demonstrates where lease and licence conditions have been addressed in the PEPR (if relevant) or demonstrates how otherwise they have or will be complied with.

7.2 Lease/Licence Conditions – Rainwater Tank Testing

The Air Quality environmental conditions, outcomes, strategies and criteria applicable for ML6438 and EML6439 only (and do not apply for MPL146), are as follows.

Lease Conditions: Air Quality (Second Schedule)

The following ML conditions (Second Schedule) relate to rainwater tank testing.

8. The Tenement Holder must:

8.1 Within 6 months of the grant of this Lease write to all third parties who have an interest within the Land, or in land within 4 kilometres of the boundary of the Land, and offer to undertake (at least annual) water quality testing of all rainwater tanks owned (or used) by those third parties; and

8.2 where a third party who has an interest within the Land, or in land within 4 kilometres of the boundary of the Land, indicates to the Tenement Holder that they wish to have rainwater tanks that they own or use tested, undertake testing of the relevant tank(s); and

8.3 if testing of a tank is undertaken, provide the third party with those test results (reported against the most recent Australian Drinking Water Guidelines (Australian Government)) within one month of the sampling.

7.2.1 Rainwater Tank Testing

Section 5.4 includes detailed information on the baseline environmental dust, sources of dust from the Hillside Copper Mine, and a comprehensive set of dust control measures. These include both proactive controls, and monitoring based reactive control measures designed to minimise dust emissions from the site. These on-site ongoing control measures represent the first tier of protection to employees and surrounding communities.

The ML conditions around dust compliance limits for the Hillside Project are based on the most up to date review of the National Environment Protection Measures (NEPM) standards and the Environment Protection Act requirements. These standards incorporate the potential health effects of dust over the long term (i.e., over work lifetimes) on employees and surrounding communities, and hence our ML conditions are set based on these to ensure no detrimental impacts to health.

Data from the proposed dust monitoring program will be used to determine the impact of the Hillside Project on the surrounding environment and community, as well as inform reactive control measures through a series of trigger alerts. The monitoring proposed is comprehensive, involving real time monitors, 24-hour compliance monitors, mobile and temporary monitors, and dust deposition gauges. This detailed and comprehensive dust monitoring program around the lease and at nearby receptors (residences) represents the second tier of protection to surrounding communities and measures actual dust in the air or potentially settling onto the ground.

The dust monitoring results are the method by which compliance and management of the mine from a dust emission perspective will be maintained, and will provide an early warning of any increase or non-compliance in dust emissions.

During the MLP process, independent consultants engaged by both the Company and by the Department of the Premier and Cabinet (DPC) determined that the quantum of copper or other metals in predicted dust will be at such low levels that they will not pose a risk to surrounding community health nor impact agricultural crops or livestock over the full life of the mine. A worst-case scenario was used by these independent consultants to determine this, i.e., assuming all fugitive dust was ore dust containing 0.6% copper and 99.4% waste rock – rather than the normal average total dust which will contain even less copper. Baseline measurements carried out during the MLP process determined the levels of dust in the current environment around Hillside.

The testing of rainwater tanks in the region required by the ML condition is to demonstrate and confirm that there will be no significant impact on rainwater tank quality from any fugitive mine dust, nor by any metals that may be contained within that dust. Hence this is a third tier of protection for the surrounding community. The primary metals that will be measured from rainwater tank water samples will be copper and uranium, and these will be compared to allowable levels in Australian drinking water standards. While other trace metals exist in Hillside ore and waste rock, they are at extremely low levels in situ, and hence will not present a hazard in dust. No organics nor biologicals will be analysed as the Hillside Project will not produce or impact these.

The 4km zone that is stated as the rainwater tank testing zone (see Figure 7-1 below) as per Rex's ML conditions is more than adequate as supported by the dust modelling and likely extent of fugitive dust leaving the site. Rex has agreed to add in a representative group of five or so of the first residences at Black Point in consultation with the Progress Association.

As part of the ML condition Rex will offer rainwater tank testing to all residences containing a tank in the 4km area. However, it is important to understand that fugitive dust from mine operations disperses from the source as it moves away, and hence any dust may be detectable in the general area of direction and will be more dilute. Therefore, testing of a range of rainwater tanks in an area will detect any change, and if individual tanks happen not to be tested (either due to owner not wishing this, or due to timing suitability) that does not represent a health concern.

It is anticipated that there will be some variability of analysed samples due to seasonal variation, and whether copper fittings are used on tanks (will be noted at time of sample collection).

Details of the process of notification of residences, response of residences back to Rex, and how and when samples will be collected and analysed are included in the draft Rainwater Tank Testing Procedure EC PRO 321 (see Appendix 7.2-A) which will be updated prior to implementation to reflect any amendments to leading practice guidance.

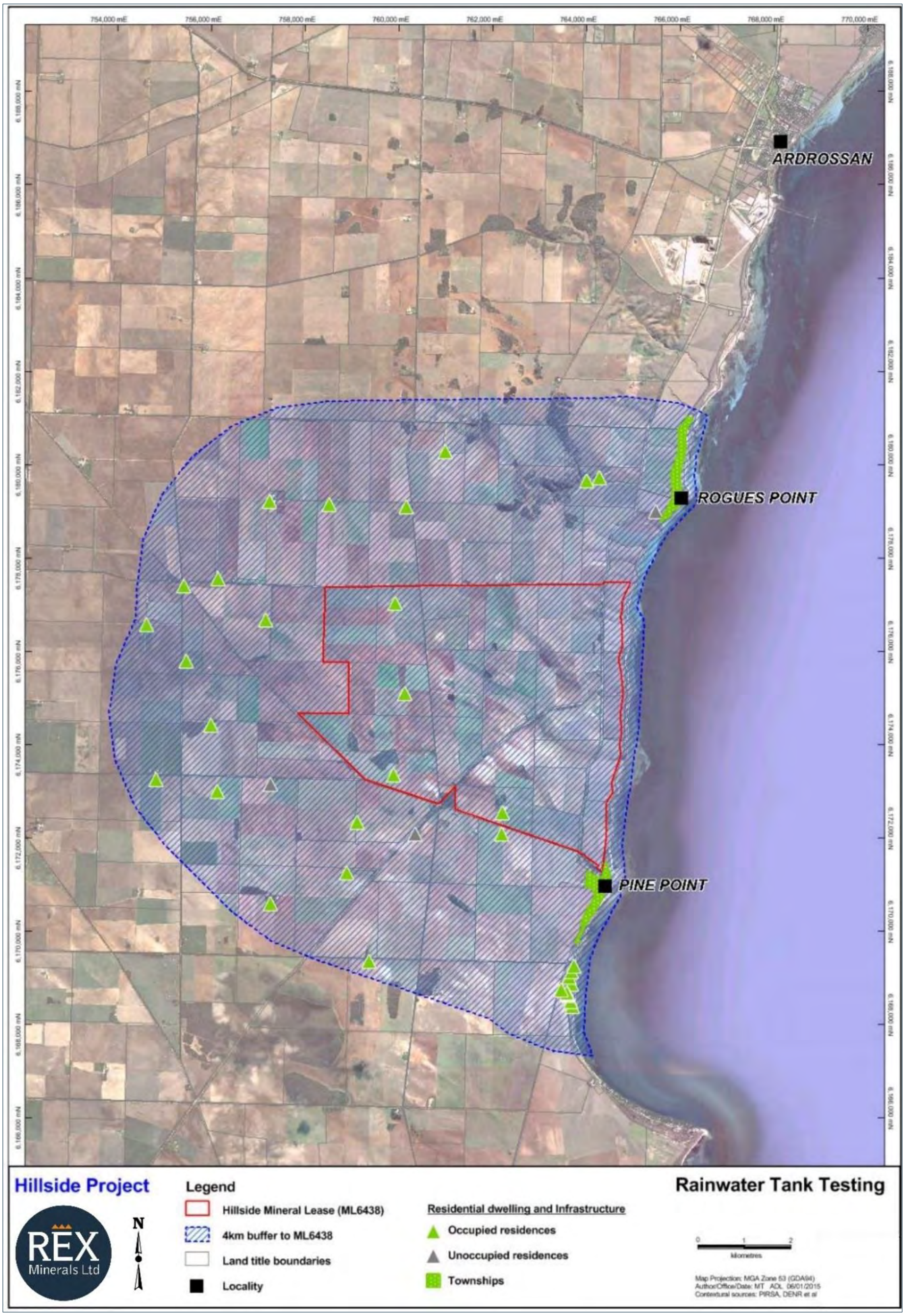

Figure 7-1: Hillside Project's rainwater tank testing zone

7.3 Lease Conditions – Additional Information in the Program (Second Schedule)

33. In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters:

33.1 The capacity of the Tenement Holder to achieve compliance with the Act and the Program in light of its management systems, personnel, policies, procedures, practices and resources.

- On 23 October 2017 Rex applied for a deferral for Condition 33.1 and duly received approval from the Department of the Premier and Cabinet (DPC) on 20 November 2017. See Appendix 7.3-A and B for copies of correspondence.

33.2 The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from:

33.2.1 an independent mining and blasting expert (i.e.: for blasting operations)

- See Appendix 7.3-C for independent review of BMP, noting that all relevant information from the reviewed management plan critical for controls, current and future works and monitoring is incorporated into the PEPR.

33.2.2 an independent environmental geochemist expert (i.e.: for potentially acid forming (PAF) material and metalliferous drainage management)

- See Appendix 7.3-D for independent review of the Acid Rock Drainage (ARD) Management Plan, noting that all relevant information from the reviewed management plan critical for controls, current and future works and monitoring is incorporated into the PEPR.

33.2.3 an independent geotechnical engineering expert (i.e.: for waste rock dump (WRD) and tailings storage facility (TSF) design and construction methodology)

- See Appendix 7.3-E for independent review of WRD and TSF design and construction methodology.

33.2.4 an independent mine waste cover system expert (i.e.: for mine waste cover systems design)

- See Appendix 7.3-E for independent review of for mine waste cover systems design.

33.2.5 an independent geomorphology expert (i.e.: for landform design, soil and erosion management)

- See Appendix 7.3-F for independent review of Soil and Landform Management Plan, noting that all relevant information from the reviewed management plan critical for controls, current and future works and monitoring is incorporated into the PEPR.

33.2.6 an independent hydrology expert (i.e.: for surface water management)

- See Appendix 7.3-G for independent review of Surface Water Management Plan, noting that all relevant information from the reviewed management plan critical for controls, current and future works and monitoring is incorporated into the PEPR.

33.2.7 an independent hydrogeology expert (i.e.: for verification of predictive ground water models, ground water management and the extent of ground water mounding underneath the TSF)

- See Appendix 7.3-H for independent review for verification of predictive ground water models, ground water management and the extent of ground water mounding underneath the TSF.

33.2.8 an independent mining geotechnical engineering expert (i.e.: for stability of final open pit and underground stope voids)

- See Appendix 7.3-I for independent review of Geotechnical Stability of Stage 5 EFS Open Pit Design Review and Boundary Stability Assessment.

33.2.9 an independent chemical, process or metallurgical engineering expert (i.e.: for tailings densities necessary for timely construction of the TSF cover system upon cessation of tailings deposition).

- See Appendix 7.3-E for independent review of tailings densities necessary for timely construction of the TSF cover system upon cessation of tailings deposition.

34. The reports in Condition 33.2 must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.

- Refer to all appendices referenced above.

Social Management Plan

40. The Tenement Holder must prepare, implement and maintain a SMP within 12 months from the date of the grant of the Mining Tenement (in consultation with relevant State Government agencies and key community stakeholders) that addresses:

40.1 The matters described in the Mining Lease Proposal (MLP) Table 8.2-1; and

40.2 anything further that the Director of Mines directs in writing.

- See Appendix 4.1-A for the Social Management Plan (SMP).

41. The Tenement Holder must make the SMP publicly available.

- This was made publicly available on 15/09/2017 (<Hillside Social Management Plan>). Any revised versions will also be made publicly available.

Community Engagement

42. The Tenement Holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a community engagement plan (CEP) that:

42.1 Sets out the purpose, objectives and parameters of engagement with the community;

42.2 Identifies all community stakeholders likely to be affected by mining operations;

42.3 sets out the tools and techniques that the Tenement Holder intends to use for;

42.3.1 identifying community attitudes and expectations;

42.3.2 providing information to the community;

42.3.3 receiving feedback from the community;

42.3.4 analysing community feedback and considering community concerns or expectations; and

42.3.5 registering, documenting and responding to communications from members of the community;

42.4 outlines an action plan to commence the proposed engagement activities; and

42.5 addresses any further matters that the Director of Mines advises in writing.

42.6 The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Mining Tenement.

- See Appendix 4.1-B for the CEP.

7.4 Licence Conditions – Additional Information in the Program (Second Schedule)

8. In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters:

8.1. The capacity of the tenement holder to achieve compliance with the Act and the PEPR in light of its management systems, personnel, policies, procedures, practices and resources.

8.2. The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from:

8.2.1. An Independent Slurry Pipeline Engineering Expert (i.e.: for verification of the design of the concentrate slurry pipeline).

8.3. The reports referred to in paragraph 8.2 must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.

On 23 October 2017 Rex applied for a deferral for Condition 8.1 to 8.3 and duly received approval from DPC on 20 November 2017. See Appendix 7.3-A and B for copies of correspondence. Note that Condition 8.2.1 no longer applies (refer to Section 3.1.4).

7.5 Lease/Licence Conditions References

The tables below, demonstrate where lease and licence conditions (for ML6438, EML6439 and MPL146) have been addressed in the PEPR (if relevant) or demonstrates how otherwise they have or will be complied with.

Table 7-1: ML6438 conditions

ML6438	
Lease Condition (ML)	PEPR Reference
First Schedule	
Authorised Mining Operations	
1. The grant of the Mining Tenement authorises mining operations (only) for the recovery of: 1.1 copper; 1.2 gold; and 1.3 iron ore (hematite and magnetite).	Section 3
2. The grant of the Mining Tenement authorises mining operations (only) that are consistent with the mining operations described in the Mining Lease Proposal document dated August 2013 and subsequent Response Document dated 21 February 2014.	Section 3 – Table 3-1 Section 7.7
3. The grant of the Mining Tenement authorises mining operations (only) in relation to ore recovered from the Land.	Noted
Second Schedule	
Air Quality	
1. The Tenement Holder must ensure that: 1.1 The total PM_{10} dust concentration (including both ambient and mine related dust) leaving the site is less than 50µg/m^3 as a 24-hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes; or 1.2 where the total PM_{10} dust concentration entering the site exceeds 50µg/m^3 as a 24-hour (midnight to midnight) average of measurements taken at intervals of not more than 10 minutes, the total PM_{10} dust leaving the site does not exceed the measured level entering the site during that period.	Section 5.4.6 – Air quality measurement criteria
2. Subject to Condition 3 the Tenement Holder must comply with the Ambient Air Quality National Environment Protection Measure (NEPM) dust concentration standard for $PM_{2.5}$ leaving the site, measured on average over a 24-hour period (midnight to midnight) with measurements taken at intervals of not more than 10 minutes.	Section 5.4.6 – Air quality measurement criteria
3. Condition 2 is applicable unless and until the Director of Mines has notified the Tenement Holder in writing that he is satisfied that the Tenement Holder has: 3.1 demonstrated compliance with Condition 2 for a period of no less than one consecutive year after the commencement of mineral processing; and 3.2 established that PM_{10} measurements can be used as a proxy for $PM_{2.5}$ measurements.	Section 5.4.5 – Air quality future works

ML6438	
4. The Tenement Holder must ensure that; (i) the total deposited dust (TDD) leaving the site does not exceed 4g/m^2/month averaged over all 12-month periods; and (ii) the mine contribution to TDD leaving the site does not exceed 2g/m^2/month for all months.	Section 5.4.6 – Air quality measurement criteria
5. The Tenement Holder must ensure that total suspended particulates (TSP) leaving the site does not exceed an average of 120µg/m^3 for all 24-hour periods (midnight to midnight) and an average of 90µg/m^3 for any 12-month period, unless the tenement holder: 5.1 Provides information (from dust dispersion modelling, operational monitoring or otherwise) that satisfies the Director of Mines that, if the tenement holder exceeds the limits outlined above, there will be no increase in public nuisance from: 5.1.1 air emissions; and/or 5.1.2 dust generated by mining operations; and 5.2 obtains written approval from the Director of Mines to conduct mining operations subject to an alternative TSP limit or limits (on such conditions as the Director of Mines thinks fit and specifies in writing, if any); and 5.3 complies with any alternative TSP limits approved in accordance with Condition 5.2, and any associated conditions.	Section 5.4.6 – Air quality measurement criteria
6. In the event that monitoring shows that Conditions 1, 2, 4 or 5 have been breached, the Tenement Holder must immediately cease the activity which resulted in the breach.	Section 5.4.5 – Air quality controls
7. The Tenement Holder must measure chemical and toxicological composition of dust emissions generated by mining operations through an ongoing air monitoring program.	Section 5.4.6 – Air quality measurement criteria
8. The Tenement Holder must: 8.1 within 6 months of the grant of this Lease write to all third parties who have an interest within the Land, or in land within 4km of the boundary of the Land, and offer to undertake (at least annual) water quality testing of all rainwater tanks owned (or used) by those third parties; and 8.2 where a third party who has an interest within the Land, or in land within 4km of the boundary of the Land, indicates to the Tenement Holder that they wish to have rainwater tanks that they own or use tested, undertake testing of the relevant tank(s); and 8.3 if testing of a tank is undertaken, provide the third party with those test results (reported against the most recent Australian Drinking Water Guidelines (Australian Government)) within one month of the sampling	Complied with in March 2015 <https://yorke.sa.gov.au/content/uploads/Hillside-Community-Voice-Bulletin-2015-May-Rainwater-Tank-Testing.pdf> Section 7.2
9. The Tenement Holder must ensure that $PM_{2.5}$ and PM_{10} dust concentration data and meteorological monitoring data acquired by the Tenement Holder is reported in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.	Section 5.4.5 – Air quality future works

ML6438	
Noise	
10. Subject to Condition 11, the Tenement Holder must ensure that noise generated from mining operations on the Land: 10.1 is measured, for or at, all sensitive receivers in accordance with the Environment Protection (Noise) Policy 2007, under the *Environment Protection Act 1993* of South Australia; and 10.2 does not exceed the following noise limits, at those sensitive receivers: 10.2.1 56dB(A) between the hours of 7am and 10pm and 49dB(A) between the hours of 10pm and 7am within a Primary Production Zone (as delineated in the Yorke Peninsula Council Development Plan at the date that the Mining Tenement was granted, set out in the Seventh Schedule of this Tenement Document); or 10.2.2 54dB(A) between the hours of 7am and 10pm and 47dB(A) between the hours of 10pm and 7am within a Settlement Zone (as delineated in the Yorke Peninsula Council Development Plan at the date that the Mining Tenement was granted, set out in the Seventh Schedule of this Tenement Document).	Section 5.5 – Noise measurement criteria
11. The Tenement Holder can only exceed the noise levels stipulated in Condition 10 if the Director of Mines: 11.1 is satisfied, on the basis of information provided to him by an acoustic engineer, that the noise from the mining operation will not cause an adverse impact at the sensitive receiver due to the existing influence of ambient noise, or the limited duration and/or frequency of occurrence of the activity, and 11.2 provides prior approval for the exceedance.	Section 5.5 – Noise current and future works
12. The Tenement Holder must monitor noise levels on a continuous basis and report that data and meteorological monitoring data acquired by the Tenement Holder in real time to the public on an unrestricted internet site. The monitoring data must be retained and remain accessible on the unrestricted internet site for the life of the mine.	Section 5.5 – Noise measurement criteria
13. In the event that monitoring shows that Condition 10, subject to Condition 11, has been breached, the Tenement Holder must immediately cease the activity that resulted in the breach.	Section 5.5 – Noise current and future works
Meteorological Monitoring	
14. The Tenement Holder must undertake meteorological monitoring in accordance with relevant Australian standards to measure and record meteorological data including (but not limited to) wind speed and direction, temperature, humidity, atmospheric pressure, solar radiation, rainfall and evaporation.	Section 5.4 – Air quality measurement criteria
Blasting	
15. The Tenement Holder must ensure that no fly rock encroaches on third-party property unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities that would include such an encroachment.	Section 5.6 – Blasting current and future works
16. The Tenement Holder must notify property owners adjacent to and within the Land, subject to their consent, of all blasts no less than forty eight hours in advance of those blasts. *Explanatory note: the consent required is for the notification of blasting, and not the blasting itself.*	Section 5.6 – Blasting controls

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Visual Amenity	
17. The Tenement Holder must ensure that any waste temporarily stored on the Land is not visible by any third-party from any land based view point.	Section 5.7 – Visual amenity outcome and controls Section 5.20 – Commercial and industrial waste outcome
18. Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a landowner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the Land at mine completion.	Section 5.7 – Visual amenity outcome
Soil and Land Disturbance	
19. The Tenement Holder must, ensure that: 19.1 there is no contamination of land and soils either on or off site as a result of mining operations; and 19.2 no contamination of land and soils either on or off site after mine completion occurs as a result of mining operations.	Section 5.8 – Soil and land disturbance outcome Also included in Section 5.20 – Commercial and industrial waste outcome
20. The Tenement Holder must ensure that all commercial or industrial waste (which does not include tailings and waste rock) is disposed of in an Environment Protection Agency (EPA) licensed facility.	Section 5.20 – Commercial and industrial waste outcome
21. The TSF embankment must be designed and constructed using the downstream construction method.	Section 3.7.1.17 Section 5.17 – TSF controls Appendix 3.4-A – TSF feasibility level design Appendix 3.6-B – TSF operating manual
22. The TSF construction and operation must be verified by a suitably qualified independent expert approved by the Director of Mines, against the design and plans that have been adopted for the TSF construction and operation 22.1 for the initial stage of TSF construction; and 22.2 for each subsequent stage of TSF construction including the cover system; and 22.3 on an annual basis for operations or at a frequency as the Director of Mines may specify by notice in writing. 22.4 the expert must prepare reports of the findings of the verifications. The initial expert report for construction verification must be provided to the Director of Mines prior to the initial placement of tailings in the TSF and subsequent reports must be provided to the Director of Mines within 1 month of completion of the verification and all reports will be made publicly available.	Section 3.7.1.17 Section 5.17 – TSF future works Appendix 3.6-B – TSF operating manual Section 7.3 Appendix 7.3-E – Independent geotechnical engineering review
Surface Water	
23. The separate extraction of NAF and PAF from the mine, and separate placement of NAF and PAF in waste rock dumps must be verified by a suitably qualified independent expert approved by the Director of Mines on a 3-monthly basis, or at a frequency as the Director of Mines may specify by notice in writing. The expert must prepare a report of the findings of the verification and this report must be provided to the Director of Mines within 1 month of completion of the verification.	Section 3.7.1 Section 5.15 – ARD measurement

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24. The Tenement Holder must ensure that: 24.1 mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and 24.2 inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion is not caused by mining operations; 24.3 unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation).	Section 5.14 – Surface water outcome
25. The Tenement Holder must: 25.1 ensure no surface water contaminated as a result of mining operations leaves the Land; and 25.2 ensure that, apart from water contained in the pit void: 25.2.1 no surface water contaminated prior to mine completion remains within the Land after mine completion; and 25.2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Land.	Section 5.14 – Surface water outcome Section 5.15 – ARD outcome Section 5.17 – TSF outcome
Groundwater	
26. The Tenement Holder must ensure there is no adverse change to the environmental values of water within the basement fractured rock aquifer outside of the Land as a result of mining operations.	Section 5.16 – Groundwater outcome
27. The Tenement Holder must ensure there is no adverse change to the environmental values of the basement fractured rock aquifer within or outside of the Land as a result of mining operations after mine completion.	Section 5.16 – Groundwater outcome
28. The Tenement Holder must obtain approval from the Director of Mines in writing before developing any: 28.1 groundwater cut-off wellfield; or 28.2 managed aquifer recharge (MAR).	Acknowledged, but not specifically addressed in the PEPR as neither are currently planned.
Traffic	
29. The Tenement Holder must ensure all road and intersection upgrades are conducted in accordance with technical standards provided in writing by the Department for Planning Transport and Infrastructure.	Section 5.19 – Traffic control
Adjacent Land Use and Third-Party Property	
30. The Tenement Holder must ensure that the open pit mining does not extend west of a plane dipping down at 35 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder: 30.1 obtains ownership of CT 5707/273; or 30.2 obtains a registered Waiver of Exemption under the Act to undertake mining operations (inclusive of future geotechnical subsidence) on CT 5707/273; or 30.3 satisfies the Director of Mines that there is no risk that the proposed mining operations below that plane could impact on third party property and the Director of Mines has approved the proposed operations in writing (subject to such conditions as he thinks fit).	Section 5.21 – Adjacent land use and third-party property current and future work

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31. The Tenement Holder must ensure that a caving method of mining is not used below a plane dipping down at 60 degrees to the east from the property boundary of CT 5707/273 – Section 39 and 44, Hundred Plan 131200, south of latitude 6174600N unless the Tenement Holder: 31.1 obtains ownership of CT 5707/273; or 31.2 obtains a registered Waiver of Exemption under the Act or agreement to undertake mining operations (inclusive of future geotechnical subsidence) on CT 5707/273; or 31.3 satisfies the Director of Mines that there is no risk that the proposed mining operations below that plane could impact on third party property and the Director of Mines has approved the proposed operations in writing (subject to such conditions as he thinks fit).	Section 3.1.4 – Lease conditions not relevant to the PEPR No longer applicable as underground mining is not relevant to this PEPR
32. The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure.	Section 5.19 – Traffic current and future works Also included in Section 5.21 – Adjacent land use and third-party property outcome
Additional Information in the Program	
33. In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters: 33.1 The capacity of the Tenement Holder to achieve compliance with the Act and the Program in light of its management systems, personnel, policies, procedures, practices and resources. 33.2 The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from: 33.2.1 an Independent Mining and Blasting Expert (i.e.: for blasting operations) 33.2.2 an Independent Environmental Geochemist Expert (i.e.: for PAF material and metalliferous drainage management) 33.2.3 an Independent Geotechnical Engineering Expert (i.e.: for WRD and TSF design and construction methodology) 33.2.4 an Independent Mine Waste Cover System Expert (i.e.: for mine waste cover systems design) 33.2.5 an Independent Geomorphology Expert (i.e.: for landform design, soil and erosion management) 33.2.6 an Independent Hydrology Expert (i.e.: for surface water management) 33.2.7 an Independent Hydrogeology Expert (i.e.: for verification of predictive ground water models, ground water management and the extent of ground water mounding underneath the TSF) 33.2.8 an Independent Mining Geotechnical Engineering Expert (i.e.: for stability of final open pit and underground stope voids) 33.2.9 an Independent Chemical, Process or Metallurgical Engineering Expert (i.e.: for tailings densities necessary for timely construction of the TSF cover system upon cessation of tailings deposition).	Section 7.3 Appendix 7.3-B – Letter to Rex Minerals Ltd Re: Exemption from Second Schedule Condition 33.1 of ML6438 and Second Schedule Conditions 8.1 and 8.2 of MPL146 from Director Mining Regulation (20 November 2017) Appendix 7.3-C – Independent expert review – Blasting geomechanics (Blasting Geomechanics Pty Ltd, October 2017) Appendix 7.3-D –- Independent expert review – ARD Management Plan (GHD, November 2017) Appendix 7.3-E - Independent expert review – Geotechnical review of waste rock dumps and TSF, geotechnical review of cover design, geotechnical review of tailings cover system (D.Williams, December 2017)

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34. The reports in Condition 33.2 must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.	Appendix 7.3-F –– Independent expert review – Geomorphology (Hydrobiology, November 2017) Appendix 7.3-G – Independent expert review – Surface water management (Water Technology, November 2017) Appendix 7.3-H – Independent expert review – Hydrogeology (Groundwater Science, November 2017) Appendix 7.3-I –-Independent expert review – Hillside pit EFS Phase 5 open pit design report review and boundary stability assessment (AMC, November 2017)
Transparency	
35. The Tenement Holder agrees to the Approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.	Acknowledged, but not specifically addressed in the PEPR
Notification of Cessation of Operations	
36. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days, the Tenement holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.	Section 3.8.8
Decommissioning and Rehabilitation Plan	
37. Unless the Director of Mines otherwise directs, a DRP must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must: 37.1 set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR; 37.2 be prepared in accordance with any guidelines provided by the Director of Mines.	Section 3.10.1
38. The Tenement Holder must comply with a DRP approved in accordance with Condition 37 or 39 when decommissioning or rehabilitating the Land.	Acknowledged, but not specifically addressed in the PEPR
39. If, in the opinion of the Director of Mines, mining operations on the Land have substantially ceased for 2 years or more, the Director of Mines may: 39.1 require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in Condition 37; and/or 39.2 direct the Tenement Holder to rehabilitate the Land in accordance with the approved PEPR and/or any DRP.	Acknowledged, but not specifically addressed in the PEPR

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Social Management Plan	
40. The Tenement Holder must prepare, implement and maintain a social management plan (SMP) within 12 months from the date of the grant of the Mining Tenement (in consultation with relevant State Government agencies and key community stakeholders) that addresses: 40.1 the matters described in Table 8.2-1 of the Mining Lease Proposal; and 40.2 anything further that the Director of Mines directs in writing.	Section 4 Section 7 Appendix 4.1-A – Social management plan
41. The Tenement Holder must make the SMP publicly available.	<http://www.rexminerals.com.au/-/rex/Lib/Docs/170915__Hillside%20Social%20Management%20Plan_v6_final.pdf>
Community Engagement	
42. The Tenement Holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a CEP that: 42.1 Sets out the purpose, objectives and parameters of engagement with the Community; 42.2 identifies all community stakeholders likely to be affected by mining operations; 42.3 sets out the tools and techniques that the Tenement Holder intends to use for; 42.3.1 identifying community attitudes and expectations; 42.3.2 providing information to the community; 42.3.3 receiving feedback from the community; 42.3.4 analysing community feedback and considering community concerns or expectations; and 42.3.5 registering, documenting and responding to communications from members of the community; 42.4 outlines an action plan to commence the proposed engagement activities; and 42.5 addresses any further matters that the Director of Mines advises in writing. 42.6 The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Mining Tenement.	Section 4 Section 7 Appendix 4.1-B – Community engagement plan <http://www.rexminerals.com.au/-/rex/Lib/Docs/2016_09_14%20-%20Community%20Engagement%20Plan_V2.1_final.pd>
Communications Protocol	
43. The Tenement Holder must develop (in consultation with the owners of land and to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Land prior to the commencement of mining operations that includes the following matters: 43.1 Interaction with landholder operations; 43.2 emergency procedures; 43.3 communications and issue management processes; 43.4 land management; 43.5 dispute resolution; 43.6 ongoing communication about the Tenement Holder's operations; 43.7 receiving and considering feedback; 43.8 safety procedures; 43.9 access protocols; and 43.10 any matters identified by the Director of Mines in writing.	Section 5.21 – Adjacent land use and third-party property current and future works Section 4 Appendix 4.1-C – Hillside landholder communications and operating protocol (EC PRO 323)
44. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Mining Tenement.	

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Complaints Register	
45. The Tenement Holder must operate a 24 hour per day, 7 day per week, free-call telephone complaints line for the purpose of receiving complaints from members of the public in relation to mining operations.	Appendix 4.7 – Complaints management procedure (EC PRO 320) Section 4 Section 5.4 – Air quality controls and future works (to establish complaints line)
46. The Tenement Holder must take reasonable measures to notify the public of the complaints line telephone number and the fact that it is a complaints line.	
47. The Tenement Holder must establish and maintain a public complaints register. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the mining operations: 47.1 the time at which the complaint was received; 47.2 all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; 47.3 the subject-matter of the complaint; 47.4 the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and 47.5 if no action was taken by the tenement holder, the reasons why no action was taken.	
48. All records in respect of the public complaints must be maintained for a period of at least 7 years.	
49. The Tenement Holder must make the public complaints register publicly available except for the name and contact details of each complainant.	
Other Legislation	
50. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant the grant of the Mining Tenement including (but not limited to) the: *50.1 Environment Protection and Biodiversity Conservation Act 1999;* *50.2 Development Act 1993;* *50.3 Dangerous Substances Act 1979;* *50.4 National Parks and Wildlife Act 1972;* *50.5 Marine Parks Act 2007;* *50.6 Natural Resources Management Act 2004;* *50.7 Public and Environmental Health Act 1987;* *50.8 Radiation Protection and Control Act 1982;* *50.9 Aboriginal Heritage Act 1988;* *50.10 Heritage Places Act 1993* *50.11 Work Health and Safety Act 2012;* *50.12 Environment Protection Act 1993;* *50.13 Native Vegetation Act 1991;* *50.14 Mines and Works Inspection Act 1920;* *50.15 Harbors and Navigation Act 1993; and* 50.16 *Road Traffic Act 1961.*	Listed as appropriate in the applicable legislation sections throughout Section 5. Note that the Harbors and Navigation Act is no longer relevant to this proposal. Also addressed in Section 5.0 – Hillside Mining Lease Proposal

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Sixth Schedule	
Air Quality Outcomes	
1. The Tenement Holder must ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.	Section 5.4 – Air quality outcome Section 5.17 – TSF outcome
2. The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through: 2.1 clearance, 2.2 dust/contaminant deposition, 2.3 fire, 2.4 reduction in water supply, or 2.5 other damage, unless prior approval under the relevant legislation is obtained.	Dust/Contaminant deposition addressed in Section 5.4 – Air quality outcome Section 5.17 – TSF outcome
3. The Tenement Holder must, in construction, operation and post-mine completion, ensure no impacts to agricultural productivity for third party land users on or off the Land as a result of mining operations, including: 3.1 reduction in crop yield; 3.2 reduction in grain quality; or 3.3 adverse health impacts to livestock.	Section 5.4 – Air quality outcome Section 5.17 – TSF outcome
Air Quality Strategies	
4. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 1; 4.1 undertake continuous dust and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria. 4.2 progressive rehabilitation and stabilisation of disturbed areas undertaken throughout the life of mine to control dust emissions generated by wind erosion.	Section 5.4 – Air quality measurement criteria Section 3.10
Air Quality Criteria	
5. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome in Sixth Schedule Clause 1; 5.1 measure PM_{10} dust concentration using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard. 5.2 Measure TDD using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard. 5.3 Measure TSP using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard. 5.4 DDD is to be measured using monitoring equipment and instruments that are recognised by a relevant International or Australian Standard. 5.5 Measure $PM_{2.5}$ dust concentration including both ambient and mine related dust using monitoring methodology, equipment and instruments that are recognised by a relevant International or Australian Standard.	Section 5.4 – Air quality measurement criteria

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Noise Outcome	
6. The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the date that this Mineral Lease was granted.	Section 5.5 – Noise control and management strategies
Noise Strategies	
7. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 6: 7.1 Ensure the strategies associated with the design, control and management of all noise sources mitigate, or eliminate noise characteristics as defined by the relevant environment protection noise policy. 7.2 At a minimum, implement all noise mitigation strategies described in the Proposal and Response Document. 7.3 Investigate and implement further additional design and engineering measures or strategies to ensure achievement of the outcome in Sixth Schedule Clause 6, specifically in relation to the mitigation and elimination of noise characteristics as defined by the relevant environment protection noise policy. 7.4 The presence, or otherwise, of tonal/modulating/impulsive/low frequency noise characteristics must be verified by a suitably qualified independent acoustic engineer (approved by the Director of Mines) within 3 months of the commencement of earthworks, or at a time as the Director of Mines may specify by notice in writing. The acoustic engineer must prepare a report of the findings of the verification, and this report must be provided to the Director of Mines within 1 month of the completion of the verification. 7.5 Undertake continuous noise and meteorological monitoring to inform decisions for operational response and contingency measures to be implemented to prevent exceedance of compliance criteria.	Section 5.5 – Noise control and management strategies Section 5.5 – Noise current and future work plan
Noise Criteria	
8. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome in Sixth Schedule Clause 6; 8.1 criteria must include calculated noise limits as derived from the Environment Protection (Noise) Policy, and be consistent with Second Schedule Condition 10. 8.2 Mine noise measured at, or for, noise-affected premises must be adjusted in accordance with the relevant environment protection noise policy by the inclusion of a penalty for each characteristic where tonal/modulating/impulsive/low frequency characteristics are present as identified by an acoustic engineer.	Section 5.5 – Noise measurement criteria Section 5.5 – Noise current and future work plan
Blasting Outcome	
9. The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to: 9.1 Public safety, 9.2 human comfort, 9.3 third-party property (including stock), 9.4 adjacent land use, 9.5 aircraft, or 9.6 other receptors, from air blast, fly rock and vibration caused by blasting.	Section 5.6 – Blasting outcome

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Blasting Strategies	
10. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 8; 10.1 develop strategies for the management of impacts from blasting, including the determination of blast exclusion zones, in accordance with relevant standards including the Australian Standard AS2187.2; 10.2 develop strategies for establishing and implementing a blast exclusion zone between any third party property, and the designated blast area, for all blasting events during mining operations; 10.3 develop strategies to ensure that the blast exclusion zone is maintained between the public and the designated blast area, for all blasting events during mining operations. 10.4 A blasting protocol and blasting schedule will be developed in consultation with residents of land within and adjoining the Land to reflect the needs of the neighbouring land use practices (including aerial crop dusting).	Section 5.6 – Blasting controls
11. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to the outcome in Sixth Schedule Clause 8; 11.1 blasting criteria is set in accordance with the Australian Standard AS2187.2. 11.2 Measurements taken to demonstrate achievement of the outcome in Sixth Schedule Clause 8 must be taken in accordance with Australian Standard AS2187.2.	Section 5.6 – Blasting controls
Visual Amenity Outcomes	
12. The Tenement Holder must, in construction, operation and post-mine completion, ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.	Section 5.7 – Visual amenity outcome
13. The Tenement Holder must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations.	Section 5.7 – Visual amenity outcome
Visual Amenity Strategies	
14. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 11; 14.1 develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to): 14.1.1 Screening of prominent built structures where practicable and use of non-reflective, natural coloured materials; 14.1.2 establishing vegetation and mature trees to screen built infrastructure and minimise views into the site; 14.1.3 positioning and design of permanent mine landforms or other earthen bunds to screen activities; 14.1.4 sculpture permanent mine landforms to soften the visual impact and reflect surrounding landscape; 14.1.5 prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan; 14.1.6 rehabilitation of the final batters immediately following the completion of each WRD lift; 14.1.7 vegetate external faces of permanent mine landforms where practical to reduce the impact of changes in landscape colour.	Section 5.7 – Visual amenity controls

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Soil and Land Disturbance Outcomes	
15. The Tenement Holder must, in construction, operation and post-mine completion ensure that the existing (pre-mining) soil quality and quantity is maintained.	Section 5.8 – Soil and land disturbance outcome Section 5.17 – TSF outcome
16. Before mine completion, the Tenement Holder must satisfy the Director of Mines that where practicable, the pre-mining land use can be recommenced after mine completion.	Section 5.8 – Soil and land disturbance outcome
Soil and Land Disturbance Strategies	
17. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clauses 14 and 15; 17.1 strategies to achieve recovery of topsoil and subsoil from areas to be disturbed by mining operations. 17.2 Strategies for maintaining the quality and quantity of stockpiled soil/s until such time that its used for rehabilitation purposes. 17.3 Strategies for reinstatement of these soils so as to maximise the likelihood of achieving the outcome in Sixth Schedule Clauses 14 and 15. 17.4 An auditable record of soil movement including recovery, stockpiling and reinstatement. 17.5 Strategies for the establishment of post-mine completion land uses and areas, including the re-establishment of land for agriculture, must be consistent with Section 6.9.3 and 6.9.4 of the Mining Lease Proposal. 17.6 A plan for establishing appropriate mechanisms to ensure effective transfer of responsibility or any maintenance of the site and control of any future development post-completion.	Section 5.8 – Soil and land disturbance outcome
Soil and Land Disturbance Criteria	
18. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to impact event Sixth Schedule Clauses 14 and 15: 18.1 Baseline data to characterise the pre-mining condition of all soils within the Land.	Section 5.8 – Soil and land disturbance current and future works
Soil and Land Disturbance Outcomes – TSF and WRD	
19. The Tenement Holder must ensure that the WRD and TSF final landforms will be physically stable post-mine completion.	Section 5.8 – Soil and land disturbance measurement criteria Section 5.17 – TSF outcome
20. The Tenement Holder must, in construction, operation and post-mine completion, ensure that water seepage from the TSF, WRDs or ore stockpiles does not result in adverse impacts on adjacent land uses including, but not limited to, growth of native vegetation and cropping land.	Section 5.15 – ARD outcome Section 5.16 – Groundwater outcome Section 5.17 – TSF outcome

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Soil and Land Disturbance Strategies – TSF and WRD	
21. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Second Schedule Conditions 19 (soil) and 25 (surface water), and Sixth Schedule Clauses 18 and 19: 21.1 The design, construction, operation and closure of the Tailings Storage Facility must be prepared in accordance with, but not limited to, the most recent ANCOLD guidelines relating to Tailings Dams; 21.2 specify the minimum freeboard height and maximum supernatant pond dimensions for the Tailings Storage Facility. The maximum dimensions of the supernatant pond must be consistent with the method of sub-aerial deposition of tailings. 21.3 The Tenement Holder must cease deposition of tailings to the TSF if the limits for freeboard height or supernatant pond dimensions specified as a result of Clause 20.2 are exceeded and report this exceedance to the Director of Mines within 24 hours of becoming aware of it. 21.4 Strategies for the control of seepage through the TSF base and walls. 21.5 Strategies for achieving and maintaining design tailings discharge densities and tailings consolidation rates to ensure timely construction of the cover system post-cessation of tailings deposition. 21.6 Tailings discharge density trigger limits and remedial actions to ensure design densities are achieved. 21.7 Quality control arrangements for all stages of construction of the TSF including supervision by appropriately qualified and experienced persons, documented procedures, quality control testing and record keeping. 21.8 A leak detection program for monitoring seepage through the base of the TSF. 21.9 The design construction and maintenance of mine waste cover systems including, but not limited to, a detailed cover system design, construction methodology, cover system modelling and provision of a program of works for field trials and collection of site specific data to validate/calibrate the model(s).	Section 3.2.12 Section 3.7.1 Section 5.17 – TSF controls, TSF future works and TSF measurement Section 7.3 Appendix 7.3-E – Independent geotechnical engineering expert review and independent mine waste cover system expert review and chemical, process or metallurgical engineering expert review Appendix 3.6-B –TSF operating manual
Native Vegetation Outcome	
22. The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off the Land through; 22.1 clearance, 22.2 dust/contaminant deposition, 22.3 fire, 22.4 reduction in water supply, or 22.5 other damage, unless prior approval under the relevant legislation is obtained.	Section 5.10 – Native vegetation outcome Dust/Contamination deposition also addressed in Section 5.4 – Air quality
Native Fauna Outcome	
23. The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mining operations that could reasonably have been prevented.	Section 5.11 – Native fauna outcome Section 5.17 – TSF outcome

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Weeds, Pest and Pathogens Outcome	
24. The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species in the Land compared to adjoining land.	Section 5.12 – Weeds, pests and pathogens outcome
Weeds, Pest and Pathogens Criteria	
25. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to Sixth Schedule Clause 23; 25.1 representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the Land prior to commencement of mine operations.	Section 5.12 – Weeds, pests and pathogens current and future works
Coastal and Marine Outcome	
26. The Tenement Holder must ensure no loss of abundance and diversity of marine flora and fauna from contaminants and dust deposition resulting from mining operations, during operations and post-mine completion.	Section 5.9 – Coastal and marine outcome Control of airborne contaminants and dust also addressed in Section 5.4 – Air quality
Heritage Outcome	
27. The Tenement Holder must, in construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.	Section 5.13 – Heritage outcome
Heritage Strategies	
28. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clause 26: 28.1 An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.	Section 5.13 – Heritage controls and future works Hillside Mining Lease Proposal Appendix 5.15-A to 5.15-C

ML6438	
Surface Water Strategies	
29. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Second Schedule Condition 25: 29.1 Locate the TSF emergency spillway to ensure any overflow reports to the open pit. 29.2 Determine a sulphur cut-off grade for PAF material through further testing for each waste rock unit. 29.3 Block modelling the sulphur distribution of all waste and ore to be mined for the purpose of determining the distribution and estimating the volume of NAF and PAF using the sulphur cut-off grade. 29.4 Integration of the sulphur model with the geological model to provide confidence in the definition of PAF boundaries, potential zones of high neutralising capacity and potential geological controls on mineralisation. 29.5 Procedures for regularly updating the models with new geological and sulphur assay data collected in the course of mine production operations. 29.6 Procedures for ensuring PAF and NAF boundaries derived from the sulphur cut-off and the sulphur block model are included in open pit bench plans. 29.7 Procedures for assaying the sulphur content of drill cuttings, produced during the course of blast hole drilling, for verifying PAF and NAF information plotted on open pit bench plans to provide a final check that all PAF and NAF materials have been correctly identified. 29.8 Procedures and recording systems for selective mining of the identified PAF and NAF materials and separate placement in accordance with the waste rock dump design. 29.9 Construction of waste rock dumps in small lifts using placement methods that prevent the separation and sorting of the larger and smaller particles of the waste rock, with each lift compacted by waste haul trucks, 29.10 Waste rock dumps designed and constructed for the selective placement of the total volume of PAF material with it effectively encapsulated by NAF. 29.11 A program for determining the erodibility of waste rock to ensure that no erodible waste rock is placed immediately underneath subsoil on external batters. 29.12 Waste rock dumps designed to ensure PAF material is not exposed as a result open pit wall failure post-mine completion. 29.13 Strategies included in any guidelines provided by the Director of Mines.	Section 3.7.1 Section 5.15 – ARD controls and ARD future works Section 5.17 – TSF controls Appendix 3.4-A – TSF feasibility level design report Appendix 3.9-A – Surface water infrastructure design
30. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clause 41: 30.1 No change in surface water flow across third party property that could prevent achievement of the outcome in Sixth Schedule Clause 41 unless otherwise agreed by the affected third party. 30.2 A plan for establishing appropriate mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post-mine completion. 30.3 Progressive landform stabilisation methods and utilisation of energy dissipation where necessary to minimise sediment loads in run-off from disturbed areas and landforms.	Section 3.8.7 Section 5.14.5 – Surface water future works

ML6438	
Groundwater Strategies	
31. The Tenement Holder must provide a calibrated ground water model in the proposed PEPR.	Section 5.16 – Groundwater future works (cannot calibrate until data is available for calibration) Groundwater management plan
32. The Tenement Holder must establish a program for the establishment and ongoing calibration of the transient ground water model using data obtained from groundwater monitoring within the PEPR.	Section 5.16 – Groundwater future works Appendix 7.3-H – Independent hydrogeological expert review
33. The Tenement Holder must provide a calibrated transient groundwater model within 1 year from the approval of the PEPR.	Section 5.16 – Groundwater future works Appendix 7.3-H – Independent hydrogeological expert review
34. The Tenement Holder must establish a program for the ongoing calibration of the pit lake geochemistry and hydrogeological models using data obtained from operational monitoring to address any assumptions and uncertainty within the model.	Section 5.16 – Groundwater future works Appendix 7.3-H – Independent hydrogeological expert review
Groundwater Criteria	
35. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to the Second Schedule Conditions 26 and 27: 35.1 Establish representative baseline water quality data for the basement fractured rock aquifer underlying the Land. 35.2 Establish compliance groundwater monitoring bores adjacent to the lease boundaries that are of sufficient density and depth to detect movement of groundwater off the Land.	Section 5.16 – Groundwater future works and measurement criteria Groundwater management plan
Public Safety Outcomes	
36. The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented.	Section 5.18 – Public safety outcome Also included in Section 5.8 – Soil and land disturbance measurement criteria
37. The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.	Section 5.18 – Public safety outcome Also included in Section 5.21 – Adjacent land use and third-party property outcome
38. The Tenement Holder must demonstrate that post-mine completion, the risks to the health and safety of the public so far as it may be affected by mining operations are as low as reasonably practicable.	Section 5.18 – Public safety outcome

ML6438	
Public Safety Strategies	
39. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clause 37: 39.1 Develop strategies to ensure final landform design for the open pit void meets the outcome for protection of public safety post-mine completion and in the long term to address the following potential hazards (but not limited to); 39.1.1 the risk of falling; 39.1.2 the risk of drowning; 39.1.3 the risk of vehicle incidents/accidents; and 39.1.4 ground instability. 39.2 A plan for establishing appropriate mechanisms to ensure effective transfer of responsibility for any maintenance of the site and control of any future development post-mine completion.	Section 5.18 – Public safety controls
Traffic Outcomes	
40. The Tenement Holder must, in construction and operation, ensure that no public impacts off the Land are caused by, noise, dust and/or dragout to and from the Land associated with mine related traffic.	Section 5.19 – Traffic outcome
41. The Tenement Holder must, in constructing and operating this Mineral Lease, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.	Section 5.19 – Traffic outcome Also identified in Section 5-18 – Public safety as an outcome
Adjacent Land Use and Third-Party Property Outcomes	
42. The Tenement Holder must during construction, operation and post-mine completion, ensure that there are no adverse impacts to third party land use on property adjacent to and on the Land as a result of mining operations, other than those agreed between the Tenement Holder and the affected user.	Section 5.21 – Adjacent land use and third-party property outcome
43. The Tenement Holder must, in construction, operation and post-mine completion, ensure no impacts to agricultural productivity for third-party land users on or off the Land as a result of mining operations, including; 43.1 reduction in crop yield; 43.2 reduction in grain quality; or 43.3 adverse health impacts to livestock.	Section 5.21 – Adjacent land use and third-party property outcome
44. The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.	Section 5.21 – Adjacent land use and third-party property outcome Also identified in Section 5-18 – Public safety as an outcome
45. The Tenement Holder must, during construction, operation and post-mine completion, ensure that as a result of a geotechnical failure caused by mining; 45.1 there are no adverse impacts to adjacent land use; and 45.2 there is no unauthorised damage to public or private property and infrastructure.	Section 5.21 – Adjacent land use and third-party property outcome
46. The Tenement Holder must, in construction and operation, ensure that there are no adverse impacts to adjacent land use as a result of light spill caused by mining operations.	Section 5.21 – Adjacent land use and third-party property outcome

ML6438	
Adjacent Land Use and Third-Party Property Strategies	
47. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clause 42; 47.1 develop strategies for the design of waste rock dumps to ensure no impact from shading to agricultural productivity for third party land users on or off the Land.	Section 5.21 – Adjacent land use and third-party property context
48. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clause 45; 48.1 adhere to Australian Standard AS 4282-1997 Control of the obtrusive effects of outdoor lighting.	Section 5.7 – Visual amenity controls

Table 7-2: EML6439 conditions

EML6439	
Lease Condition (EML)	PEPR Reference
First Schedule	
Authorised Mining Operations	
1. Mining operations authorised by the grant of the Mining Tenement must: 1.1 Only be for the recovery of extractive minerals from stockpiles of excess overburden from the operations associated with the realignment of the Yorke Highway and St Vincent Highway within the Land; and 1.2 Be consistent with the mining operations described in the Mining Lease Proposal document dated August 2013 and subsequent Response Document dated 21 February 2014.	Section 3 – Table 3-1 Section 7.7 Section 3 in general
Second Schedule	
Surface Water	
1. The Tenement Holder must ensure that: 1.1 Mining operations do not cause inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing); and 1.2 inundation of third party property and infrastructure by water (to a greater extent than would be expected to occur prior to mining operations commencing) after mine completion is not caused by mining operations; unless the Tenement Holder obtains a registered Waiver of Exemption under the Act to undertake mining activities (inclusive of inundation).	Section 5.14 – Surface water outcome
2. The Tenement Holder must: 2.1 Ensure no surface water contaminated as a result of mining operations leaves the Land; and 2.2 ensure that: 2.2.1 no surface water contaminated prior to mine completion remains within the Land after mine completion; and 2.2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Land.	Section 5.14 – Surface water outcome
Transparency	
3. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports submitted in accordance with the Regulations, being made available for public inspection.	Acknowledged, but not specifically addressed in the PEPR
Notification of Cessation of Operations	
4. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the Tenement Holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.	Section 3.8.8

EML6439	
Decommissioning and Rehabilitation Plan	
5. Unless the Director of Mines otherwise directs, a DRP must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must: 5.1 Set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR; 5.2 be prepared in accordance with any guidelines provided by the Director of Mines.	Section 3.10.1
6. The Tenement Holder must comply with a DRP approved in accordance with Condition 5 or 7 when decommissioning or rehabilitating the Land.	Acknowledged, but not specifically addressed in the PEPR
7. If, in the opinion of the Director of Mines, mining operations on the Land have substantially ceased for 2 years or more, the Director of Mines may: 7.1 Require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in Condition 5; and/or 7.2 direct the Tenement Holder to rehabilitate the Mining Tenement in accordance with the approved PEPR and/or any DRP.	Acknowledged, but not specifically addressed in the PEPR
Communication Protocol	
8. The Tenement Holder must develop (to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to and on the Land (subject to the agreement of the owners of land) prior to the commencement of mining operations that includes the following matters: 8.1 Interaction with landholder operations; 8.2 emergency procedures; 8.3 communications and issue management processes; 8.4 land management; 8.5 dispute resolution; 8.6 ongoing communication about the Tenement Holder's operations; 8.7 receiving and considering feedback; 8.8 safety procedures; 8.9 access protocols; and 8.10 any matters identified by the Director of Mines in writing.	Section 5.21 – Adjacent land use and third-party property current and future works Section 4 Appendix 4.1-C – Hillside landholder communications and operating protocol (EC PRO 323)
9. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Mining Tenement.	
Complaints Register	
10. The Tenement Holder must operate a 24 hour per day, 7 day per week, free-call telephone complaints line for the purpose of receiving complaints from members of the public in relation to mining operations.	Appendix 4.7 – Complaints management procedure (EC PRO 320) Section 4 Section 5.4 – Air quality controls
11. The Tenement Holder must take reasonable measures to notify the public of the complaints line telephone number and the fact that it is a complaints line.	

EML6439	
12. The Tenement Holder must establish and maintain a public complaints register. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the mining operations: 12.1 The time at which the complaint was received; 12.2 all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; 12.3 the subject-matter of the complaint; 12.4 the action taken by the tenement holder in relation to the complaint, including any follow-up contact with the complainant; and 12.5 if no action was taken by the tenement holder, the reasons why no action was taken.	and future works (to establish complaints line)
13. All records in respect of the public complaints must be maintained for a period of at least 7 years.	
14. The Tenement Holder must make the public complaints register publicly available except for the name and contact details of each complainant.	
Other Legislation	
15. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to): *15.1 Environment Protection and Biodiversity Conservation Act 1999;* *15.2 Development Act 1993;* *15.3 Dangerous Substances Act 1979;* *15.4 National Parks and Wildlife Act 1972;* *15.5 Marine Parks Act 2007;* *15.6 Natural Resources Management Act 2004;* *15.7 Public and Environmental Health Act 1987;* *15.8 Radiation Protection and Control Act 1982;* *15.9 Aboriginal Heritage Act 1988;* *15.10 Heritage Places Act 1993;* *15.11 Work Health and Safety Act 2012;* *15.12 Environment Protection Act 1993;* *15.13 Native Vegetation Act 1991;* *15.14 Mines and Works Inspection Act 1920;* *15.15 Harbours and Navigation Act 1993; and* 15.16 *Road Traffic Act 1961.*	Listed as appropriate in the Applicable Legislation sections throughout Section 5 Note that the Harbors and Navigation Act is no longer relevant to this proposal. Also addressed in Hillside Mining Lease Proposal – Section 5.0
Sixth Schedule	
Air Quality Outcomes	
1. The Tenement Holder must, in construction, operation and post-mine completion, ensure that there are no public health and/or public nuisance impacts from air emissions and/or dust generated by mining operations.	Section 5.4 – Surface water outcomes
Noise Outcome	
2. The Tenement Holder must, in construction and operation, ensure noise emanating from mining operations is in accordance with the current amenity as defined by the Yorke Peninsula Council Development Plan at the time of lease grant, set out in the Seventh Schedule of this Tenement Document.	Section 5.5 – Noise

EML6439	
Noise Strategies	
3. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 2; 3.1 the Tenement Holder must ensure that separation distances between any extractive stockpiles and Pine Point ensure the achievement of the outcome in Sixth Schedule Clause 2.	Section 5.5 – Noise control and management strategies Section 5.5 – Noise measurement criteria
Visual Amenity Outcome	
4. The Tenement Holder must, in construction, operation and post-mine completion, ensure that the form, contrasting aspects and reflective aspects of mining operations are visually softened to blend in with the surrounding landscape.	Section 5.7 – Visual amenity outcome Note there will be no stockpiles remaining within the EML at relinquishment
Visual Amenity Strategies	
5. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Sixth Schedule Clause 4; 5.1 develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but not limited to): 5.1.1 Screening of prominent built structures and use of non-reflective, natural coloured materials. 5.1.2 Prompt rehabilitation of disturbed areas once no longer required for mining operations, utilising every available opportunity provided by the mine plan.	Section 5.7 – Visual amenity controls
Soil and Land Disturbance Outcome	
6. The Tenement Holder must, in construction, operation and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained.	Section 5.8 – Soil and land disturbance outcome
Native Vegetation Outcome	
7. The Tenement Holder must not clear any native vegetation on the Land other than in accordance with the realignment of the St Vincent Highway and the realignment of the Yorke Highway.	Section 5.10 – Native vegetation outcome
Weeds, Pest and Pathogens Outcome	
8. The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species on the Land compared to adjoining land.	Section 5.12 – Weeds, pests and pathogens outcome
Heritage Outcome	
9. The Tenement Holder must, in construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.	Section 5.13 – Heritage outcome

EML6439	
Heritage Strategies	
10. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Sixth Schedule Clause 9: 10.1 An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.	Section 5.13 – Heritage controls and future works Hillside Mining Lease Proposal Appendix 5.15-A to 5.15-C
Surface Water Strategies	
11. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to Second Schedule Conditions 1 and 2: 11.1 No change in surface water flow across third party property that could prevent achievement of the outcome in Second Schedule Condition 1 unless otherwise agreed by the affected third party. 11.2 Progressive landform stabilisation methods and utilisation of energy dissipation where necessary to minimise sediment loads in run-off from disturbed areas and landforms.	Section 5.14 – Surface water outcome
Public Safety Outcomes	
12. The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented.	Section 5.18 – Public safety outcome
13. The Tenement Holder must in construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mining operations.	Section 5.18 – Public safety outcome Also included in Section 5.21 – Adjacent land use and third-party property outcome
Traffic Outcomes	
14. The Tenement Holder must, in construction and operation, ensure that no public impacts offsite are caused by noise, dust and/or dragout to and from the mine associated with mine related traffic.	Section 5.19 – Traffic outcome
15. The Tenement Holder must, in construction and operation, ensure that there are no traffic accidents involving the public at mine access points that could have been reasonably prevented by the Tenement Holder.	Section 5.19 – Traffic outcome Also identified in Section 5-18 – Public safety as an outcome

Table 7-3: MPL146 conditions

MPL146	
Lease Condition (MPL)	**PEPR Reference**
First Schedule	
Authorised Mining Operations	
1. The Mining Tenement is granted for the purpose: 1.1 Of constructing, operating and maintaining water and concentrate pipelines, and 1.2 a high voltage power line, directly related to the conduct of mining operations authorised under mining tenement ML6438.	Section 3
2. Mining operations on the Land must be consistent with the activities described in the Miscellaneous Purposes Licence management plan dated August 2013 and subsequent response document dated 21 February 2014.	Section 3 – Table 3-1 Section 7.7
Second Schedule	
Visual Amenity	
1. Unless the Director of Mines has approved (in writing) an alternative agreement between the Tenement Holder and a land owner relating to the removal of infrastructure, the Tenement Holder must ensure that all infrastructure is decommissioned and removed from the Land at mine completion.	Section 5.7 – Visual amenity outcome
Soil and Land Disturbance	
2. The Tenement Holder must, in construction, operation, and post-mine completion, ensure that the existing (pre-mining) soil quality and quantity is maintained.	Section 5.8 – Soil and land disturbance outcome
Weeds	
3. The Tenement Holder must, in construction, operation and post-mine completion, ensure no introduction of new species of weeds, plant pathogens or pests (including feral animals), nor sustained increase in abundance of existing weed or pest species on the Land compared to adjoining land.	Section 5.12 – Weeds, pests and pathogens outcome
Surface Water	
4. The Tenement Holder must: 4.1 Ensure no surface water contaminated as a result of mining operations leaves the Land; and 4.2 ensure that; 4.2.1 no surface water contaminated prior to mine completion remains within the Land after mine completion; and 4.2.2 no contamination of surface water occurs after mine completion as a result of mining operations within the Land.	Section 5.14 – Surface water outcome Section 5.15 – ARD outcome

MPL146	
Groundwater	
5. The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments outside of the Land as a result of site operations.	No longer applicable as the EFS design does not include a concentrate pipeline nor a return sea water line relevant to this PEPR.. There are no other activities that would influence the shallow aquifer planned for the MPL
6. The Tenement Holder must ensure there is no adverse change to the environmental values of the groundwater within the shallow Cainozoic age sediments within or outside of the Land after mine completion.	
Adjacent Land Use and Third-Party Property	
7. The Tenement Holder must ensure any activities undertaken on the road or road reserve are conducted in accordance with any written requirements of the Department for Planning Transport and Infrastructure.	Section 5.21 – Adjacent land use and third-party property outcome
Additional Information in the PEPR	
8. In accordance with section 70B(2)(d) of the Act it is a condition of the grant of the Mining Tenement that a proposed PEPR submitted in accordance with Part 10A of the Act must include reports from suitably qualified independent experts on the following matters: 8.1 The capacity of the tenement holder to achieve compliance with the Act and the PEPR in light of its management systems, personnel, policies, procedures, practices and resources. 8.2 The effectiveness of the proposed strategies in the proposed PEPR achieving the environmental outcomes identified in the proposed PEPR, including but not limited to reports from: 8.2.1 An Independent Slurry Pipeline Engineering Expert (i.e.: for verification of the design of the concentrate slurry pipeline). 8.3 The reports referred to in paragraph 8.2 must include identification of any risks, assumptions and uncertainties associated with the relevant strategies.	Condition 8.1, 8.2 and 8.3: Appendix 7.3-B – Letter to Rex Minerals Ltd Re: Exemption from Second Schedule Condition 33.1 of ML6438 and Second Schedule Conditions 8.1 and 8.2 of MPL146 from Director Mining Regulation (20 November 2017) Condition 8.2.1: Section 3.1.4 – Lease conditions not relevant to PEPR. No longer applicable as the EFS design does not include a slurry pipeline relevant to this PEPR
Transparency	
9. The Tenement Holder agrees to the approved PEPR and any compliance reports and reportable incident reports, submitted in accordance with the Regulations, being made available for public inspection.	Acknowledged, but not specifically addressed in the PEPR
Notification of Cessation of Operations	
10. Within 30 days of becoming aware of any event or decision which is likely to give rise to the cessation of mining operations for a period of more than 7 days and prior to the cessation of mining operations, the Tenement Holder must notify the Director of Mines in writing of the event or decision. The notice must specify the date upon which the mining operations are expected to cease, or have ceased and an estimate of the period of cessation.	Section 3.8.8

MPL146	
Decommissioning and Rehabilitation Plan	
11. Unless the Director of Mines otherwise directs, a DRP must be submitted to the Director of Mines for approval within 30 days of any decision or event that is likely to give rise to the permanent cessation of mining operations, and that DRP must: 11.1 Set out the activities and scheduling required for the carrying out of the rehabilitation works specified in the approved PEPR; and 11.2 Be prepared in accordance with any guidelines provided by the Director of Mines.	Section 3.10.1
12. The Tenement Holder must comply with a DRP approved in accordance with Condition 11 or 13 when decommissioning or rehabilitating the Mining Tenement.	Acknowledged, but not specifically addressed in the PEPR
13. If, in the opinion of the Director of Mines, mining operations on the Land have substantially ceased for 2 years or more, the Director of Mines may: 13.1 Require that the Tenement Holder submits a DRP for approval dealing with the requirements set out in Condition 11; and/or 13.2 direct the Tenement Holder to rehabilitate the Land in accordance with the approved PEPR and/or any DRP.	Acknowledged, but not specifically addressed in the PEPR
Community Engagement	
14. The Tenement Holder must prepare, implement and maintain (to the satisfaction of the Director of Mines) a Community Engagement Plan (CEP) that: 14.1 Sets out the purpose, objectives and parameters of engagement with the Community; 14.2 identifies all community stakeholders likely to be affected by mining operations; 14.3 sets out the tools and techniques that the Tenement Holder intends to use for; 14.3.1 identifying community attitudes and expectations; 14.3.2 providing information to the community; 14.3.3 receiving feedback from the community; 14.3.4 analysing community feedback and considering community concerns or expectations; and 14.3.5 registering, documenting and responding to communications from members of the community; 14.4 outlines an action plan to commence the proposed engagement activities; and 14.5 addresses any further matters that the Director of Mines advises in writing.	Section 4 <http://www.rexminerals.com.au/-/rex/Lib/Docs/2016_09_14%20-%20Community%20Engagement%20Plan_V2.1_final.pdf>
15. The CEP must be submitted to the Director of Mines for approval within three months of the grant of the Mining Tenement.	

MPL146	
Communications Protocol	
16. The Tenement Holder must develop (in consultation with the owners of land and to the satisfaction of the Director of Mines) a communication and operating protocol between itself and owners of land adjacent to the Land and on the Land prior to the commencement of mining operations that includes the following matters; 16.1 interaction with landholder operations; 16.2 emergency procedures; 16.3 communications and issue management processes; 16.4 land management; 16.5 dispute resolution; 16.6 ongoing communication about the Tenement Holder's operations; 16.7 receiving and considering feedback; 16.8 safety procedures; 16.9 access protocols; and 16.10 any matters identified by the Director of Mines in writing.	Section 5.21 – Adjacent land use and third-party property current and future works Appendix 4.1-C – Landholder communications and operating protocol (EC PRO 323) Section 4
17. The Tenement Holder must maintain and adhere to the protocol to the satisfaction of the Director of Mines for the term of the Mining Tenement.	
Complaints Register	
18. The Tenement Holder must operate a 24-hour-per-day, 7-day-per-week, free-call telephone complaints line for the purpose of receiving complaints from members of the public in relation to mining operations.	Appendix 4.7 – Complaints management procedure (EC PRO 320) Section 4 Section 5.4 – Air quality controls and future works (to establish complaints line)
19. The Tenement Holder must take reasonable measures to notify the public of the complaints line telephone number and the fact that it is a complaints line.	
20. The Tenement Holder must establish and maintain a public complaints register. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the mining operations: 20.1 The time at which the complaint was received; 20.2 all personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect; 20.3 the subject-matter of the complaint; 20.4 the action taken by the Tenement Holder in relation to the complaint, including any follow-up contact with the complainant; and 20.5 if no action was taken by the Tenement Holder, the reasons why no action was taken.	
21. All records in respect of the public complaints must be maintained for a period of at least 7 years.	
22. The Tenement Holder must make the public complaints register publicly available except for the name and contact details of each complainant.	

MPL146	
Other Legislation	
23. The Tenement Holder must comply with all State and Commonwealth legislation and regulations applicable to the activities undertaken pursuant to this lease including (but not limited to) the: 23.1 *Environment Protection and Biodiversity Conservation Act 1999;* 23.2 *Development Act 1993;* 23.3 *Dangerous Substances Act 1979;* 23.4 *National Parks and Wildlife Act 1972;* 23.5 *Marine Parks Act 2007;* 23.6 *Natural Resources Management Act 2004;* 23.7 *Public and Environmental Health Act 1987;* 23.8 *Radiation Protection and Control Act 1982;* 23.9 *Aboriginal Heritage Act 1988;* 23.10 *Heritage Places Act 1993* 23.11 *Work Health and Safety Act 2012;* 23.12 *Environment Protection Act 1993;* 23.13 *Native Vegetation Act 1991* 23.14 *Mines and Works Inspection Act 1920;* 23.15 *Harbours and Navigation Act 1993; and* 23.16 *Road Traffic Act 1961.*	Listed as appropriate in the Applicable Legislation sections throughout Section 5 Note that the Harbors and Navigation Act is no longer relevant to this proposal Also addressed in Hillside Mining Lease Proposal – Section 5
Sixth Schedule	
Visual Amenity Strategies	
1. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Visual Amenity Outcome Schedule 2 – Condition 1; 1.1 develop and implement strategies in consultation with affected parties for the management of visual amenity which should include (but is not limited to): 1.2 Prompt rehabilitation of disturbed areas once they are no longer required for mine related activities.	Section 5.7 – Visual amenity controls
Soil and Land Strategies	
2. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Soils Outcome Schedule 2 – Condition 2; 2.1 the location and depth below the natural surface of the concentrate and water pipelines must prevent any foreseeable damage due to accidental excavation or surface disturbance.	Section 3.1.4 – Lease conditions not relevant to PEPR No longer applicable as Rex is not pumping concentrate or returning seawater to or from the Ardrossan Port facility
Native Vegetation Outcome	
3. The Tenement Holder must, in construction, operation and post-mine completion, ensure no loss of abundance or diversity of native vegetation on or off Land through; 3.1 clearance, 3.2 dust/contaminant deposition, 3.3 fire, 3.4 reduction in water supply, or 3.5 other damage, unless prior approval under the relevant legislation is obtained.	Section 5.10 – Native vegetation outcome Dust/contamination deposition also addressed in Section 5.4 – Air quality

MPL146	
Native Fauna Outcome	
4. The Tenement Holder must ensure that there are no native fauna injuries or deaths due to mine related activities that could reasonably have been prevented.	Section 5.11 – Native fauna outcome
Weeds Strategies	
5. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(d) of the Regulations in relation to the Weeds Outcome Schedule 2 – Condition 3; 5.1 representative baseline data on the presence and abundance of weeds, pests and plant pathogens within the Land prior to commencement of site operations.	Section 5.12 – Weeds, pests and pathogens current and future works
Heritage Outcomes	
6. The Tenement Holder must, in construction and operation, ensure that there is no disturbance to Aboriginal or European heritage sites, objects or remains unless prior approval under the relevant legislation is obtained.	Section 5.13 – Heritage outcome
7. The Tenement Holder must, in construction and operation, ensure that there is no disturbance to Geological monuments unless prior approval under the relevant legislation is obtained.	Section 5.13 – Heritage outcome
Heritage Strategies	
8. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the outcome in Schedule 6 – Clause 6: 8.1 An Aboriginal heritage survey to be carried out with the representatives of the Traditional Owners prior to the disturbance of land, to identify and document Aboriginal sites and objects for all land to be disturbed.	Section 5.13 – Heritage controls and future works Hillside Mining Lease Proposal – Appendix 5.15-A to 5.15-C

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Groundwater Strategies	
9. The Tenement Holder is required to address the following matters for the purposes of Regulation 65(2)(c) of the Regulations in relation to the Groundwater Outcome Schedule 2 – Condition 5; 9.1 design and management strategies are to be provided for pipeline leak detection which includes automation of operational controls for the monitoring and control of all pipelines on the related Mineral Lease and this Mining Tenement. This should include (but is not limited to); 9.1.1 continuous and automatic monitoring of pressures, flow rates and any other parameters for the prompt detection and resolution of abnormal operating conditions in any pipeline or processing plant equipment; 9.1.2 continuous and automatic monitoring of process plant functions, including tank levels, flow rates, pressures and fluid quantities; 9.1.3 the integration of data through a central computer-based control and monitoring system.	Section 3.1.4 – Lease conditions not relevant to PEPR No longer applicable as the EFS design does not include a slurry pipeline relevant to this PEPR
Public Safety Outcomes	
10. The Tenement Holder must, in construction and operation, ensure that unauthorised entry to the Land does not result in public injuries and or deaths that could have been reasonably prevented.	Section 5.18 – Public safety outcome
11. The Tenement Holder must, construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by site operations.	Section 5.18 – Public safety outcome Also addressed in Section 5.21 – Adjacent land use and third-party property outcome
12. The Tenement Holder must demonstrate that post-mine completion, the risks to the health and safety of the public so far as it may be affected by site operations are as low as reasonably practicable.	Section 5.18 – Public safety outcome
Traffic Outcome	
13. The Tenement Holder must, in construction and operation, ensure that there are no traffic accidents involving the public as a result of mine related activities within the Land that could have been reasonably prevented by the Tenement Holder.	Section 5.19 – Traffic outcome Also Identified in Section 5-18 – Public safety as an outcome
Adjacent Land Use and Third-Party Property Outcome	
14. The Tenement Holder must, construction and operation, ensure that there are no adverse impacts to adjacent land use and no unauthorised damage to public or private property and infrastructure as a result of uncontrolled fires caused by mine related activities.	Section 5.21 – Adjacent land use and third party property outcome Also Identified in Section 5-18 – Public safety as an outcome

7.6 Waivers

Table 2-4 in Section 2 identifies the receptors and cultivated land which may be classified as ‘exempt’ land under the *Mining Act 1971* (SA). Where the Project requires access to that land for direct operational disturbance within the ML, a waiver will be required. Mining operations will not be carried out within any particular exempt land until a waiver of the benefit of the exemption has been obtained in respect of that land.

7.7 Regulator Assessment Report – December 2016 (released February 2017)

In the December 2016 Assessment Report (DSD), there are a number of areas where additional information was requested from Rex during and with submission of the PEPR. These include the following:

Land access:

Refer to Section 7.6 above.

Redding Road remaining open:

DPC requested that evidence be provided of Rex adequately informing the Yorke Peninsula Council (YPC) that Redding Road will remain open during the EFS operations of the Hillside Project. Rex Minerals has held four meetings with the YPC, including with the CEO, Directors/Managers, and the full Council (refer to Appendix 4.2 – Consultation Summary) where it detailed key changes from the MLP to the revised EFS (Stage 1) Project. The YPC has acknowledged by email (dated 19 January 2018) the points presented to YPC, and that they have no concerns with Redding Road remaining open. This email was provided to DPC on 19 January 2018.

Detail of how staging of mine development will fit with the MLP:

Refer to Section 3 – Section 3.1 (Table 3-1), Section 3.3.1.3, Sections 3.5.12 and 3.5.13.

Detail on surface water controls:

Refer to Section 5.14.

New receptors have been consulted:

Refer to Appendix 4.2 – Consultation Summary. Rex has consulted with the new identified receptors to ensure that they have been adequately informed of the revised mining operation, the measures to manage environmental impacts, and the strategies to achieve outcomes throughout the life cycle of the mine, as described in the PEPR.

Evidence that stakeholders have been liformed of proposed changes to operations:

Refer to Appendix 4.2 – Consultation Summary. Rex has consulted with adjacent landowners to ensure that they have been adequately informed of the revised mining operation, the measures to manage environmental impacts, and the strategies to achieve outcomes throughout the life cycle of the mine, as described in the PEPR.

Summary of the results of consultation:

See Appendix 4.2 – Consultation Summary.

Demonstration that the relevant environmental outcomes are still appropriate:

A summary of the changes to the project are provided in Table 3-1 and Table 5-1. Rex has documented every stakeholder meeting and discussion held with local landowners and stakeholders (summarised in Appendix 4.2– Consultation Summary). For evidence and confirmation that the environmental outcomes can be achieved at all receptors, refer also to the various consultant reports on the revised mine plan (EFS) including Appendices 3.4 to 3.9 in Section 3, Appendices 5.14 in Section 5, and the independent expert reports in Appendices 7.3-C to 7.3-I in Section 7.

7.8 References

Department of State Development, 2016. *Assessment report for the Rex Minerals Ltd Submissions Regarding the Staged Approach for Development of the Hillside Copper Mine Mineral Lease ML6438*, Mineral Policies 2016D009921, Mining Regulation Branch. Department of State Development, South Australia, Adelaide.