Planning Services
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Richard Bailey
General Manager Operations
Mount Pleasant Operation
GPO Box 94
Brisbane QLD 4001

Dear Mr Bailey,

Mount Pleasant Operation (DA 92/97)
Approval of Management Plans and Strategy

I refer to your email dated 21 December 2018, submitting the following plans and strategy for the Mount Pleasant Operation for approval:

- Environmental Management Strategy (condition 1 of Schedule 5);
- Waste Management Plan (condition 52 of Schedule 3); and
- Blast Management Plan (condition 17 of Schedule 3).

The Department has reviewed this plans and strategy and is satisfied that that they meet the relevant conditions of the development consent (DA 92/97). Therefore, the Secretary has approved these plans.

Please ensure the finalised copies of each plan are made available on the company's website.

Should you have any enquiries in relation to this approval, please contact Anthony Barnes at the details above.

Yours sincerely,

Howard Reed

Howard Reed 14.1.19.
Director
Resource Assessments
As nominee of the Secretary

MOUNT PLEASANT OPERATION

WASTE MANAGEMENT PLAN

Document ID:	MP001-0000-ENV-PLN-0008		
Company:	MACH Energy Australia Pty Ltd		
Effective Date:	14 January 2019	**Status:**	Issued for Use
Endorsed By:	Richard Bailey	**Revision Number:**	01

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1 INTRODUCTION

The Mount Pleasant Operation (MPO) is located in the Upper Hunter Valley of New South Wales (NSW), approximately 3 kilometres (km) north-west of Muswellbrook and approximately 50 km north-west of Singleton (Figure 1). The village of Aberdeen and locality of Kayuga are also located approximately 5 km north-northeast and 1 km north of the MPO boundary, respectively (Figure 1). The proponent of the MPO is MACH Energy Australia Pty Ltd (MACH Energy), which purchased the MPO from Coal & Allied Operations Pty Ltd (Coal & Allied) in 2016.

The initial development application for the MPO was made in 1997. This was supported by an Environmental Impact Statement (EIS) prepared by Environmental Resources Management (ERM) Mitchell McCotter (ERM Mitchell McCotter, 1997). On 22 December 1999, the then Minister for Urban Affairs and Planning granted Development Consent DA 92/97 to Coal & Allied. This allowed for the "Construction and operation of an open cut coal mine, coal preparation plant, transport and rail loading facilities and associated facilities" at the MPO. The consent allowed for operations 24 hours per day seven days per week and the extraction of 197 million tonnes (Mt) of run-of-mine (ROM) coal over a 21 year period, at a rate of up to 10.5 Mt of ROM coal per year.

The Mount Pleasant Project Modification (MOD 1) was submitted on 19 May 2010 with a supporting Environmental Assessment (EA) prepared by EMGA Mitchell McLennan (EMGA Mitchell McLennan, 2010). MOD 1 included the provision of an infrastructure envelope for siting the mine infrastructure, the provision of an optional conveyor/service corridor linking the MPO facilities with the Muswellbrook-Ulan Rail Line and modification of the existing Development Consent DA 92/97 boundaries to accommodate the optional conveyor/service corridor and minor administrative changes. MOD 1 was approved on 19 September 2011.

The MPO South Pit Haul Road Modification (MOD 2) was submitted on 30 January 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017a). MOD 2 proposed to realign an internal haul road to enable more efficient access to the South Pit open cut, with no other material changes to the approved MPO. MOD 2 was approved on 29 March 2017.

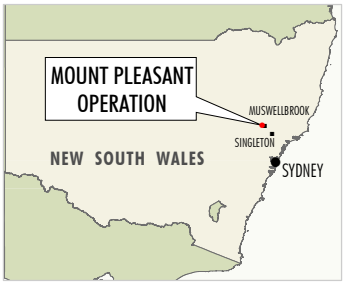
The MPO Mine Optimisation Modification (MOD 3) was submitted on 31 May 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017b). MOD 3 comprised an extension to the time limit on mining operations (to 22 December 2026) and extensions to the South Pit Eastern Out of Pit Emplacement to facilitate development of an improved final landform. MOD 3 was approved on 24 August 2018.

The MPO Rail Modification (MOD 4) was submitted on 18 December 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017c). MOD 4 proposed the following changes:

- duplication of the approved rail spur, rail loop, conveyor and rail load-out facility and associated services;
- duplication of the Hunter River water supply pump station, water pipeline and associated electricity supply that followed the original rail spur alignment; and
- demolition and removal of the redundant approved infrastructure within the extent of the Bengalla Mine, once the new rail, product loading and water supply infrastructure has been commissioned and is fully operational.

MOD 4 was approved on 16 November 2018 by the Secretary of the Department of Planning and Environment (DPE) (under Delegation). Appendix 2 of the modified Development Consent DA 92/97 illustrates the Conceptual Project Layout Plan of the approved MPO at 2021 and 2025, Approved Surface Disturbance Plan and Conceptual Final Landform (Attachment 1) incorporating the MOD 4 infrastructure relocations.

MAC-16-01 MP2018_Figure 1_Rev A



LEGEND

- Mining Operation
- Proposed Mining Operations (Application Lodged)
- Mining Lease Boundary (Mount Pleasant)
- Railway
- Local Government Boundary
- State Forest
- National Parks and Wildlife Estate

Source: Geoscience Australia (2006); NSW Division of Resources & Geoscience (2017); Office of Environment and Heritage NSW (2017); Land and Property Information (2017)

MACHEnergy

MOUNT PLEASANT OPERATION

Project Location

Figure 1

1.1 PURPOSE AND SCOPE

This Waste Management Plan (WasteMP) has been prepared by MACH Energy to satisfy the requirements of Development Consent DA 92/97 and specifically Schedule 3, Condition 52.

The WasteMP applies to all employees and contractors at the MPO and covers all areas within the MPO boundary. The WasteMP applies to the life of the MPO, including (but not limited to) the period of mining operations specified in Development Consent DA 92/97, which currently permits mining until 22 December 2026. As required by Condition 5, Schedule 2 of Development Consent DA 92/97, the WasteMP will continue to apply (excluding mining operations) beyond 22 December 2026, as required, until the rehabilitation and any additional undertakings (required by the Secretary of the NSW Department of Planning and the Environment [DPE], or the Division of Resources and Geoscience within the Department [DRG]) have been carried out satisfactorily.

This WasteMP has been prepared to manage waste associated with construction and operation of the MPO, including for example, initial establishment and development, open cut mining, operation of the coal handling and preparation plant (CHPP), construction and operation of the rail spur/loop, construction and operation of the Fines Emplacement Area, rehabilitation and the supply of water to the MPO.

1.1.1 Previous Versions

A previous version of the WasteMP was submitted by Coal & Allied Operations Pty Ltd as a Construction Waste Management Plan (CWMP) and was approved on 23 July 2012. The CWMP was submitted as a staged plan limited to the management of waste during the construction stage of the MPO, excluding any coal extraction, handling or processing.

The CWMP was replaced by a WasteMP prepared by MACH Energy, which was approved on 29 September 2017. The WasteMP allowed for both construction and operation of the MPO.

1.1.2 Current Version

This version of the WasteMP has been prepared to reflect the approval of MOD 3/MOD 4 and replaces the WasteMP described in Section 1.1.1.

1.2 STRUCTURE OF THE WASTEMP

The remainder of the WasteMP is structured as follows:

- Section 2: Outlines the statutory obligations relevant to this WasteMP.
- Section 3: Outlines the waste streams identified at the MPO.
- Section 4: Provides a description of the objectives and performance targets for this WasteMP.
- Section 5: Describes the waste management measures proposed to be implemented at the MPO.
- Section 6: Outlines the waste monitoring measures proposed for the MPO.
- Section 7: Describes the fines emplacement methods proposed at the MPO.
- Section 8: Describes the Pollution Incident Response Management Plan (PIRMP) for pollution incidents which may occur at the MPO.
- Section 9: Outlines the reviewing procedure for MPO documentation, including in particular for this WasteMP.
- Section 10: Outlines the reporting procedures proposed for the MPO.
- Section 11: Provides a list of the references cited in this report.

2 STATUTORY OBLIGATIONS

MACH Energy's statutory obligations are contained in:

- the conditions of Development Consent DA 92/97 (as modified) (Section 2.1);
- the conditions of Environment Protection Licence (EPL) 20850 (Section 8); and
- other relevant legislation (Section 3).

Obligations relevant to this WasteMP are described in Section 2.1 below.

2.1 DEVELOPMENT CONSENT DA 92/97

The conditions of Development Consent DA 92/97 relevant to the content and structure of this WasteMP are described in Sections 2.1.1 and 2.1.2 below.

2.1.1 WasteMP Requirements

Conditions 49 to 52, Schedule 3 of Development Consent DA 92/97 outline the waste management required at the MPO, including the preparation of a WasteMP (refer Table 1).

Table 1
Waste Management Development Consent DA 92/97 Conditions

MPO Development Consent DA 92/97 Schedule 3	Section where addressed in this WasteMP document
49. The Applicant must: *(a) minimise the waste (including coal reject) generated by the development;*	Sections 5 and 7
(b) ensure that the waste generated by the development is appropriately stored, handled and disposed of in a lawful manner.	Section 5
50. The Applicant must ensure that all sewage generated on site is treated and disposed of to the satisfaction of Council.	Section 5
51. The Applicant must not emplace fine rejects in the southern catchment without the written approval of the Secretary	Section 7
52. The Applicant must prepare a Waste Management Plan for the development to the satisfaction of the Secretary. This plan must: *(a) be prepared in consultation with DoI Water and DRG, and submitted to the Secretary for approval prior to carrying any development on site;*	This WasteMP
(b) describe the measures that would be implemented to avoid, minimise, reuse and recycle all waste streams generated by the development;	Section 5
(c) include a fines emplacement plan; and	Appendix 1
(d) a program to evaluate the fines emplacement plan and methods, with a view to emplacing fines within active mining areas. *The Applicant must implement the management plan as approved by the Secretary.*	Section 7.2

2.1.2 Management Plan (General) Requirements

Condition 2, Schedule 5 of Development Consent DA 92/97 outlines general management plan requirements. Table 2 presents these requirements and indicates where each is addressed within this WasteMP.

Table 2
General Development Consent DA 92/97 Conditions

MPO Development Consent DA 92/97 Schedule 5	Section where addressed in this WasteMP document
2. *The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:*	Section 3
(a) detailed baseline data;	N/A
(b) a description of: • *the relevant statutory requirements (including any relevant consent, licence or lease conditions);*	Section 2
• *any relevant limits or performance measures/criteria;*	Section 4
• *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;*	Section 4
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 5
(d) a program to monitor and report on the: • *impacts and environmental performance of the development;* • *effectiveness of any management measures (see c above);*	Section 6
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 8
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 9
(g) a protocol for managing and reporting any: • *incidents;* • *complaints;* • *non-compliances with statutory requirements; and* • *exceedances of the impact assessment criteria and/or performance criteria; and*	Section 10
(h) a protocol for periodic review of the plan. *Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*	Section 9

Note: N/A = Not applicable.

3 WASTE STREAMS

The waste streams expected to be generated at the MPO include (for example):

- General waste:
  - scrap food;
  - animal waste;
  - litter and gross pollutants;
  - packaging including crates and pallets;
  - water based paints;
  - green waste; and
  - building and demolition waste (except any asbestos contaminated materials).
- Recyclable waste:
  - glass;
  - wood;
  - aluminium cans;
  - paper and cardboard; and
  - scrap metals.
- Special wastes:
  - clinical;
  - asbestos waste; and
  - waste tyres.
- Liquid waste:
  - sewage;
  - waste oil;
  - washer liquid waste and degreaser;
  - engine coolant; and
  - flammable liquids.
- Hazardous wastes:
  - batteries;
  - waste grease;
  - corrosives;
  - hydrocarbon contaminated sludge/soil;
  - aerosols, paints and solvents;
  - oxidising agents; and
  - containers previously containing dangerous goods including explosives, flammable liquids, oxidising substances and corrosive substances.

Waste generated will be managed in accordance with relevant legislation and guidelines, including the NSW *Protection of the Environment Operations (Waste) Regulation, 2014* (*POEO [Waste] Regulation 2014*), the NSW *Waste Avoidance and Resource Recovery Act, 2001*, and the NSW Environment Protection Authority (EPA) *Waste Classification Guidelines* (EPA, 2014).

4 OBJECTIVES AND PERFORMANCE TARGETS

The objectives of the WasteMP are to:

- maintain compliance with the conditions in Development Consent DA 92/97, EPL 20850 and related legislation associated with waste;
- minimise waste generation, and encourage and facilitate re-use and recycling of waste streams where possible;
- ensure appropriate segregation, storage, transportation and disposal of waste generated on-site;
- ensure proper hydrocarbon management and storage of sewage; and
- provide education and training programs to all personnel regarding waste minimisation measures and proper waste handling and disposal.

The effectiveness of the implementation of the management actions will be determined by a series of key performance indicators set for each parameter. Table 3 defines the objectives and performance criteria for waste management.

Table 3
Performance Criteria

Parameter	Target	Key Performance Indicators
Avoidance at source	Avoid generation of waste through adoption of innovative purchasing practices.	Initiatives adopted by suppliers to prevent or reduce generation of waste (e.g. packaging).
Reducing toxicity in products and materials	Avoid using toxic product and material where possible.	Identify safer alternatives to toxic products and materials when they are requested.
Segregation at source	All wastes segregated appropriately.	Correct bins provided at suitable locations around the site. Correct segregation of waste.
Storage of waste	Wastes are stored in appropriate facilities.	Storage areas bunded and/or lined as required to prevent contamination.
Minimisation of waste to landfill	Recycling or reuse of waste is maximised.	Preferential use of products that can be reused or recycled. Correct segregation of waste. Identification of recycling opportunities.
Compliance with regulations	All wastes are managed in accordance with relevant legislation.	Correct segregation of waste. Tracking and recording of regulated waste. Additional education for roles managing regulated waste.

5 MANAGEMENT MEASURES

In line with current practices at similar sites in the Hunter Valley, MACH Energy has engaged a licensed contractor to provide waste management services.

Waste will be segregated at source, and stored and transported appropriately. The segregation of waste ensures different waste streams are appropriately managed based upon their level of risk to the environment, and in accordance with any legal requirements. Segregation at source reduces the contamination of waste streams, improves the ease of storage, handling, disposal and tracking and reduces the potential disposal costs for some items. Labelled and numbered bins will be provided at the points where waste is produced to improve segregation.

There will be no landfill developed on-site, however some inert waste material (e.g. concrete) may be disposed of within the overburden emplacement. Larger quantities of waste will be stored in secure locations on-site until it can be removed. These locations will be recorded in the waste register. Adequate containment, such as bunding, will be provided to prevent leaching from wastes onto the ground which could affect surface water quality or cause soil contamination. Waste would also be managed to ensure separation from likely ignition sources and to minimise the risk of fire. Prior to the disposal of waste on-site, MACH Energy will obtain an EPL variation if required, subject to consultation with EPA.

Sewage management facilities will be constructed on-site, and will comply with the conditions of the Development Consent DA 92/97, the requirements of the Muswellbrook Shire Council and any relevant legislation.

Regulated wastes (as classified under Schedule 1 of the *POEO [Waste] Regulation 2014* will be managed in accordance with the *POEO (Waste) Regulation 2014*, ensuring that all tracking and recording requirements are complied with.

Throughout operation of the MPO, particular emphasis will be placed on:

- Preferential purchase and use of products that generate minimal waste (including packaging) and pollution.
- Preferential purchase and use of less toxic or hazardous products and materials.
- Preferential purchase and use of products and materials that can be more efficiently reused and recycled (e.g. materials which limit disassembling) or are more readily disposed of.
- Avoiding oversupply or wastage of materials and products.
- Regular review of re-use and recycling options.
- Management of on-site waste storage, treatment and disposal to minimise the risk of contaminant release.
- Transporting all waste required to be tracked off-site by a licensed contractor for disposal at a suitably licensed destination using mandated tracking tools (such as the waste data form).
- Transporting and disposing all asbestos waste in accordance with the *WasteLocate* system (https://wastelocate.epa.nsw.gov.au/).
- Limiting transport of off-site waste (excluding reuse or recycling etc.) to less than 150 km from where it is generated (the proximity principle). If there is no disposal facility within 150 km, waste will preferentially go to one of the two nearest lawful disposal facilities.

Example management actions for waste are listed in Table 4.

Table 4
Example Management Actions

Parameter	Action
General Waste	• Separate at source. • Avoid contamination with other recyclable and regulated waste. • Dispose at Muswellbrook Shire Landfill.
Green waste	• During clearing, assess potential for re-use as habitat. • Mulch and use for rehabilitation and landscaping. • Identify location of disposal of mulch and other green waste to avoid impacts on the environment (e.g. siltation of waterways).
Wood waste	• Promote segregation of this waste stream and transport to recycling facilities.
Building and demolition waste	• Transport and disposal by licensed operators at licensed facilities. • Disposal of some wastes (e.g. concrete) on-site.
Recyclable waste	• Provide bins where possible for recyclables and educate personnel on their correct use. • Promote use of recyclable materials and products. • Avoid contamination of this waste stream with other general and regulated waste. • Transport to Muswellbrook Recycling Facility or similar.
Scrap metal	• Provide bins to separate scrap metal. • Recycle through a metal recycling company. • Ensure that products are appropriately disassembled to minimise contamination of this stream.
Biological waste	• Transport and disposal by licensed operators and facility. • Avoid spills and contamination of soil and waterways. • Minimise exposure of unauthorised personnel to this waste stream.
Tyre waste	• Dispose all used heavy mobile equipment tyres at approved on-site locations (i.e. in the open cut). • Ensure disposal in accordance with applicable regulations and industry best practice.
Asbestos waste	• Handling, transport and disposal by licensed operators and facility in accordance with regulatory requirements including *WasteLocate* (https://wastelocate.epa.nsw. gov.au/). • Ensure identification and treatment (e.g. encapsulation) of any asbestos related products and materials.
Sewage	• Handling, transport and disposal by licensed operators at licensed facilities. • Avoid spills and contamination of soil and waterways, and exposure to personnel.
Hazardous waste	• Correct segregation and storage. • Transport and disposal by licensed operators and facility. • Avoid contamination of this waste stream with other recyclable and general waste. • Avoid spills and contamination of soil and waterways.

6 MONITORING

In order to meet the objectives for waste management outlined in Section 4, monitoring of a number of parameters will be undertaken. This monitoring is outlined in Table 5.

Table 5
Waste Monitoring

Parameter	Monitoring	Timing
Maintain compliance with Development Consent DA 92/97 conditions and relevant regulatory requirements	• Inspect the waste management system to ensure correct segregation of waste streams and avoidance of cross contamination. • Audit the waste operator and treatment/disposal facilities.	Monthly. Annually.
Minimise waste generation and encourage reuse and recycling	• Maximise use of correct receptacles to minimise landfill disposal. • Regularly monitor volumes of general, wood and recyclable waste produced. • Review waste stream volumes to identify improvement opportunities.	Ongoing. Monthly. Annually.
Ensure appropriate segregation, storage, transportation and disposal of waste generated on-site	• Inspect the waste management system to ensure correct segregation of waste streams and avoidance of cross contamination. • Maintain an up to date register (volume, location) of tyre waste disposed on-site. • Audit the waste operator and treatment/disposal facilities.	Monthly. Ongoing. Annually.
Ensure proper hydrocarbon management and wastewater and sewage treatment	• Ensure that storage areas are constructed and operated in accordance with applicable regulations and industry best practice. • Inspect the sewage treatment facilities to ensure they are operated in accordance with Muswellbrook Shire Council requirements.	Ongoing. As per licence requirements.
Provide education and training programs to personnel	• Test understanding of waste segregation principles and practises.	Induction and annual refresh.

7 FINES EMPLACEMENT

ATC Williams Pty Ltd has prepared a Fines Emplacement Plan for the MPO, presented in Appendix 1. This plan outlines the transport of fine rejects from the CHPP located in the Infrastructure Area, to a MPO Fines Emplacement Area located approximately 2 km to the north-west of the CHPP (Attachment 1). This plan also describes the design of the emplacement and the methodology for emplacing fines. Section 7.1 provides a summary of the methodology described in Appendix 1. Section 7.2 provides a program to evaluate the Fines Emplacement Plan, including the emplacement methodology.

In the 1997 EIS, two catchments were investigated as fines emplacement areas, viz., a northern and a southern option (ERM Mitchell McCotter, 1997). The Fines Emplacement Area outlined in the Fines Emplacement Plan (Appendix 1) is wholly located in the northern option. In accordance with Condition 51, Schedule 3 of Development Consent DA 92/97, MACH Energy will not emplace fine rejects in the southern option without the written approval of the Secretary of the DPE.

7.1 FINES EMPLACEMENT METHODOLOGY

Fines will be pumped from the CHPP and deposited in the Fines Emplacement Area via spigotted discharge along the embankment and valley abutments of the Fines Emplacement Area. Spigot discharge points will be located approximately every 50 metres and will deposit the fine rejects into the dam sub-aerially. As the production of ROM Coal increases over the life of the mine, the embankment height of the Fines Emplacement Area will be progressively raised to ensure that it has a sufficient capacity. Decant water will be recovered from a decant pond located on the edge of the Fines Emplacement Area. This water will be pumped for reuse in the MPO water management system.

7.2 FINES EMPLACEMENT PLAN REVIEW

Following the commencement of coal processing, a review of the fines emplacement methodology will be undertaken every 12 months. This review will be undertaken with a view to consider altering fine rejects storage from within a dedicated out-of-pit Fines Emplacement Area, to a combination of out-of-pit and in-pit emplacement. The review will include, but not necessarily be limited to, the following:

- The feasibility of implementing a belt filter press to remove entrained water within the fines prior to emplacement. This will be determined by the nature of the reject material being produced and the additional costs associated with operating a belt filter press.
- Increased costs associated with hauling fines to the active mining area (in-pit emplacement). As the open cut develops north, the haulage distance to the active mining area will increase, which will increase the number of trucks travelling within the MPO, as well as the distance travelled by the fleet. This will likely increase the overall haulage costs, as well as potential dust, noise, and diesel fumes emitted from the MPO.
- Other aspects such as the geochemical characteristics of the materials and consequences for rehabilitation would also be considered.

The results of the review will be summarised in the subsequent Annual Review.

If, following the commencement of coal processing, a Fines Emplacement Plan review finds that emplacement within the active mining area is appropriate, MACH Energy will consult with DPE on the implementation of a program to co-dispose fines within the active mining area, as well as within the Fines Emplacement Area. MACH Energy will seek necessary approvals from DRG and DPE prior to commencing co-disposal.

8 POLLUTION INCIDENT RESPONSE MANAGEMENT PLAN

EPL 20850 requires the preparation of a PIRMP for the MPO.

A PIRMP has been developed by MACH Energy, which outlines the process for reporting and managing a pollution incident in the event of a pollution incident occurring at the MPO. As outlined in the PIRMP, the NSW *Protection of the Environment Operations Act, 1997* (POEO Act) requires pollution incidents causing or threatening material environmental harm to the environment to be reported immediately to appropriate regulatory authorities.

In accordance with the PIRMP, an Emergency Response Team (ERT) will assist in the control and clean up in the event of a chemical/hydrocarbon spill. Hydrocarbon or chemical spills will be reported in the mine site incident reporting and management system with corrective and preventative measures taken as appropriate.

Appropriate spill containment and fire fighting equipment is stored and maintained at a number of strategic locations around the MPO site. A training program has been developed with the objective of informing personnel of the appropriate implementation of the PIRMP. This training program includes hazardous materials training for ERT members.

Following a pollution incident, the incident will be immediately reported to the DPE and EPA in accordance with the PIRMP, and appropriate and safe remediation works will be determined and undertaken. An internal investigation of the possible causes of the pollution incident, as well as the proposed management measures to be undertaken as a result of the incident. Additionally, within seven days of the date on which the incident occurred, MACH Energy will provide written details of the notification to the EPA.

9 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

9.1 ANNUAL REVIEW

In accordance with Condition 3, Schedule 5 of Development Consent DA 92/97, MACH Energy will review and evaluate the environmental performance of the MPO by the end of March each year (for the preceding calendar year) (or other such timing as agreed by the Secretary of the DPE).

In relation to waste, the Annual Review will:

- include a summary of the monitoring undertaken in accordance with the WasteMP in the past year;
- identify any waste-related non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the waste monitoring data over the life of the MPO; and
- describe what waste-related measures will be implemented over the next year to improve the environmental performance of the MPO.

The Annual Review will be made publicly available on the MACH Energy website in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

9.2 WASTE MANAGEMENT PLAN REVISION

In accordance with Condition 4, Schedule 5 of Development Consent DA 92/97, this WasteMP will be reviewed, and if necessary revised (to the satisfaction of the Secretary of the DPE), within three months of the submission of:

- an Annual Review (Condition 3, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an Independent Environmental Audit (Condition 9, Schedule 5); and
- any modification to the conditions of Development Consent DA 92/97[1].

Within four weeks of conducting any such revision, MACH Energy will advise the Secretary of the DPE of the outcomes of the review, and submit any revised documents to the Secretary of the DPE for approval.

In accordance with Condition 4A, Schedule 5 of Development Consent 92/97, MACH Energy may submit a revised WasteMP for the approval of the Secretary at any time, and may also submit any revision to this WasteMP required under Development Consent DA 92/97 on a staged basis.

If agreed with the Secretary of the DPE, a revision to this WasteMP required under Development Consent DA 92/97 may be prepared without undertaking consultation with all parties nominated under the relevant Condition of Development Consent DA 92/97.

This WasteMP will be made publicly available on the MACH Energy website, in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

[1] Note that in the event of an inconsistency between Condition 4(d), Schedule 5 of Development Consent DA 92/97 and any Condition in Schedule 3 of Development Consent DA 92/97, the latter prevails.

10 REPORTING PROCEDURES

In accordance with Condition 2, Schedule 5 of Development Consent DA 92/97, MACH Energy has developed protocols for managing and reporting the following:

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

These protocols are described in detail in the Environmental Management Strategy (MACH Energy, 2018).

In accordance with Condition 8, Schedule 5 of Development Consent DA 92/97, MACH Energy will provide regular reporting on the environmental performance of the MPO on the MACH Energy website.

11 REFERENCES

EMGA Mitchell McLennan (2010) *Mount Pleasant Project Modification Environmental Assessment Report.* Prepared for Coal & Allied Operations Pty Limited.

Environment Protection Authority (2014) *Waste Classification Guidelines*.

Environmental Resources Management Mitchell McCotter (1997) *Mount Pleasant Operation Environmental Impact Statement.*

MACH Energy (2017a) *Mount Pleasant Operation (DA 92/97) – South Pit Haul Road Modification*.

MACH Energy (2017b) *Mount Pleasant Operation – Mine Optimisation Modification Environmental Assessment.*

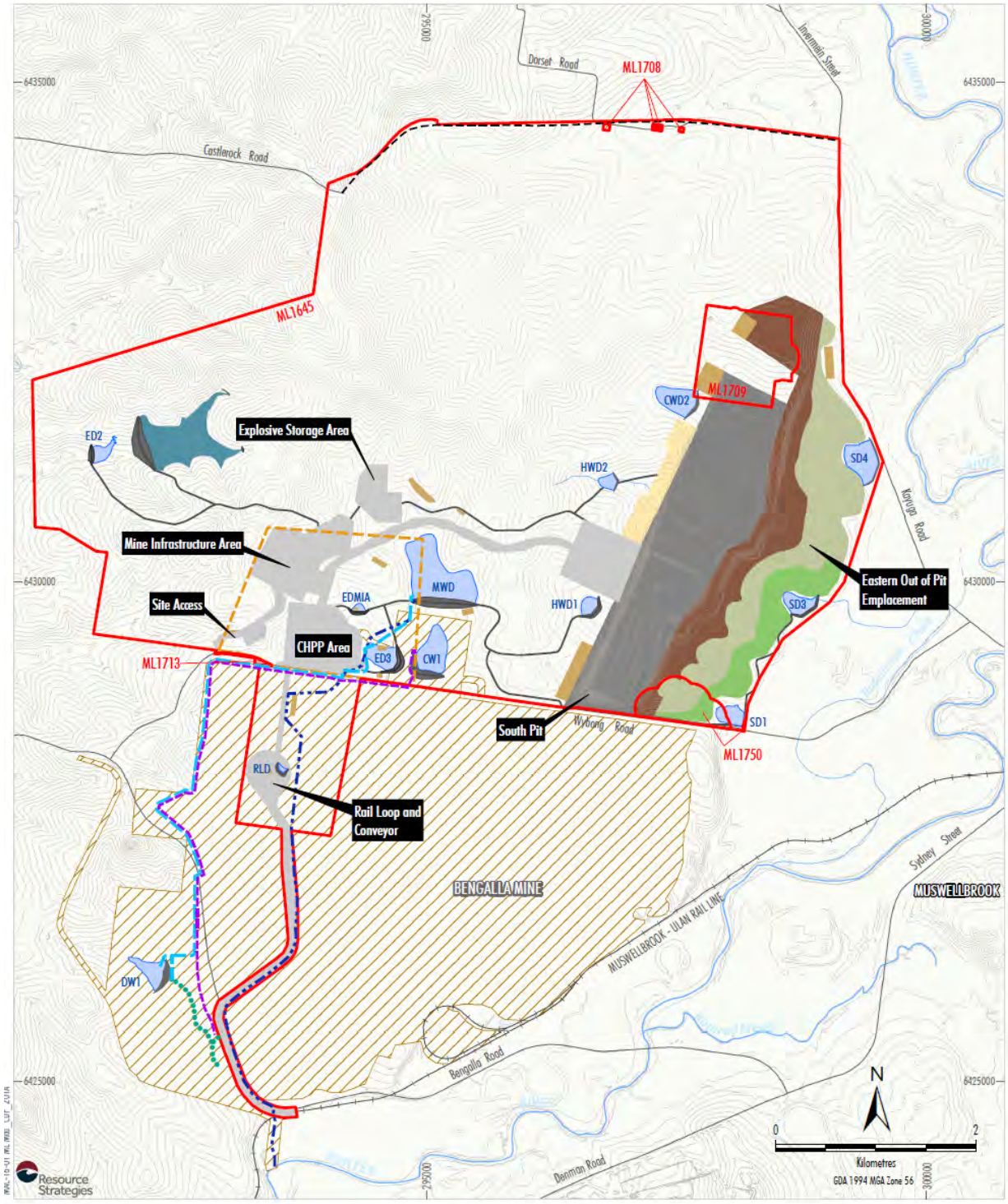
MACH Energy (2017c) *Mount Pleasant Operation – Rail Modification Environmental Assessment.*

MACH Energy (2018) *Mount Pleasant Operation Environmental Management Strategy.*

ATTACHMENT 1

APPENDIX 2 OF DEVELOPMENT CONSENT DA 92/97

APPENDIX 2
FIGURE 1 - CONCEPTUAL PROJECT LAYOUT PLAN AT 2021



LEGEND

- Mining Lease Boundary
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Infrastructure Area Envelope
- Active Stripping Area
- Active Mining Area
- Active Overburden Emplacement Area
- Topsoil Stockpile
- Initial Rehabilitation
- Established Rehabilitation
- Infrastructure and Borrow/Stockpile Area
- Access Road
- Northern Link Road

Indicative Water Pipeline Alignment

- MPO Hunter River Supply Pipeline
- MPO DW1 Pipeline (Bi-directional)
- Bengalla Mine CW1 Pipeline
- Approximate Extent of Scour Protection
- Water Dam
- Fines Emplacement Area

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2017)

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MOUNT PLEASANT OPERATION

FIGURE 2 - CONCEPTUAL PROJECT LAYOUT PLAN AT 2025

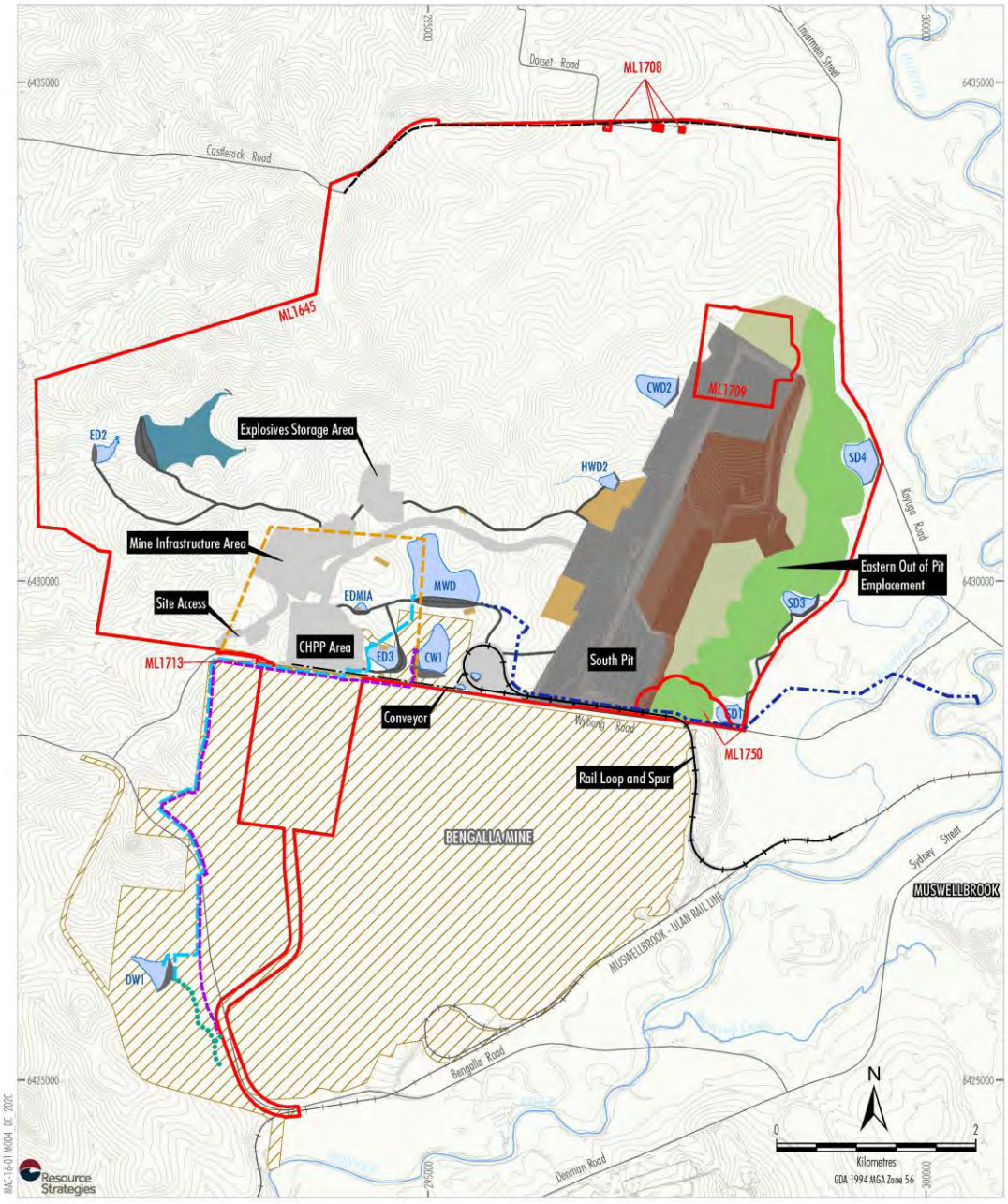
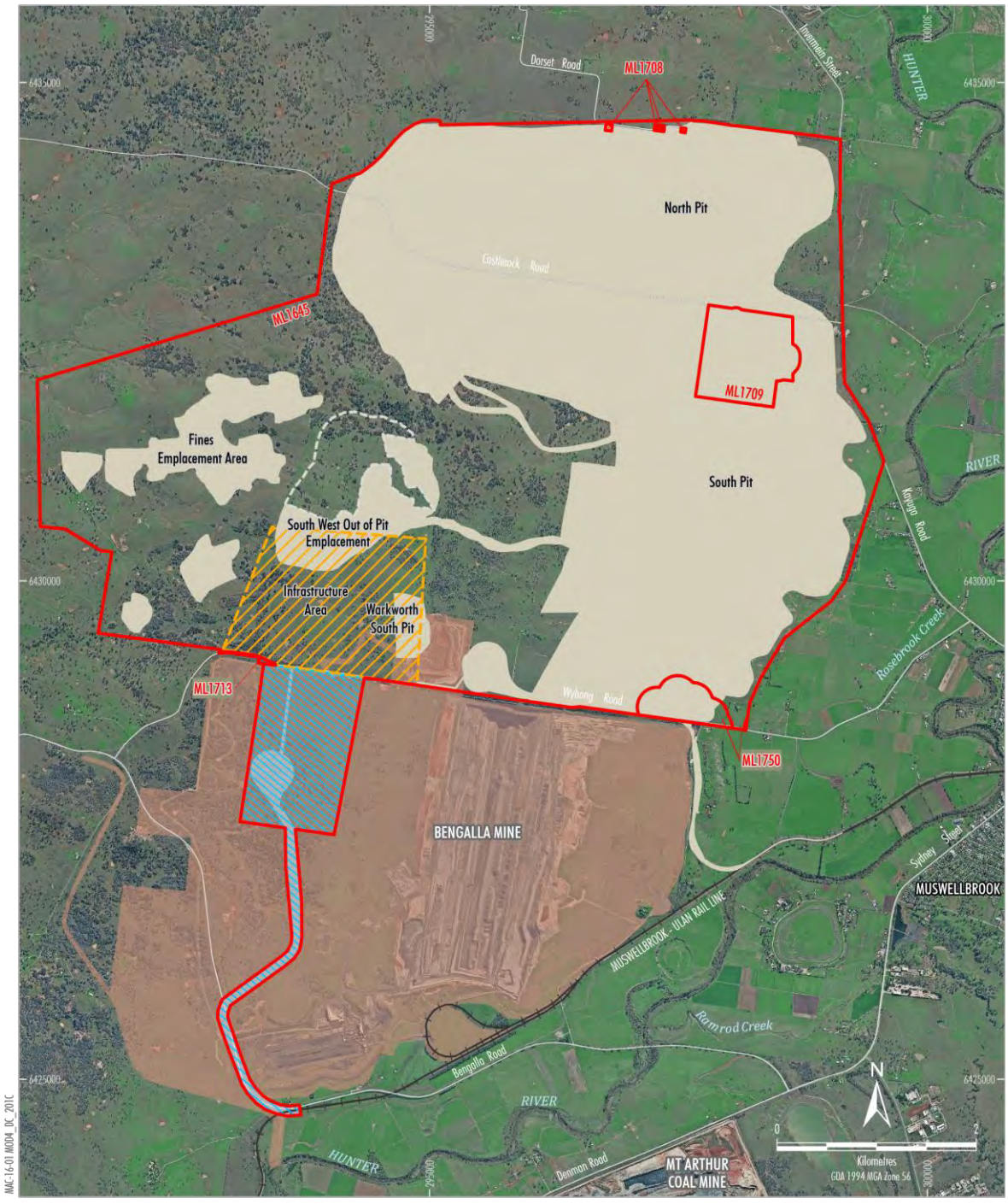


FIGURE 3 - APPROVED SURFACE DISTURBANCE PLAN



LEGEND

- Mining Lease Boundary
- Approximate Extent of Approved Surface Development [1]
- Area Relinquished for Overburden Emplacement and Major Infrastructure
- Infrastructure Area Envelope
- Infrastructure to be removed under the Terms of Condition 37, Schedule 3
- Indicative Existing Coal Transport Infrastructure
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)

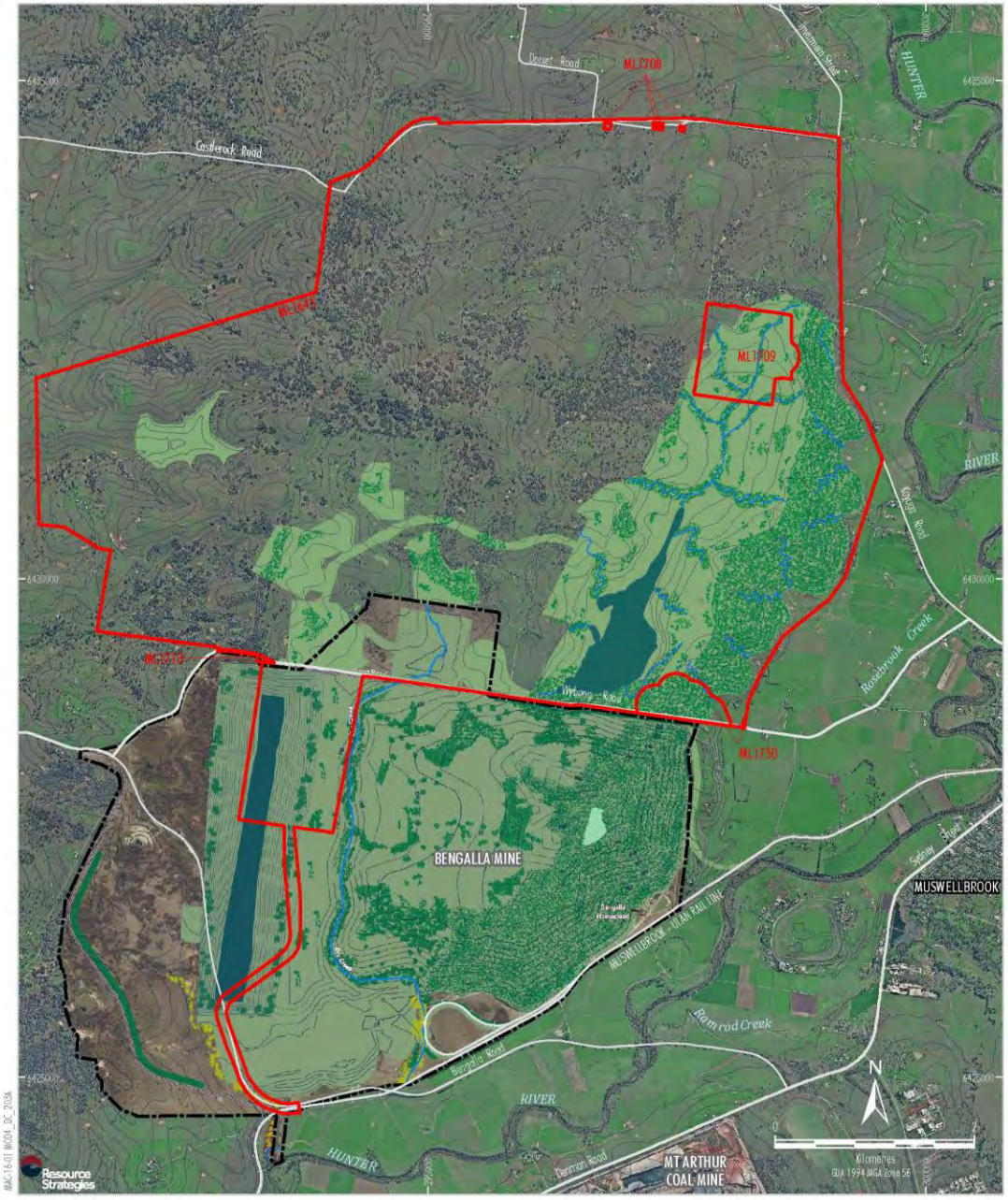
NOTE

1. Excludes some project components such as water management infrastructure, infrastructure within the Infrastructure Area Envelope, offsite coal transport infrastructure, road diversions, access tracks, topsoil stockpiles, power supply, temporary offices, signalling, other ancillary works and construction disturbance.

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2018); Department of Planning and Environment (2016); MACH Energy (2017)
Orthophoto: MACH Energy (Aug 2016)

MACHEnergy
MOUNT PLEASANT OPERATION
Approved Surface Disturbance Plan

FIGURE 4 - CONCEPTUAL FINAL LANDFORM



APPENDIX 1

FINES EMPLACEMENT PLAN

MACH ENERGY AUSTRALIA

Mount Pleasant Project

MOUNT PLEASANT OPERATIONS

FINES EMPLACEMENT PLAN

Tailings Dam

July 2018

MP001-2000-CIV-PLN-003-1

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1 PROJECT DESCRIPTION AND SETTING

1.1 General

1.1.1 Project Development and Design Description

MACH Energy Australia Pty Ltd (MACH) is the owner of the proposed Mount Pleasant Project, acquiring the greenfield site from Rio Tinto Coal Australia (RTCA) in March 2016. The Mount Pleasant Project site is located in New South Wales (NSW), situated approximately 5km west of the Muswellbrook township, within the upper Hunter Valley region. The mine will be developed as an open cut coal mining project with the pit progressing from east to west and extending up to the north-south trending ridgeline which divides the mining lease. The Mount Pleasant Project is approved under the State development consent Development Approval 92/97, granted under the *Environmental Planning and Assessment Act 1979*. The Mt Pleasant site is primarily covered under mining lease ML 1645.

The Fines Emplacement Plan forms part of the Waste Management Plan, required as part of the Development Consent (92/97), and is intended to provide background on the disposal strategies for fines rejects (tailings solids). Disposal of tailings solids will occur within the storage area of the Tailings Dam, as per the development consent.

The Tailings Dam is located within a tributary of Sandy Creek, west of the north-south trending ridgeline which separates the Tailings Dam from the Mine Infrastructure Area and open cut pit. A tailings (reject) stream will be produced as low density solids slurry at the Coal Handling and Processing Plant (CHPP) and will be pumped via a delivery pipeline to the Tailings Dam.

1.1.2 Mine Production

Production of coal at the Mount Pleasant Project is anticipated to begin in late 2017, with a forecasted maximum throughput rate of up to 10.5Mtpa of ROM coal from 2020 through to the end of 2026 (as provided by MACH). For the purposes of this study in relation to estimating the operational lifespan beyond the Stage 1 Tailings Dam, a throughput of 10.5Mtpa has been assumed for the period beyond 2027. The Stage 1 Tailings Dam is designed to achieve a three year operational lifespan, based on the following ROM coal production rate:

- Year 2017/2018: 4,273,000 ROM Coal Tonnes
- Year 2019: 7,831,000 ROM Coal Tonnes
- Year 2020 - 2026: 10,500,000 ROM Coal Tonnes

1.1.3 Tailings Production

Tailings production for the project has been based on a fines reject production of some 9.2% of the ROM Coal through the CHPP (as advised by MACH). Based on 9.2% of the ROM Coal production, and the anticipated achievable settled density (refer Section 1.1.4), the following tailings quantity for each period is presented below:

Table 1
Tailings Typical Physical Properties

Year	Approx. Tailings Tonnage	Approx. Tailings Volume
2017 / 2018	393,000 t	524,000 m^3
2019	720,000 t	961,000 m^3
2020 - 2022	966,000 tpa	1,288,000 m^3/yr
2022 - 2026	966,000 tpa	1,073,000 m^3/yr

1.1.4 Related Tailings Production Characteristics

The expected tailings parameters adopted for the design of the Tailings Dam are summarised as follows:

Table 2
Tailings Typical Physical Properties

Parameter	Typical Values
Particle Density	1.96 t/m^3
Settled Density Years 2017 - 2022 Years 2022 and beyond	 0.75 t/m^3 0.90 t/m^3
Material Classification	CLAY (CI, CH)
Atterberg Limits Liquid Limit (%) Plasticity Index (%)	 40 - 50 16 - 26
Estimated Permeability	10^{-7} m/s
Typical beaching angle	<0.5%

The tailings particle size distribution implies a CLAY/SILT classification. The density and beaching angle have been assumed and are appropriate for sub-aerial deposition method and beaching of the tailings.

1.1.5 Tailings Geochemistry

Geochemical evaluation of the <0.5mm reject fraction (tailings) was undertaken as part of the EIS studies in 1998. Test work comprised evaluation of individual seams and composite samples representative of the full mining sequence. Results from this study indicate that tailings from the Wynn and Broonie seams have the potential to be acid forming. However, based on the results of the combined samples, it was concluded that the overall tailings from the proposed multi-seam operation are likely to be non-acid forming. Further column leach tests indicated elevated salinity levels in leachate, decreasing with time (ATCW, 2007).

2 DESCRIPTION OF THE PROPOSED TAILINGS DAM DEVELOPMENT

2.1 Tailings Dam Stage 1

The Tailings Dam will be located downstream of the existing ED1 development (refer Appendix A Drawings) and will serve as the main fine rejects storage for the Mount Pleasant Project. Tailings bleed water and stormwater runoff will be collected at the decant area within the eastern portion of the storage, away from the embankment with the captured water being pumped to the MWD for reuse in the mine processing. The Tailings Dam has been prescribed as a High C Consequence Category dam by the DSC.

The capacity requirement for the Tailings Dam was based on the following:

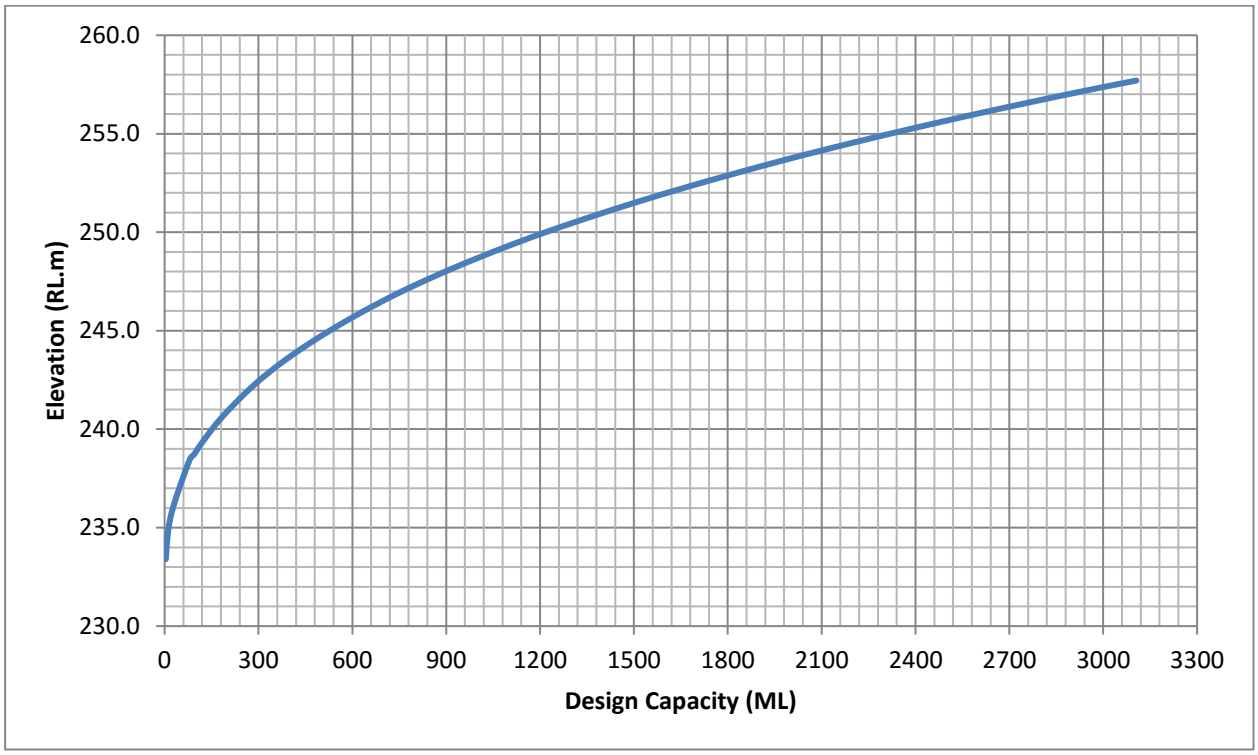
- Anticipated quantity of tailings produced within the first three years of operation (based on ROM Coal Production schedule provided by MACH);
- Additional capacity requirements for the operational decant pond. The operational decant pond volume was advised by HEC, with the Tailings Dam expected to achieve a spill risk of less than one per cent Annual Exceedance Probability (AEP) under modelled conditions; and
- DSC freeboard requirements.

The Tailings Dam storage configuration is summarised as follows:

- Embankment Crest Level — RL 259.8m (centreline of crest)
- Embankment Crest Width — 10.5m (incl. 3.5m batter armouring)
- Embankment Crest Slope — 3% fall towards upstream side
- Embankment Overall Batter Slopes — 3H : 1V
- Clay Core Batter Slope — 3H : 1V (upstream)
2.5H : 1V (downstream)
- Emergency Spillway Invert Level — RL 257.7m
- Emergency Spillway Base Width — 30m
- Emergency Spillway Depth — 1.9m (min at upstream side)
- Maximum Embankment Height — 30.5m
- Total Embankment Length — 615m
- Storage Capacity (at Emergency Spillway Level) — 3,106ML
- Storage Area (at Full Supply Level) — 28.5 ha

A storage curve for the Tailings Dam based on this configuration is shown on Plate 1.

Plate 1
Tailings Dam Storage Curve



*Note: The design assumes approximately 487,000m^3 of material is excavated from the storage area to be used in construction of the embankment (subject to the requirements of the Specification). The actual storage curve may vary based on actual extent of excavations during construction works.

A typical section through the Tailings Dam embankment is shown on Drawing MP001-2510-CIV-DRG-003-0. The dam is designed as a zoned earthfill embankment, comprising an upstream Clay Fill zone, foundation drain and downstream Earth Fill shoulder. Zoned earthfill materials are expected to be won from storage excavation. A foundation drain comprising Select Earthfill will span the width of the embankment at the lowest foundation elevation (within the natural creek line) to allow drainage to the Seepage Management Manhole. The Seepage Management Manhole will comprise a precast reinforced concrete manhole, which allows seepage water to be collected, tested and recovered using a pump back system as required.

The emergency spillway for Tailings Dam is designed a non-trafficable Rock Fill armoured spillway on the northern abutment of the embankment. It is anticipated that majority of the spillway will be excavated into insitu bedrock materials.

2.2 Tailings Dam Clean Water Diversion Drains

Clean water diversion drains have been designed to circumscribe the storage area of the Tailings Dam as a strategy to minimise the extreme storage allowance (DSC freeboard requirements) and hence, reduce the overall capacity requirements of the Tailings Dam. The clean water diversion drains were designed to accommodate the 1 in 100yr critical duration rainfall event. The northern clean water diversion drain will outlet to the downstream section of the Tailings Dam spillway, with stormwater runoff ultimately flowing into Sandy Creek.

The southern clean water diversion drain will pass the southern abutment of the Tailings Dam, and continue to be diverted around ED2. The configuration of the diversion drains are provided in Table 3 below.

Table 3
Summary of Tailings Dam Clean Water Diversion Drains

Parameter	North Drain	South Drain
Type	Clean Water Diversion	Clean Water Diversion
Design AEP	1 in 100	1 in 100
Design Depth	1.1m	0.9m
Overall Length	1,920m	1,770m
Base Width	5.0m	5.0m
Design Gradient*	0.5% to 1.0%	0.5% to 1.0%
Batter Slope	2H : 1V (cut) 3H : 1V (fill)	2H : 1V (cut) 3H : 1V (fill)
Channel Lining**	Topsoiled and Grassed	Topsoiled and Grassed

* Design gradient changes along length of drain - refer Drawing MP001-2610-CIV-DRG-005-0.
** Channels anticipated to be excavated into insitu bedrock material.

2.3 Tailings Dam Embankment Raise Strategy

As the Mount Pleasant operation progresses, the Tailings Dam embankment will require staged raises to provide additional storage for tailings solids, and to maintain the DSC3F freeboard requirements (with consideration given to the maximum volume of the decant pond). The downstream raise technique is proposed for future raises, which will provide a more robust structure in terms of stability compared to centreline or upstream raising techniques.

Generally, future downstream raises would provide a minimum of 3 to 5 years of additional life to the Tailings Dam. Based on providing an additional 5 years of operating life per embankment raise under the proposed ROM Coal schedule (10.5Mtpa), the Tailings Dam would require a number of staged embankment raises over the life of mine to provide capacity for tailings solids. Based on the Tailings Dam design, the following raise heights would be expected:

- Stage 2: Approx. 11m raise (Year 2021 to 2025)
- Stage 3: Approx. 6m raise (Year 2026 to 2030)
- Stage 4: Approx. 5m raise (Year 2031 to 2035)
- Stage 5: Approx. 5m raise (Year 2036 to 2040)

The above raise heights and operational lifespan are dependent on the actual production of tailings solids from the CHPP and water management strategies. The approximate raise heights do not consider the additional capacity provided from excavation of the storage, which may decrease the required raise height of each stage and/or prolong the operation life of the structure. In addition, the height of future raises may also be dependent on achieving specific client construction budgets, with potential to reduce the heights of each raise but increasing the number of raises and raise frequency.

Detailed design work has been completed for Stage 1 of the Tailings Dam, with formal design for the staged embankment raises to be progressively developed. This Fines Emplacement Plan will be updated progressively as the embankment raises are required. Future Tailings Dam designs will be compliant with the requirements of the DSC and the Development Consent.

3 BASIS FOR SYSTEM DEVELOPMENT AND OPERATION

3.1 Operational Principles and Objectives

The philosophy in relation to the operation of Mount Pleasant Tailings Dam is as stated below:

- The system will achieve appropriate environmental performance standards, given the setting and design constraints of the facility. Specifically, these standards relate to protection of receiving environments, with emphasis on maintaining environmental values of surface water, groundwater and air quality.
- A system of operating, monitoring and reporting in relation to tailings deposition and associated activities will be maintained to ensure that all statutory requirements are met.

Specific objectives of the Tailings Dam operation, reflecting the above philosophies and commitments, are as follows:

- The Tailings Dam will provide effective containment for all tailings solids and liquor, in accordance with conditions of the relevant approvals/authorities. Storage enhancement, by lifting or whatever means are appropriate, and operational practices will be implemented during the life of the facility to ensure that such containment is maintained.
- The operation of the facility will be focussed on reducing the quantities of seepage from the impoundment, linked to maximising storage efficiencies and achieving a competent tailings beach.
- Rehabilitation of the facility will be carried out in compliance with approvals requirements, with emphasis on developing a geotechnically competent and sustainable landform to support an appropriate end land use.

To achieve, or significantly contribute to the above objectives, the subaerial deposition method of tailings has been adopted as a minimum operating standard. Subaerial deposition involves discharge of tailings via a series of moveable discharge locations. Typically this involves spigot lines off a main delivery pipeline laid around the perimeter of the facility and particularly from the embankment or adjacent hillslopes to facilitate a decant pond to the west (at the furthest point from the embankment). At each discharge location, the objective of the deposition is for the tailings slurry to produce near-laminar flow over a gently sloping tailings beach to enable segregation and deposition of tailings solids. Subsequent evaporation from the exposed beach surface dries and consolidates the tailings as a means of increasing in situ deposited densities and beach strengths. Water liberated from the tailings through the deposition phase accumulates within a water pond at the toe of the beach. From this pond, water can be decanted and is available for reuse. The benefits of such a deposition method are as follows:

- Maximised tailings densities and therefore operational efficiency of the storage;
- Maximised geotechnical strength/integrity of the tailings beach to enable future embankment lifting over the beach surface as an option should it be required and for post closure landform development.
- Allows the recovery of tailings water to be maximised for recycling purposes.

3.2 Regulatory Compliance Requirements

3.2.1 Licencing Context

Development and operation of the Mount Pleasant Project is approved under the State development consent Development Approval 92/97, granted under the *Environmental Planning and Assessment Act 1979*. The development and operation of the site is subject to the 1997 Environmental Impact Statement, 2010 Environmental Assessment (EA) and the statement of commitments as made by the 2011 Modification Environmental Assessment. The location of the Tailings Dam shall be the approved fine rejects emplacement area as per DA 92/97.

3.3 Minimum Design and Operating Standards

3.3.1 Key Design References

The design benchmarks for the Tailings Dam are as follows:

- *Guidelines on Tailings Dams Planning, Design, Construction, Operation and Closure (ANCOLD 2012)*
- *Guidelines on the Consequence Categories for Dams* (ANCOLD, 2012)
- *Guidelines on Selection of Acceptable Flood Capacity for Dams* (ANCOLD, 2000)
- *Guidelines on Dam Safety Management* (ANCOLD, 2012)
- *Guidelines for Design of Dams for Earthquakes* (ANCOLD, 1998)
- *Dam Safety Management Systems DSC2A (NSW DSC, 2010)*
- *Surveillance Reports for Dams DSC2C (NSW DSC, 2010)*
- *Operation and Maintenance for Dams DSC2F (NSW DSC, 2010)*
- *Emergency Management for Dams DSC2G (NSW DSC, 2010)*
- *Consequence Categories for Dams DSC3A (NSW DSC, 2010)*
- *Acceptable Flood Capacities for Dams DSC3B (NSW DSC, 2010)*
- *Acceptable Earthquake Capacities for Dams DSC3C (NSW DSC, 2010)*
- *Tailings Dams DSC3F (NSW DSC, 2010)*
- *General Dam Safety Considerations DSC3G (NSW DSC, 2010)*

4 TAILINGS DAM OPERATING PROCEDURES

4.1 Key Operating Principles

The key principles towards achieving the goals as well as principles of good practice in terms of dam safety are as follows:

1. A deposition practice that achieves sub-aerial tailings deposition;
2. Control of the position of the decant pond away from the embankment, as well as minimising its size/extent;
3. Protection of the upstream face of the embankment;
4. Timely construction of future raises of the embankment.

Each of the above key principles is discussed in the sections that follow.

4.1.1 Sub-Aerial Deposition

A key operational philosophy is to achieve sub-aerial deposition of the tailings. Sub-aerial deposition is advantageous because the associated extended period of air drying maximises in situ tailings densities which in turn maximises the storage efficiency of the facility as well as providing a more competent tailings surface for future rehabilitation purposes. Other advantages of sub-aerial deposition include earlier facilitation of final rehabilitation due to a more competent tailings surface, rapid recovery of water for reuse in the plant process and minimisation of seepage potential from the Tailings dam.

Implementation of the sub-aerial philosophy for tailings deposition is achieved by:

- Peripheral, thin layer discharge of tailings;
- A nominal beaching thickness of 150mm to promote grain size segregation and to minimise tailings beach angle, as well as maximising the rate of pre-drying of the exposed tailings beach surface;
- A solids concentration for the deposited tailings stream maintained at a level that promotes solids segregation (encouraging the coarse tailings fraction to deposit nearer to the embankment, with finer solids migrating to the centre of the storage), whilst reducing the quantity of decant water to be recovered.
- Appropriate decant recovery practices that ensure the decant pond volumes are minimised which maximises the beach area to promote drying of the tailings as well as ensuring that the decant pond does not encroach within a prescribed minimum distance of the embankment. To maintain freeboard within the Tailings Dam a pumped decant system will be operated with decant water returned to the MWD as a priority, thereby minimising the decant pond volume and seepage potential of the Tailings Dam.

4.1.2 Embankment Safety & Decant Pond Control

The decant pond should be located as far from the embankment as possible. This has the following benefits:

- Reduces the phreatic level in the embankment thereby improving stability;
- Reduces the risk of overtopping the embankment;
- Reduces the risk of erosion of the upstream embankment materials by wave action;
- Minimises seepage from the Tailings Dam.

Ideally the decant pond is located at the most eastern portion of the storage away from the Tailings Dam embankment. Locating the pond within the eastern portion of the storage requires a decant access road to be formed to allow access to the barge for maintenance. It is critical that the decant pond be maintained away from the Tailings Dam embankment, with a minimum buffer of 100m to apply at all times.

Control of location of the decant pond is achieved by deposition of tailings from the entire perimeter of the Tailings Dam. As a minimum, deposition must be from the embankment over its full length. This will ensure that the tailings forms a beach that slopes away from the embankment thereby maintaining the pond at the greatest distance.

Regular relocation of the tailings deposition point is necessary to control the pond location. Particular attention is to be paid to prevention of deposition from one location for too long a period as this will tend to push the pond to the opposite side of the Tailings Dam, with corrective relocation becoming more difficult. Regular cycling of the deposition point will result in good control of the pond location.

In addition to control of the pond location is the requirement of managing the size of the pond. The size of the pond must be kept to the minimum possible. To maintain freeboard within the Tailings Dam a pumped decant system will be operated with decant water returned to the process plant as a priority, thereby minimising the decant pond volume and seepage potential of the Tailings Dam.

4.1.3 Prevention of Erosion of the Upstream Embankment Face

Due to the significant height of the Stage 1 embankment above the natural ground, the initial slope length of the upstream face is significant and prone to erosion by the tailings slurry stream if not managed correctly.

The upstream face of the embankment consists of a selected rock material placed during the construction phase with the purpose of protecting the underlying low-permeability Clay Fill material. Although the protection zone material has been selected to be durable, care must be taken that the deposition of tailings slurry does not erode this material to the extent that the Clay Fill becomes exposed.

This may be achieved either by the reduction of the energy of the tailings slurry stream by ensuring that sufficient discharge points are open simultaneously, or by minimising the slope length down which the slurry can flow upon deposition. The latter is considered more practical and may be achieved by positioning the open end of any delivery pipe as close to the bottom of the slope as possible. Details are described in Section 4.2.1.

4.1.4 Planning and Construction of Future Stages of the Tailings Dam

Emphasis is placed on ensuring that sufficient time is available for the detailed design, construction, and commissioning of the next stage of the embankment so that sufficient capacity is available for tailings deposition in the present phase during the construction of the next, while simultaneously achieving the DSC freeboard storage requirements at all times.

It is imperative that the Tailings Dam is not filled with tailings to above the spillway level as this reduces the hydraulic flow capacity of the spillway and reduces the dry freeboard available on the embankment, making a dam overtopping event more likely and therefore compromising dam safety.

Careful and continuous monitoring of the remaining capacity is required to ensure that the next stage of the embankment is completed in sufficient time as operational factors may cause the storage to be filled at a higher rate than anticipated. Some factors that would lead to such a scenario include a lower than expected tailings in situ density and/or a higher than expected tailings production rate.

4.2 Operating Procedures

Five key operating aspects are relevant to the Tailings Dam. These aspects are as follows:

1. Deposition of Tailings
2. Operation of Decant System (Return Water Management)
3. Seepage Recovery System
4. Rectification of Faults/Leakage in Pipelines
5. Maintenance of System Infrastructure

These aspects contribute to protection of environmental values surrounding the Project site, including:

- Surface water
- Groundwater
- Air quality

The five operating aspects are outlined in the following sections.

4.2.1 Deposition of Tailings

Tailings deposition into the Tailings Dam will occur via spigotted discharge along the embankment and valley abutments to the Tailings Dam. Beaching of tailings shall occur sub-aerially.

The tailings delivery system shall comprise the delivery of tailings from the processing plant to the Tailings Dam via HDPE pipe, with the pipeline corridor bunded as required to contain spills/leaks from the pipelines within the site dirty water management system.

4.2.1.1 Operating Guidelines for Tailings Deposition

The philosophy for tailings management within the Tailings Dam is the sub-aerial deposition of tailings, with key objectives as follows:

- To develop and maintain a constant rate of tailings surface rise, with tailings applied in consistent cycles around the storage;
- To control the decant pond condition around the decant pond location; and
- To ensure that a new campaign of tailings deposition does not cover "fresh" tailings, with the period between deposition campaigns to be sufficient to achieve the degree of desiccation required to maximise the tailings beach dry density.

A delivery system having multiple spigot discharge points at approximately 50m centres will greatly assist in achieving the sub-aerial, dam safety and decant control objectives defined in other parts of this manual and such a system is therefore recommended for the operation of the Tailings Dam. The following discussion assumes that the spigot method is adopted.

A typical spigot discharge system is described as follows:

- Delivery of tailings slurry is via a delivery main (trunk pipe) generally laid around the perimeter of the Tailings Dam and particularly along the embankment.
- Spigot ("dropper type") off-takes are teed off the delivery main at approximately 50m centres.
- The spigots are laid down the upstream embankment face to ensure that discharge occurs directly onto the tailings beach to avoid erosion of the embankment batter. Spigots may also be placed on the adjacent northern and southern hillsides to promote a surface gradient towards the decant area on the eastern portion of the Tailings Dam storage area.
- Spigot discharge is typically via 100ND slotted HDPE pipe to facilitate progressive discharge of tails (lay-flat pipe is also suitable but requires frequent shortening as the tailings level rises).
- Spigot off-takes are valve controlled.

A typical spigot system layout is shown on Plate 2 and 3.

Plate 2
Typical Arrangement of Tailings Delivery Line from Embankment Crest

Plate 3
Typical Discharge Spigot Off-Take Line Showing Slotted Pipe

Tailings deposition must satisfy the key principle to minimise erosion of the upstream face of the Tailings Dam embankment (see Section 4.1.3). This may be achieved either by the reduction of the energy of the tailings slurry stream by ensuring that sufficient discharge points are open simultaneously, or by minimising the slope length down which the slurry can flow upon deposition. The latter is considered more practical and may be achieved by the positioning the discharging end of any delivery pipe or spigot as close to the bottom of the slope as possible.
As the tailings level in the facility rises over time the pipe should be pulled upwards to avoid inundation by the tailings. Lay-flat hose is recommended as a practical pipe material for this approach, due to its relatively low cost and ease of handling. It is readily cut to any length necessary and coupled with existing pipework. Alternatively perforated plastic pipe can be used which is sacrificed as the tailings level rises.

A guideline for tailings deposition using a spigot system is provided as follows:

- Prior to commencement of deposition from a tailings delivery pipeline section, a sufficient number of spigots within the operating section of pipeline are to be opened such that excess pressure within the delivery line is prevented.
- When sufficient tailings have been deposited in the vicinity of a spigot, spigots are to be systematically closed in the direction of pipe flow (i.e. downstream end to upstream end).
- Spigot closures will depend on total tailings thickness deposited at spigot locations. Nominally, a depth of between 150 to 300mm of tailings is to be deposited from a set of operating spigots at one time. As the beach develops to the required level for that cycle, spigots are to be closed, which will move the point of deposition further up the line. A maximum of 10 spigots shall be closed at any one time, with a limit of 2 to 3 spigots being preferred. After flow commences at the corresponding upstream spigots, further spigots may be closed, with this process continuing until all spigots not required are closed.
- Discharge of tailings from any spigot will occur perpendicularly and away from the embankment. Discharge parallel to or towards the embankment on which the spigot is located is not permissible.

- The control of deposition periods/cycles, and further, the requirement for deposition over discrete sections of tailings beach will be assessed by periodic survey of the beach adjacent to individual spigot locations. This survey shall be used essentially to maintain a consistent beaching configuration, achieving the desired beaching thickness.
- Visual assessment of the decant pond location shall also be made as part of the deposition process, with discharge onto discrete areas of beach undertaken to control this pond area (refer Section 4.2.2).
- On the completion of pumping through any one of the delivery pipelines, that section of line shall be immediately flushed by directing decant water to the tailings pumps, with flushing to continue until the discharge runs clean. This assists in the prevention of settlement of tailings solids within and blockage of the pipe.

4.2.2 Operation of Decant System (Return Water Management)

4.2.2.1 System Description

Decant water will be recovered by an electric pump located on a mobile floating barge positioned within the decant pond. Decant pond control (position and size) is described in Section 4.1.

Note that, at times, the intake will be located a considerable distance from the edge of the Tailings Dam and as such the pipework and power supply cabling may require buoyancy aids to cross the tailings beach to the barge.

The barge may be prone to drift from its ideal position due to wind action as well as tailings beach formation. The barge will also require relocation from time to time as the position of the pond is adjusted by the operation. It is recommended that the position of the barge within the Tailings Dam be controlled by cables attached to the barge and anchored to suitable positions on the valley abutments. Adjustment of the length of these cables will reposition the barge.

Recovered tailings water will be transferred to the process plant via a HDPE pipe of appropriate diameter, selected by MACH.

Plate 4
Example Floating Pontoon Decant Arrangement

4.2.2.2 Operating Guideline for Decant Water Recovery

The operating objectives for the decant system within the Tailings Dam are:

(i) to minimise the volume of water contained within the storage (thus contributing to maintenance of freeboard levels, and facilitating exposure of the deposited tailings beach to consolidation and air-drying, particularly as the capacity of the storage is approached); and
(ii) to deliver only "clean" liquor (i.e. with minimal suspended solids) to the MWD, thus enabling immediate recovery and reuse of this liquor.

Key aspects of Tailings Dam decant operation are as follows:

- The location of the decant pond is maintained by effective tailings deposition (refer Section 4.1). This practice involves opening spigot sets on appropriate sides of the tailings area, ensuring that sets are not operated for too long a period, with the key objective to keep the pond centred around the decant location.
- The overall size of the decant pond is maintained by operation of the decant pump system, with the key objective being to maintain a distance from any external embankment to the pond edge of no closer than 100m. The decanting process is controlled by varying the periods and rate of pumping to maintain an adequate decant pond water depth, corresponding to a suitable pond size.

A guideline for decant pond operation, based on the above, is as follows:

- The decanting of liquor from the Tailings Dam shall occur as a "general priority". As such, the volume of water contained within the storage shall be kept to a practical minimum, and below the operating freeboard level.
- Prior to operating the decant pumping system, following any period of non-operation, an inspection of the system shall be carried out to confirm operability and to clear any debris from intakes, as required.
- General surveillance of the clarity of decant water is to be maintained, with pumping rates reduced when the clarity is poor, or increased when the clarity is good, whilst minimising the total pond area (as required).

To achieve the above conditions, safe access for operational staff to the pumping system is to be maintained. Such access relates to the integrity of the causeways/roadways leading to the pump.

4.2.2.3 Performance Requirements for Decant Pump System

The following basic performance requirements exist for the decant pump system, based on operating requirements as described above:

- The minimum pumping duty will be equivalent to the rate of liquor liberated from settling of tailings on deposition into the Tailings Dam. This rate is controlled by the tailings production rate, solids concentration for the tailings stream, and solids settling characteristics.
- The nominal maximum pumping duty will be equivalent to that rate of water accumulated within the Tailings Dam through a combination of full-production tailings deposition, direct rainfall inputs under critical wet season conditions, balanced against maintaining containment requirements. The results of the water balance model indicate that a pump rate of 110 L/s is necessary (HEC, 2017) to maintain a spill risk of less than one per cent.

- Subject to MACH's preferred approach, the options for equipping the system to accommodate the maximum pumping duty are to provide a permanent/standby pumping capacity, or to mobilise temporary pump(s) for the period of each wet season. The permanent/standby system is the preferred approach.

4.2.3 Operation of Seepage Management

A foundation drain which outlets to the Seepage Management Manhole will be installed to management seepage through the embankment. A Clay Fill cut-off key which will be constructed to key into the bedrock underlying the embankment footprint to minimise the potential shallow seepage pathway.

The depth of the cut-off key shall be subject to confirmation during the construction phase based on observation of the excavations by the Designer's Representative (ATC Williams).

The rate of seepage to be intercepted by the central foundation drain was estimated by modelling the steady state full supply level, and modelling the total flux passing through the clay core. The estimated seepage rate through the modelled cross section was multiplied by the embankment length as a representation of the seepage rate across the entire embankment. The seepage rate to be intercepted by the embankment foundation drain was modelled as follows:

- Tailings Dam: approx. 0.4 L/s under long term steady state conditions.

This seepage rate is considered to be a maximum estimate, as the model assumes the water level is at the FSL under long term steady state conditions, and noting the seepage rate should decrease on the embankment abutments as the height of the embankment decreases.

Notwithstanding, assessment of the quantities and effects of any seepage that may occur must be included as part of the ongoing monitoring and surveillance of the site and if necessary, remedial actions taken.

4.2.4 Rectification of Faults/Leakage in Pipelines

The principle pipelines associated with the Tailings Dam comprise the tailings delivery lines, the decant pipelines to the process pond and any return water system from the seepage recovery infrastructure, if applicable. A general procedure for repair of faults or small leaks within pipelines is described as follows:

- Maintain an inspection program to check for faults or leaks
- Where a leak is detected, this area shall be marked to assist maintenance personnel to locate the fault.
- As a temporary measure, Linatex bandages, fibreglass tape or insertion of timber plugs may be used to repair leaks. Regardless of whether temporary measures are successful or not, prompt action by the maintenance crew will be required to undertake permanent repairs of leaks or faults.
- In the event that a significant fault or leak is encountered (i.e. cannot be managed by temporary measures), the maintenance crew shall be contacted immediately. Such an event may constitute an incident, with incident reporting to be carried out in accordance with MACH's incident response process.

As a means of limiting the occurrence of faults or leakage or at least in prompt identification of faults within pipeline systems around the Tailings Dam, the following management measures are of importance:

- Daily visual checks

4.2.5 Maintenance of System Infrastructure

A maintenance program must be implemented to maintain the integrity and long term serviceability aspects of the following key infrastructure items:

- Storage Embankment
- Emergency Spillway
- Decant System/Return Water Pipeline
- Seepage Recovery Pond and Return Water Systems

Specific maintenance procedures and a maintenance schedule, developed with consideration of the monthly and surveillance requirements, shall be prepared and implemented by MACH.

4.2.6 Indicative Tailings Beach Profile

The indicative tailings beach profile under the above deposition strategies is shown in Appendix A, for operational years one to three.

4.2.7 Interim Operating Procedures (Interim Tailings Dam)

During the initial construction period for the Mount Pleasant Operations, MACH have advised that Tailings Dam will be operated at the proposed Interim Tailings Dam elevation of RL 248.00m. It is estimated that the Interim Tailings Dam will be operated for approximately 1 to 1.5 months before practical completion of the Stage 1 Tailings Dam. Based on the above, the following spill risk criteria and requirements are applicable to the Interim Tailings Dam during this period:

- Adopted spill risk criteria of 0.01AEP based on the following inputs:
  - Tailings Volume: 144 ML (maximum)
  - Operational Decant Pond Volume: 50ML
  - Operational Freeboard Requirement: 193.5 ML

Based on the above, a total capacity of 387.5ML is required during the Interim Tailings Dam phase. The volumes above have been conservatively estimated assuming no recovery of decant water from the Tailings Dam. The total capacity requirement for the Interim Tailings Dam is equivalent to an elevation of approximately RL 245.10m. It is noted that the planned Interim Tailings Dam elevation will be RL 248.00m which will provide some 685 ML of storage (approximately 297ML more than the total capacity requirement).

Tailings shall be deposited into the Interim Tailings Dam via a single spigot discharge located on the southern abutment of the storage. Deposition through a single spigot arrangement shall be temporary until practical completion of the Stage 1 Tailings Dam. Deposition into the Interim Tailings Dam storage shall cease at an accumulated tailings volume of 144ML, unless construction of the Stage 1 Tailings Dam has reached practical completion.

The operator shall make provisions for emergency pump infrastructure, with drawdown of the decant pond required at an elevation of RL 246.25m (ie. the 0.01 AEP, 72hr rainfall event freeboard requirement). Further information is provided in the Interim Tailings Dam technical memo (116134.01.L02-a).

REFERENCES

[1] AAM (2016), *Mount Pleasant 2011 LIDAR Survey - Adjustment to AUSGEOID09*, Volume 18217A04NOK, August 2016.

[2] ANCOLD (1998), Guidelines for Design of Dams for Earthquakes, Australian National Committee on Large Dams.

[3] ANCOLD (2003), Guidelines on Dam Safety Management, Australian National Committee on Large Dams.

[4] ANCOLD (2012), Guidelines for Design on Tailings Dams, Australian National Committee on Large Dams.

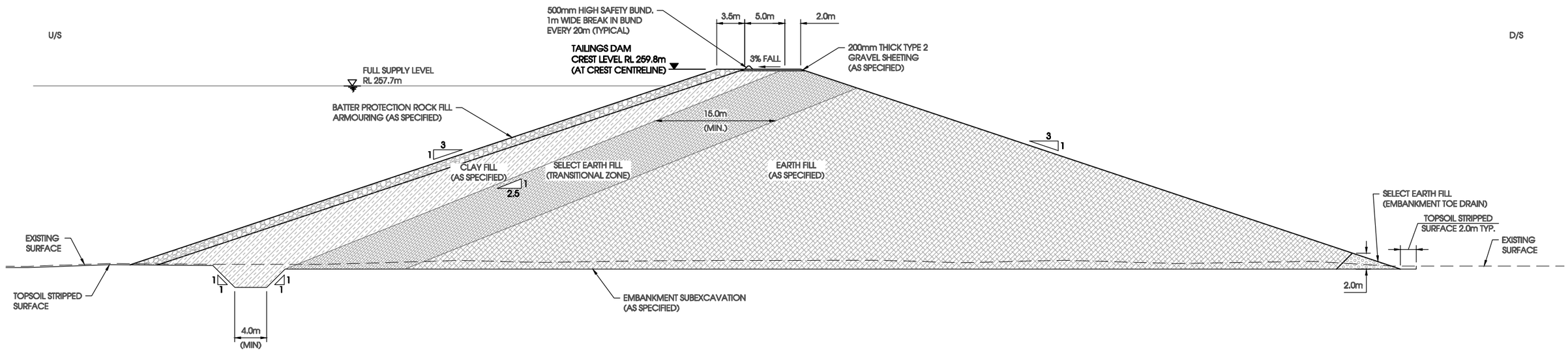
[5] ATCW (2007), *Mount Pleasant Project - Tailings Storage Facility*, Final Report, August 2007.

[6] Hydro Engineering & Consulting Pty Ltd (2017), *Mount Pleasant Project - Site Water balance and Water Management System Design*, January 2017 (ref: J1607.r1b)

[7] New South Wales Dam Safety Committee Guidance Sheets 2010.

- DSC2A Dam Safety Management Systems (SMS)
- DSC2C Surveillance Reports for Dams
- DSC2F Operation and Maintenance for Dams
- DSC2G Emergency Management for Dams
- DSC3A Consequence Categories for Dams
- DSC3B Acceptable Flood Capacity for Dams
- DSC3C Acceptable Earthquake Capacity for Dams
- DSC3F Tailings Dams
- DSC3G General Dam Safety Considerations

APPENDIX A



TYPICAL TAILINGS DAM SECTION

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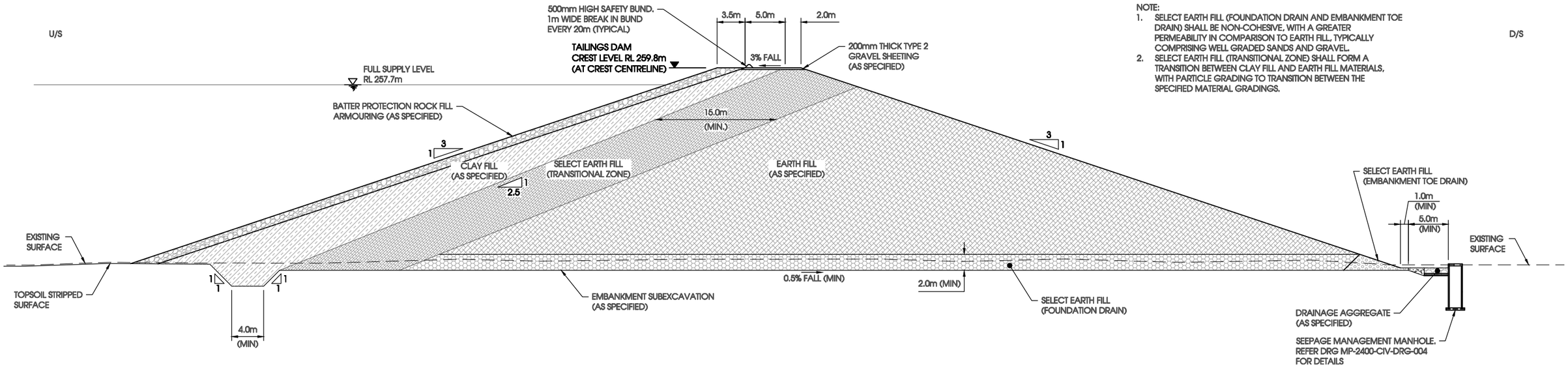
NOTE:
1. SELECT EARTH FILL (FOUNDATION DRAIN AND EMBANKMENT TOE DRAIN) SHALL BE NON-COHESIVE, WITH A GREATER PERMEABILITY IN COMPARISON TO EARTH FILL, TYPICALLY COMPRISING WELL GRADED SANDS AND GRAVEL.
2. SELECT EARTH FILL (TRANSITIONAL ZONE) SHALL FORM A TRANSITION BETWEEN CLAY FILL AND EARTH FILL MATERIALS, WITH PARTICLE GRADING TO TRANSITION BETWEEN THE SPECIFIED MATERIAL GRADINGS.



TYPICAL TAILINGS DAM CROSS SECTION WITH CENTRAL FOUNDATION DRAIN

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DIMENSIONS ARE IN METRES

1:250 (A1)
1:500 (A3)

ISSUED FOR CONSTRUCTION

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SCALE:	1:500
JOB No.	116134-01
DATE	JAN. 2017
DESIGN	AJB
DRAWN	SIT
CHECKED	MT
APPROVED	RH

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Mount Pleasant Operation

MOUNT PLEASANT PROJECT

TAILINGS DAM
TYPICAL CROSS SECTION

DWG No. MP001-2510-CIV-DRG-003

SHEET SIZE A3 Rev. 0

SHEET 1 OF 1

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Plotted Date: 13/07/17

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DATE: CAPTURED 9 & 12 AUG 2016

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HEIGHT DATUM: AHD (AUSGEOID9)

LEGEND:

INDICATIVE TAILINGS SPIGOT

N

E 292000m
E 292500m
E 293000m
N 6432000m
N 6431500m
N 6431000m

TAILINGS DAM

50m TYP.

244.8
244.6
244.4
244.2
244.0

INDICATIVE OPERATIONAL DECANT POND

FSL RL 257.7m

INDICATIVE DECANT PUMP PAD

DECANT ACCESS ROAD

CONTROL LINE LVSR_12

ED2

100 0 100 200
DIMENSIONS ARE IN METRES

1:2,500 (A1)
1:5,000 (A3)

ISSUED FOR REVIEW

NOT FOR CONSTRUCTION

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JOB No.	116134-01
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TAILINGS DAM
FINES EMPLACEMENT PLAN
YEAR 1 - INDICATIVE TAILINGS DEPOSITION

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SHEET 1 OF 1

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DATE: CAPTURED 9 & 12 AUG 2016

HORIZONTAL DATUM: GDA 94, ZONE 56
HEIGHT DATUM: AHD (AUSGEOID9)

LEGEND:

INDICATIVE TAILINGS SPIGOT

N

E 292000m
E 292500m
E 293000m
N 6432000m
N 6431500m
N 6431000m

TAILINGS DAM

50m TYP.

ED2

INDICATIVE OPERATIONAL DECANT POND

FSL RL 257.7m

INDICATIVE DECANT PUMP PAD

DECANT ACCESS ROAD

CONTROL LINE LVSR_12

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DIMENSIONS ARE IN METRES
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1:5,000 (A3)

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JOB No.	116134-01
DATE	APR. 2017
DESIGN	AJB
DRAWN	SIT
CHECKED	MT
APPROVED	RH

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MOUNT PLEASANT PROJECT

DWG No. ME16-010-BSE-SKT-0041

TAILINGS DAM
FINES EMPLACEMENT PLAN
YEAR 2 - INDICATIVE TAILINGS DEPOSITION

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SHEET 1 OF 1

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DATE: CAPTURED 9 & 12 AUG 2016

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HEIGHT DATUM: AHD (AUSGEOID9)

LEGEND:

INDICATIVE TAILINGS SPIGOT

N

E 292000m
E 292500m
E 293000m
N 6432000m
N 6431500m
N 6431000m

TAILINGS DAM

50m TYP.

ED2

INDICATIVE OPERATIONAL DECANT POND

FSL RL 257.7m

INDICATIVE DECANT PUMP PAD

DECANT ACCESS ROAD

CONTROL LINE LVSR_12

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DIMENSIONS ARE IN METRES
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1:5,000 (A3)

ISSUED FOR REVIEW

NOT FOR CONSTRUCTION

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SCALE:	1:5,000
JOB No.	116134-01
DATE	APR. 2017
DESIGN	AJB
DRAWN	SIT
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TAILINGS DAM
FINES EMPLACEMENT PLAN
YEAR 3 - INDICATIVE TAILINGS DEPOSITION

SHEET SIZE A3 | Rev. A

SHEET 1 OF 1

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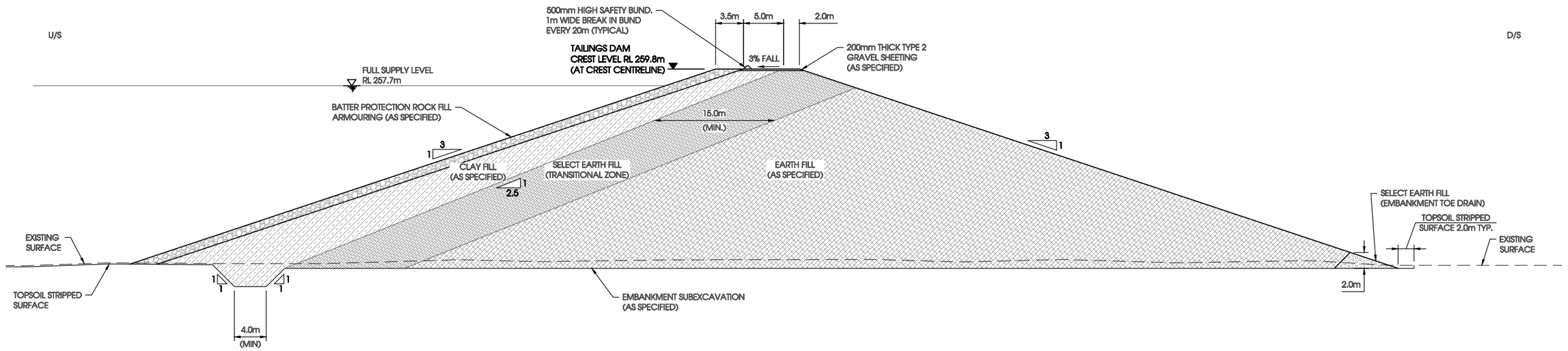

TYPICAL TAILINGS DAM SECTION

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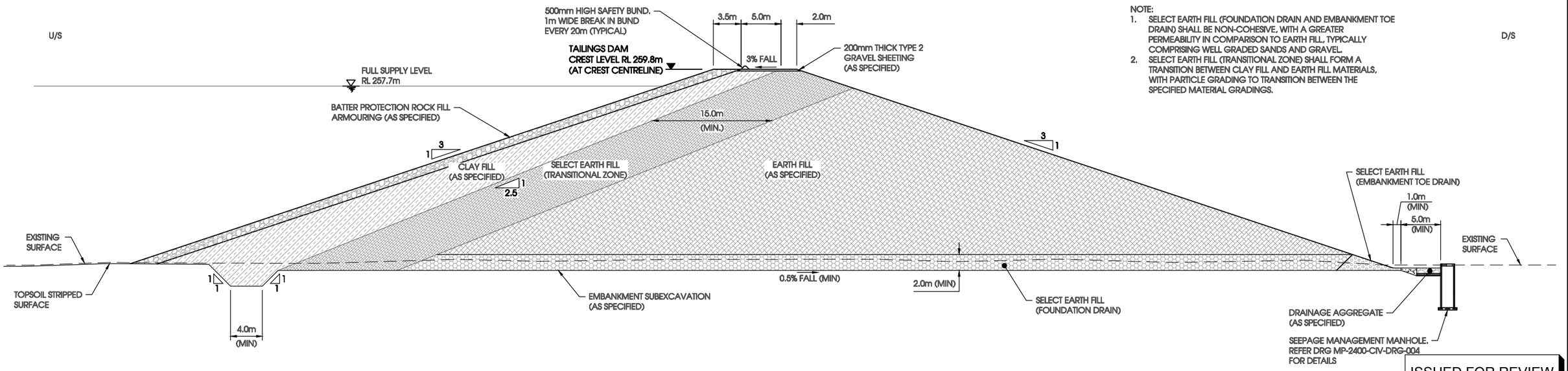

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TYPICAL TAILINGS DAM CROSS SECTION WITH CENTRAL FOUNDATION DRAIN

SCALE: 1:500

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1:250 (A1)
1:500 (A3)
DIMENSIONS ARE IN METRES

ISSUED FOR REVIEW

NOT FOR CONSTRUCTION

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DATE	JAN. 2017
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TAILINGS DAM
TYPICAL CROSS SECTION

DWG No. MP001-2510-CIV-DRG-003

SHEET SIZE A3 | Rev. A

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