PART

7

ENVIRONMENTAL, OPEN SPACE AND LANDSCAPING

- Rehabilitation Plan prepared by Cardno Chenoweth
- Information in Support of Application for Multiple Environmentally Relevant Activities prepared by Cardno
- Existing Species List prepared by Saunders Havill Group

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REHABILITATION PLAN PREPARED BY CARDNO CHENOWETH

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Carmichael Coal Project Rail Camp One Rehabilitation Plan

Carmichael Coal Project Rail Camp One Rehabilitation Plan

October 2012

Prepared for Adani Mining Pty Ltd

15 October 2012

Cardno
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Prepared for Adani Mining Pty Ltd

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1 Introduction

To facilitate the construction of a rail corridor associated with the Carmichael Coal Project, temporary construction camps are required in several locations. Following completion of construction and decommissioningof these construction camps, the sites require rehabilitation, generally to their previous condition and land use. This rehabilitation plan for Camp Site 1 (*the Site*) has the primary goal of returning the Site to its former state ie. pasture for cattle grazing, and addresses issues of site preparation, seeding, establishment and monitoring.

This rehabilitation plan does not constitute an erosion / sediment control plan. Works associated with erosion and sediment control may be necessary prior to or in parallel with site rehabilitation, depending on time-lag between decampment and appropriate seed-sowing times. It has been assumed that Buffel Grass (*Cenchrus ciliaris*) pasture was present on the Site prior to camp construction, and is to be restored to similar condition after the construction camp is no longer required.. Any alternatives (such as more suitable pasture types) should be integrated into the current plan prior to seeding.

The primary objective of the report is to ensure that the Site can be rehabilitated to a state equivalent to or greater than its previous state in terms of vegetative cover (in this case Buffel Grass pasture).

2 Methodology

The following documentation has been reviewed to assist in understanding Site dynamics and associated processes that will be required to rehabilitate the Site following decampment:

> CAD drawings showing site location and structure;

> Spatial layers showing Regional Ecosystems, contour, drainage, soil type, geology and other relevant site characteristics;

> Associated site reporting;

> Aerial imagery.

Following review the rehabilitation procedure was developed and confirmed by consulting with local agricultural service providers to ensure feasibility.

3 Site Description

The Site is located on Lot 7 on RP890093, approximately 34km west of the township of Moranbah, where rainfall is generally concentrated in the months from November to February (BOM, 2012).The Regional Ecosystem Preclear mapping (Qld Herbarium 2009) shows the site to be dominated by Landzone 4 (Cainozoic clay deposits, usually forming level to gently undulating plains above current alluvial systems).

Aerial photography shows the area as predominately cleared pasture, with a central fenceline / access track running north / south through the center of the site, which is approximately 9.3 ha in size. A site map is provided in Appendix A.

Contour mapping shows the area to be of very low gradient (ie. less than 10%) which corresponds with Landzone classification..

4 Rehabilitation Procedure

The rehabilitation procedure has been developed with reference to the Department of Agriculture, Fisheries and Forestry guidelines for Buffel Grass planting (DAFF, 2012) and further consultation with local agricultural contractors.

4.1 Preclearance Inspection

A preclearance (ie. preconstruction) inspection of the Site should be undertaken to gain a full appreciation of:

> Site grass cover utilising the Grass Check (Forge, 1994) methodology, including coverage and dominant species);

> Site weed cover, focussing on declared weeds and non-declared weeds with the potential to invade pastures (eg. African Lovegrass);

> Suitability of rehabilitation plan in terms of Site rehabilitation.

> Location of photopoints and pre-construction photographs, as a basis for later monitoring.

To maximise rehabilitation effectiveness, the rehabilitation plan should be updated following Site Preclearance inspection and survey.

4.2 Site Preparation

Following decampment, the following tasks should be implemented, preferably in the listed order:

> An erosion and sediment control plan should be implemented if required.

> Garbage and coarse waste (including building materials should be removed from the site.

> Any construction materials such as roadbase should be scraped and taken from the site.

> Topsoil and subsurface material (if removed) should be returned to the site. If unavailable, suitable fill should be utilised to recontour the Site, with a minimum 100mm of local topsoil utilised to cap the Site (for areas where topsoil has been removed only.

> Weeds identified in the Site Preclearance Inspection should be treated utilising an appropriate treatment method for the weed species as recommended by the Department of Primary Industries (e.g. registered herbicide at the listed rate).

> Cattle should be isolated from the Site using existing fencing or temporary fencing, preferably until the crop has both seeded and spread over a minimum 70% of the site .

> The Site should be tilled / cultivated in preparation for seeding. Such cultivation should be avoided following heavy rains to avoid soil clods which will hamper seeding.

4.3 Seeding

Seeding will be undertaken as follows:

> The seed is best sown just ahead of the expected rainy season (November to February). Weather outlooks available at the time of the project will provide better guidance on this matter.

> The site should be lighly watered immediately prior to seeding (or within the same pass) to reduce dust assist the adhesion of seed to the ground surface.

> Seeding rate: Bare seed at 4kg/ha (Seed coated to prevent predation and facilitate spread will be required at 8kg/ha). Seed mix can be either pure Buffel Grass or a local mix such as a “Miner’s Mix” which contains other cover crop species. Seed must be within its viability period.

> Seed can be sown through special buffer seed drills fitted with agitators in the seedbox to separate the seed, or with an augur device to perform the same function. Seed will not be sown at a depth greater than 10mm. The method utilised to broadcast the seed will be dependent on site moisture conditions at the time.

4.4 Maintenance

> Following germination, the soil must remain moist for 4-5 days for successful seedling growth. This may be in the form of retained on-site moisture, follow up-up rains or site irrigation (eg. Tractor mounted boom sprays).

> Livestock and traffic should be excluded from the Site during pasture development using existing fencing or temporary fencing, preferably until the crop has both seeded and spread over a minimum 80% of the site .

> Macropods such as kangaroos should be monitored during the growth phase of the pasture and measures such as control programs or the application of alum-based products should be implemented to deter their use of the Site should they be consitantly overgrazing the site.

> Large gaps (ie. greater than 500m^2) in germination should be reseeded as above.

4.5 Monitoring

6 months following seeding, a monitoring inspection should be undertaken to gauge rehabilitation effectiveness. Key aspects to inspect and report on include:

> Site grass cover utilising the Grass Check (Forge, 1994) methodology, including coverage and dominant species).

> Grazing by cattle or feral animals such as kangaroos.

> Presence of waste / debris.

> Photographs from identified photopoints.

> Presence of invasive weeds, including data and control measures regarding weeds that have the capacity to seriously inhibit pasture development.

Key performance criteria include:

1. Site has been cultivated prior to seeding.

2. Site has been sown with viable Buffel Grass seed (ie. within ‘use by’ period) to a minimum of 4kg/ha (uncoated) or 8kg/ha (coated)..
3. Sown pasture species cover a minimum 80% of the ground area.
4. Class 1 or 2 Weeds declared under the Land Protection (Pest and Stockroute Act) 2002 are absent or <1% of the area, and other invasive weeds are <15% of the ground area.
5. All waste / debris have been removed from the site.

If key performance criteria have been met then rehabilitation will be deemed successful and no further reporting or actions are required.

Should any key performance criteria not be met then exclusion of grazing or further works (such as reseeding or weed control) and monitoring will be required until they have been met.

5 Conclusion

The re-establishment of Buffel Grass pasture in an area previously vegetated with the same pasture is likely to be successful, provided the site is prepared, any weeds removed and seeding rates are adequate, as specified in this Rehabilitation Plan. However the pasture should be monitored and allowed to establish before grazing recommences. When implemented the Rehabilitation Plan will ensure that the Site is returned to a state similar to its previous condition in terms of pasture coverage.

6 References

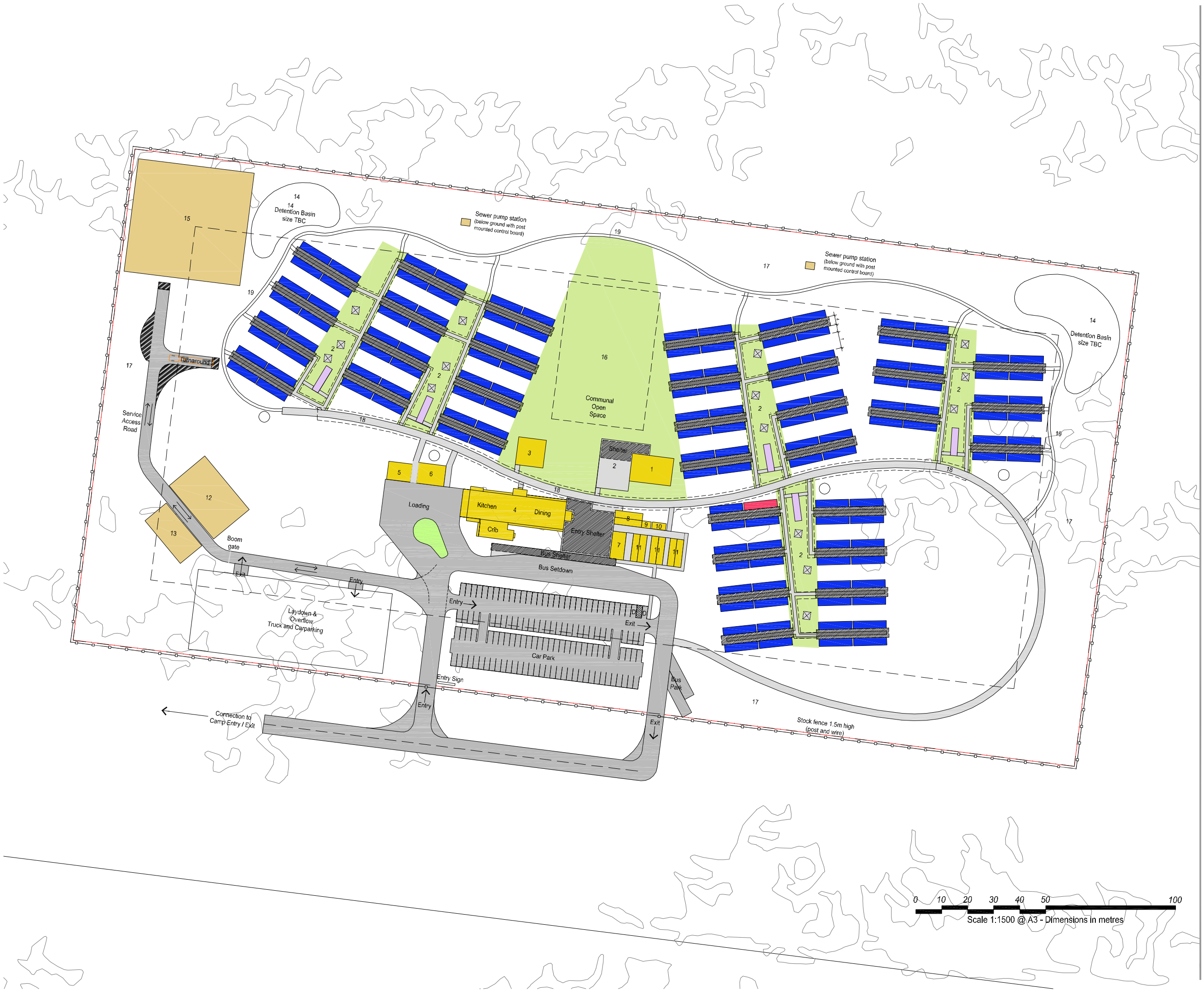
Commonwealth Bureau of Meteorology, As viewed on 15/October/2012, Rainfall Statistics, as viewed at: http://www.bom.gov.au/climate/data.

Commonwealth Department of Agriculture, Fisheries and Forestry, As viewed on 15/October/2012, Guidelines for Planting Buffel Grass, as viewed at http://www.daff.qld.gov.au/26_18055.htm#Sowing

Forge, K. 1994. GRASS Check : Grazier Rangeland Assessment for Self-Sustainability. Department of Primary Industries.

QLD Herbarium. 2009. Preclearance Mapping version 6.1.

Appendix A Site Mapping



COMMUNAL BUILDING
ACCOMODATION UNIT
DISABLED UNIT
LAUNDRY
PATH
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COMMUNAL OPEN SPACE

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A	10.10.2012	Preliminary	DM

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Drawing:
RAIL CAMP 1 - LAYOUT

Client:
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INFORMATION IN SUPPORT OF APPLICATION FOR MULTIPLE ENVIRONMENTALLY RELEVANT ACTIVITIES PREPARED BY CARDNO

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Carmichael Mine and Coal Rail Project-Construction Camps – Rail Camp 1

Information in Support of Development Application

7508-90

Prepared for
Adani Mining Pty Ltd

30 October 2012

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Shaping the Future

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Executive Summary

Adani Mining Pty Ltd proposes to develop a rail construction accommodation camp located approximately 33km west of Moranbah, 97km north of Clermont and 16km west of Kilcummin Diamond Downs Road, Pasha herein referred to as Rail Camp 1. Development approval is being sought from Isaac Regional Council, for Material Change of Use – for a Temporary Rail Workers Camp. An EIS Report has also been prepared in support of the development application.

Rail Camp 1 is required in relation to the construction of a new rail corridor that is proposed to service the proposed Carmichael Coal Mine Project, previously assessed by the Office of the Co-ordinator General as a 'state significant' project under separate legislation. Rail Camp 1 is to include 400 rooms, a temporary Sewage Treatment Plant (STP) and a temporary generator facility with associated diesel aboveground tank fuel storage and day tank storage to provide power to the site.

The fuel storage and onsite STP are activities that constitute Environmentally Relevant Activities (ERAs), as defined in Schedule 2 of the *Environmental Protection Regulation* 2008. Therefore these activities also require a development approval for *Material Change of Use for an Environmentally Relevant Activity* and registration certificate.

Cardno (Qld) Pty Ltd (Cardno) has been commissioned by Adani Mining Pty Ltd to prepare information in support of an application for these activities and an associated Site Based Management Plan (SBMP).

The ERAs which are the subject of the application are consistent with the definition of:

> ERA 8(3)(a) – Chemical Storage (10 to 500 cubic metres of chemicals class C1 or C2 combustible liquids); and

> ERA 63(2)(b)(i) – Sewage Treatment (operating a sewage treatment works, other than a no-release works with a total daily peak design capacity of more than 100 to 1500EP, if treated effluent is discharged from the works to an infiltration trench or through an irrigation scheme).

The subject development application is intended to be provided to the Coordinator General as part of the overall Environmental Impact Statement (EIS) submission for the Carmichael Coal Mine Project. The purpose of the inclusion of this document within the EIS is to facilitate particular exemptions from the supplementary IDAS process that are afforded under the *State Development and Public Works Organisation Act 1971.*

Table 1-1 ERA Summary Information

Activity	Chemical Storage	Sewage Treatment
Scale	28,000L fuel (27,438L diesel storage tank + contingency storage) Minor packaged oils & lubricants	Total peak capacity of up to 80kL per day (ADWF assuming 200L/EP/day for 400 persons)
Scope	Bulk fuel storage for refuelling of generators on site Oils and lubricants for generator maintenance	Sewage treatment for 400 person construction camp - 400 Equivalent Persons (EP) Disposal of treated effluent to dedicated irrigation area of up to 4.0ha.
Location (Lot numbers)	Part of Lot 7 SP233102	Part of Lot 7 SP233102
ERA Threshold	10 to 500 m^3 of chemicals.	100 to 1500 EP.
Environmental Management	Double lined proprietary tank for fuel storage. Minor fuel storages and flammable liquids appropriately designed, signed and registered and emergency management systems in place.	Effluent managed by irrigation to land on site (up to 4.0 ha irrigation area with public access). Effluent concentration: 10mg/L median Nitrogen, 5mg/L median Phosphorous. 9 days wet weather storage volume in tank farm (up to 720 kL total storage volume).

Activity	Chemical Storage	Sewage Treatment
		Contingency tanker removal of effluent from storage in extreme wet weather conditions where irrigation cannot occur.

The supporting information contained in this document provides further information on the activities, the site and how the activities are to be conducted to facilitate assessment by Council and DEHP.

The SBMP has also been prepared in accordance with DEHP's SBMP guideline licensing requirements and describes in full detail the ERAs to be carried out at the site and how they are to be managed. The SBMP identifies the environmental management measures which will be adopted onsite to address potential environmental impacts associated with the proposed ERAs.

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1 Proposed Activities

This report relates to the proposed development of a rail construction camp ("the development") which is required for the construction of a new rail corridor that is proposed to service the proposed Carmichael Coal Mine Project, and is to temporarily provide 400 residential units for construction workers, bus and truck parking, central recreational facilities, site office, wet mess, laundry, kitchen and dining facilities, ablutions, temporary STP and generator facility with associated fuel storage. The development will cater for up to 400 construction personnel.

Cardno has been commissioned by Adani Mining Pty Ltd to prepare an application including supporting information and a SBMP for activities associated with the accommodation to be provided for Rail Camp 1, located 33km west of Moranbah and 97km north of Clermont (Figure 1).

This report and accompanying SBMP is intended to support an application for *Material Change of Use for Environmentally Relevant Activity* for a 400EP temporary STP and temporary 28,000L fuel storage ("the activities") associated with development on part of Lot 7 SP233102 ("the site"). The layout of the various proposed activities listed above is shown in Figure 2.

1.1 Environmentally Relevant Activities (ERAs)

Of the activities proposed, a number meet the criteria of ERAs under Schedule 2 of the *Environmental Protection Regulation 2008 (EP Reg 2008)*. The ERAs to be carried out may be defined as follows:

> ERA 8(3)(a) – Chemical Storage (10 to 500 cubic metres of chemicals class C1 or C2 combustible liquids); and

> ERA 63(2)(b)(i) – Sewage Treatment (operating a sewage treatment works, other than a no-release works with a total daily peak design capacity of more than 100 to 1500EP, if treated effluent is discharged from the works to an infiltration trench or through an irrigation scheme).

It should be noted that the ERAs are for a temporary sewage treatment plant and temporary fuel storage to accommodate Rail Camp 1 and will be decommissioned once the rail corridor is complete.

2 Site Characteristics

The subject site area of 9.33ha which incorporates the temporary STP, associated irrigation scheme and temporary fuel storage activity occurs on part of Lot 7 SP233102. The lot is bound to the:

> north by undeveloped land;

> east by undeveloped land;

> south by undeveloped land; and

> west by undeveloped land and further west Kilcummin Diamond Downs Road.

The STP and fuel storage activity are expected to occupy a total area of approximately 0.7ha located in the south-western extent of the lot. The proposed locations for these activities are shown on Figure 2.

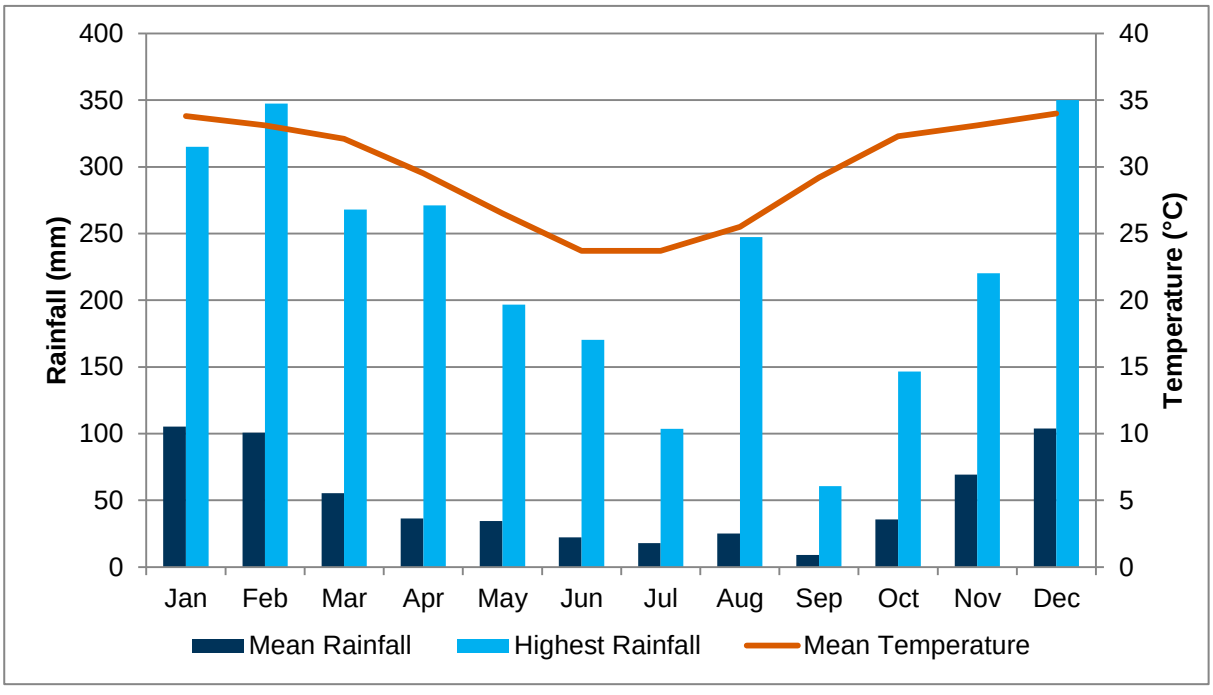
The irrigation scheme associated with the STP activity is expected to occupy up to 4ha of land, consisting of irrigation of landscaped communal open space and buffer areas. The proposed locations of the irrigation scheme are shown on Figure 2. On-site sewage treatment and subsequent irrigation disposal is required for the development as the site is not currently sewered.

It should be noted that the ultimate area of the irrigation scheme has been conservatively estimated, as it is anticipated that much of the effluent generated by the STP may ultimately be used as on-site dust suppression during construction works and the use of recycled water from the STP will serve to further reduce the overall water demand from Rail Camp 1.

2.1 Climate

Historical climatic data was obtained from the Bureau of Meteorology (BOM) for Moranbah (Moranbah Water Treatment Plant BOM station #034038). Table 2-1 shows that mean monthly rainfall and maximum temperature are greatest in January and December. For the Moranbah weather observation site, the mean annual maximum temperature is 29.7°C and rainfall is 616.00mm. These matters will be required to be considered when planning and managing the activities.

Table 2-1 Climate data for Moranbah



2.2 Land Use and Topography

The site land is currently used for rural grazing. Pursuant to the *Belyando Shire Planning Scheme* the site is zoned as Rural. The topography of the development site is generally flat without distinctive topographical features. A gentle slope runs towards the north-eastern boundary with natural surface elevations ranging from approximately 261m to 263m AHD.

2.3 Soils and Geology

Site specific soil and geotechnical investigations have not been conducted for the purposes of the development application; therefore the irrigation scenarios presented assume irrigation activity in the worst case scenario; that is irrigation of clay soils, allowing 100m^2 per person for effluent disposal.

The site has not been mapped within the Belyando Shire Planning Scheme as being at risk of the occurrence of acid sulfate soils as it is located inland and above 20m (Australian Height Datum) AHD. Acid sulphate soils are not considered to be a risk factor in non-coastal areas and on land above 20m AHD.

2.4 Waterways and Ambient Water Quality

Stormwater from the catchment of the site discharges to a tributary of Belyando River, however stormwater arrangements will be such that the majority of stormwater flows will be captured and returned to the site where possible as specified in the Development Application. The stormwater detention basin at the site will be designed in accordance with the requirements to maximise the retention of stormwater and achieve required pollutant load reduction.

No natural wetlands or waterways are located within the proposed camp location. Stormwater from the catchment of the site is likely to either discharge to Meinly creek located approximately 4km to the north, Diamond Creek located 9km to the south or Grosvenor Creek located 10km to the east of the site. These creeks are tributaries of Suttor River and Isaac River Catchments.

The site is not located within a designated flood or floodplain area and is not considered to be subject to flooding.

Pursuant to the findings of the Carmichael Mine and Coal Rail Project EIS the northern tributaries of the Belyando River are listed as having a range of Environmental Values including:

> aquatic ecosystems;

> irrigation;

> farm supply/use;

> stock water;

> other values (floodplain);and

> cultural and spiritual values.

Relevant Water Quality Objectives (WQOs) for the Suttor River Basin are not currently defined in the *Queensland Water Quality Guidelines 2009* (QWQG, 2006), however to support and protect relevant environmental values for waters in the Suttor River Basin, typical water quality objectives which will apply to this catchment will be similar to those for the nearby Isaac River Catchment as shown in Table 2-2 below.

Table 2-2 Isaac River Water Quality Objectives

Water Quality Parameter	Water Quality Objective (for slightly to moderately disturbed lowland streams)
Ammonia Nitrogen	>20 µg/L
Oxidised Nitrogen (Nitrite and Nitrate)	<60 µg/L
Organic Nitrogen	<420 µg/L
Total Nitrogen	<500 µg/L
Filterable Reactive Phosphorous	<20 µg/L

Water Quality Parameter	Water Quality Objective (for slightly to moderately disturbed lowland streams)
Total Phosphorous	<50 µg/L
Chlorophyll-*a*	<5.0 µg/L
Dissolved Oxygen	85 – 110 % sat.
Turbidity	<50 NTU
Suspended Solids	<55 mg/L
pH	6.5-8.5
Oils and Grease	No visible films or odours
Litter/Gross Pollutants	No anthropogenic material greater than 5mm in any dimension

It is anticipated generally that discharge quality to creeks within this catchment will be required to be such as to enable WQOs for streams in dry tropics to be achieved. These are expected to be similar to those specified in Table 2.2 and are due to be published in early 2013.

Nonetheless the WQOs for the catchment are considered to be of limited relevance for the purposes of the current application as the STP arrangement will be such that there will be no discharge to receiving waterways. Application to land from irrigation scheme is the preferred effluent management strategy.

2.5 Groundwater

Groundwater levels are not available for this location at present; however it is assumed that the groundwater regime in vicinity of the site is consistent with that described in the Carmichael Mine and Coal Rail Project EIS, which indicates that groundwater resources are located at significant depths below ground level.

It is not proposed to carry out site specific groundwater investigations for the purposes of the application, as the irrigation activity is designed as a deficit irrigation scheme and is unlikely to impact on groundwater.

2.6 Vegetation

The site contains vegetation consisting predominantly of tuft grass with small scattering of mature vegetation. The site is considered to be relatively low ecological value and is mapped as non-remnant and as such does not contain *endangered*, *of concern*, or *least concern* remnant vegetation. Additionally no areas of high value regrowth vegetation of *endangered*, *of concern* and *least concern* vegetation were mapped as occurring within the site pursuant to the VM Act.

Based on an inspection of the relevant trigger maps, the site is not considered to contain any Referrable Wetlands or Areas of High Ecological Significance.

The site is considered to be in a low to medium risk bushfire area according to the *Belyando Shire Planning Scheme* Risk Hazard Mapping.

2.7 Nearest Residential Receptors

The site is situated in an isolated location that is a substantial distance from the nearest urban centres of Clermont to the south and Moranbah to the east. The nearest residential dwellings to the temporary STP and temporary fuel storage facility will be the Rail Camp 1 accommodation blocks adjacent to the activities. These blocks are anticipated to be a distance greater than 20m from the STP and fuel storage area so as to provide for adequate noise level reduction at the accommodation blocks from these sources.

3 Proposed ERA Information

Details of the ERAs which are the subject of this application and which will be required for the operation of Rail Camp 1 are provided in the following Sections.

3.1 Fuel Storage Area

The proposed fuel storage area includes a bulk fuel storage tank and generator (Genset) for the facilitation of electricity to the site. The fuel storage area is to be completely enclosed to protect the fuel storage area from vehicular collisions. An indicative layout of the fuel storage area is shown in Figure 2.

The bulk diesel storage tank proposed is an aboveground proprietary double lined tank. The single tank will have the capacity to store the total volume proposed (27,438L) of diesel. This total volume is consistent with the threshold fuel storage volumes for application of ERA 8(3) (a) chemical storage. The proposed tank is a self-bunded (i.e. double-skinned or double-lined tank) tank which complies with or exceeds *AS1692-2206* – Steel Tanks for Flammable & Combustible Liquids and *AS1940-2004 - The Storage & Handling of Flammable & Combustible Liquids* requirements amongst others, and as it will be double walled/lined, installation within a tank bund will not be required. The tank is integrated with a single fuel delivery hose, self bunded refuelling compartment, an overflow protection valve with warning alarm and a bunded fill point (overflow bunding).

A small amount of diesel will also be stored in the Genset. The Genset will have the capacity to store generally one day's operation and is designed to siphon diesel from the diesel storage tank via piping. Piping is to be aboveground and run from the bulk storage tank to the Genset. The Genset consists of a fully enclosed system, with a double lined tank, inlet solenoid valves and overfill/return valves to return diesel to the diesel storage tank.

Other minor chemical storages will also be required however these are unlikely to amount to significant volumes for the purpose of this application.

The arrangement for the fuel storage will incorporate best practice environmental management as follows:

> All ground surfaces beneath the tanks shall be impervious (i.e. concrete or asphalt) with a self bunded refuelling compartment to assist with management of contamination as a result of spills from refuelling. Spill kits will be provided for a rapid spill clean-up response, and all operators of the fuel storage and refuelling facility will be trained on its proper and effective use.

> The ground surface beneath the tanker refuelling area (as identified on Figure 2) shall be impervious (i.e. concrete or asphalt) to assist with management of contamination as a result of the unlikely event of tanker rupture. In the unlikely event of a tanker rupture spill kits will be provided for a rapid spill clean-up response, and all tanker refuelling operators will be trained on its proper and effective use.

> Minor storages of solvents, oils, greases and other flammable liquids will be appropriately stored in bunded areas on site. Due to the small volumes of the chemicals stored at any one time, only minor spillages should occur and spill kits will be provided for a rapid spill clean-up response.

Given the nature of the containment systems for the fuel storage areas, the fuel storage area is not ordinarily expected to generate any discharges. Refer to Element 4 – ERA 8 of the SBMP for environmental management details.

3.2 Sewage Treatment Activity

An onsite package sewerage treatment plant (STP), storages and irrigation scheme will be required to treat and dispose of all wastewater flows from Rail Camp 1 due to the lack of sewerage mains to the site. It is anticipated that there will be a maximum of 400 construction workers at any given time onsite, with expected flows to consist of domestic sewerage from toilets, showers, the laundry and kitchen facilities. The operational life of the STP is expected to be up to 2 years.

For the purposes of this approval, the proposed STP, irrigation areas and effluent storage dimensions have been conservatively modelled on experience and knowledge with a similar site and development. It is

anticipated that the detailed design of the STP, irrigation areas and effluent storage will be confirmed using the modelling tool MEDLI.

The flows expected to the STP are approximately those for a 400 EP sewerage treatment plant, based on a conservatively high estimate of daily flow per capita of 200L/person/day (i.e. higher than expected volumes to be used in calculating the reference design). As such the reference STP will have the capacity to treat up to 80kL/day of wastewater. It is anticipated that due to the short duration of the STP operation that there will be minimal inflow and infiltration to the system required to be treated.

Effluent reuse is proposed via a combination of surface irrigation and usage for dust suppression on the Adani rail construction site, with effluent from the package treatment plant to be treated to a Class A standard. Nutrient removal and disinfection capabilities will be such as to provide effluent suitable for irrigation of public open spaces.

The final plant specification to be chosen by Adani Mining Pty Ltd is subject to confirmation however the reference case of a 400EP plant has been proposed for consideration for approval purposes as it is likely to represent the eventual scale of development. The nominated wastewater flows of 80kL/day gives an approximation of the likely irrigation requirements and management requirements for the STP.

Proposed details of the wastewater treatment system are included in Table 3-1:

Table 3-1 Treatment Plant Information

Parameter	Details
Maximum Plant Capacity (kL/day)	Plant to treat up to 80 (ADWF)
Expected Sewage Volumes (L/person/day)	Up to 200
Equivalent Persons (EP)	400
Treatment Type	Proprietary Package Treatment Plant
Annual Irrigation Volume Generated (ML/year)	29.20 ML/year (sewage effluent volume may be adjusted downwards for reduced effluent volume as a result of reduced water due to dust suppression usage)
Nutrient Output	10 mg/L Nitrogen: 5 mg/L Phosphorous
Effluent Class	Class A
Storage (no of days)	9 days
Storage Volume for 9 days storage (Total)	720,000L

3.3 Elements of the Proposed STP

The contract for supply, installation and operation of the STP has not been awarded, however it is envisaged that the STP will be a proprietary package treatment plant incorporating, chemical and biological nutrient removal, filtration and disinfection using Sodium Hypochlorite and/or Ultra Violet light (UV) system as required.

Construction of the proposed STP is expected to involve the following works:

> installation of an automated STP with instrumentation and monitoring equipment;

> construction of an enclosed building for housing STP equipment;

> installation of pumps as required for the transfer treated effluent from the STP to the nominated irrigation areas and to Rail Camp 1 toilets;

> installation of wet weather storage tank equipped with isolation valves;

> installation of treated wastewater pipelines from the STP to all irrigation areas; and

> installation of a metered or manual irrigation system to the designated irrigation areas.

A description of the elements of a typical STP follows:

Element 1: Inlet Works

Incoming sewage will be received into the treatment plant through the inlet works. The inlet works will consist of a screenings and grit removal system as appropriate.

Element 2: Bioreactor Tank

The screen-degritted waste will flow to a bioreactor tank through either a gravity fed or pump flow to a bioreactor tank. The bioreactor chamber/tank will consist of aerobic zones for the aerobic biological reduction of BOD_5 and nitrogen. The reactor is likely to have aeration blowers, submersible mixers and return activated sludge pumps.

Element 3: Sludge Tank

Waste sludge from the treatment process will be tankered offsite for further treatment.

Element 4: Filtration

Clarified supernatant from the aerobic zone of the bioreactor will be treated in the filtration unit to satisfy turbidity requirements.

Element 5: UV Disinfection

Filtered effluent water from the filtration unit will pass through the UV system if required to achieve disinfection rates. Any UV system will be designed to provide minimum dose level of 40mw/cm^2 at peak flows, incorporating continuous intensity monitoring, lamp failure alarms and auto wiping mechanism.

Element 6: Chlorination

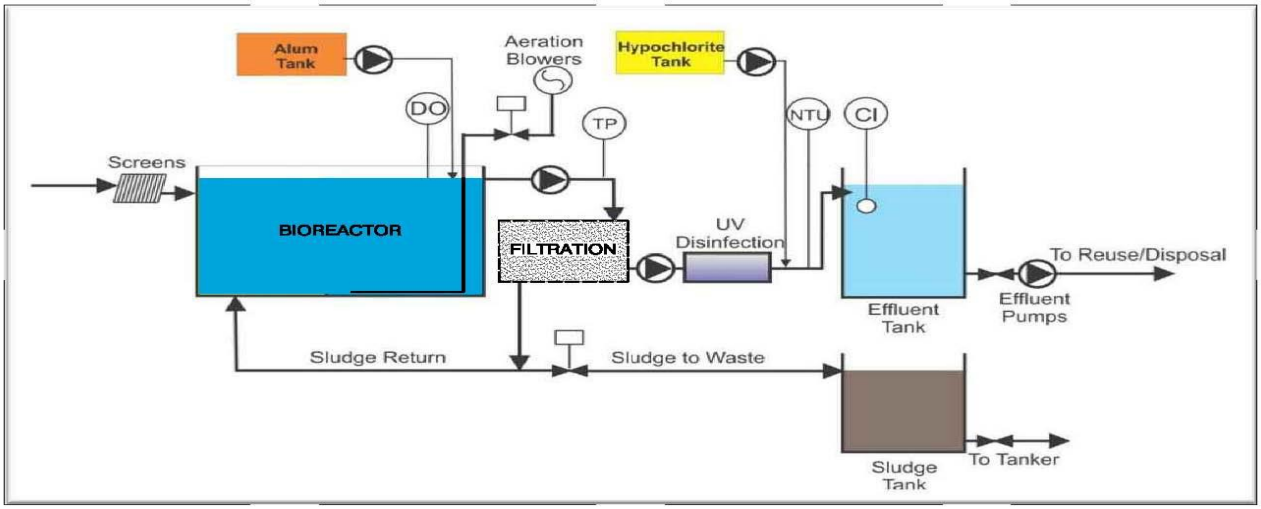
The final effluent will be dosed with Sodium Hypochlorite for disinfection before storage/reuse.

3.4 STP Process Flow Diagram

A package plant which will provide the stated level of treatment, methodology and compliance to the aforementioned standards is readily available. The ultimate design, upgrade and layout considerations will be finalised as part of a comprehensive performance based supply chain process. In the interim and for the purposes of the application a generalised process flow diagram is shown below for the treatment system.

The STP will utilise Programmable Logic Control liked with Supervisory Control and Data Acquisition (SCADA) computer interface system to provide point and click operation and value entry controls. Remote monitoring and alarming systems will be in place regarding process and effluent parameters to be monitored.

Typical Layout for the Proprietary Package Treatment Process



3.4.1 Effluent Quantity

As discussed the flow (ADWF) to the STP per day has been calculated as 80 kL/day based on a total expected number of 400 room construction camp.

Average Dry Weather Flow = 400EP x 200L/EP/day

= 80 kL/day

The plant capacity (in accordance with the stated thresholds of the EP Reg 2008) of the plant is therefore expected to be 400EP using 200L/EP/day. This activity will generate 29.2ML/year approximately of effluent to be irrigated/disposed to land or recycled.

The effluent will also be used at the camp for dust suppression during construction of the Carmichael Coal Project which may, as such, further reduce the volume of effluent required to be irrigated (both due to reduced overall water demand for the camp and reduced volume for irrigation).

3.4.2 Effluent Quality

Effluent will be treated to comply with the quality specified for Class A effluent suitable for irrigation of sites requiring unrestricted public access as required for general dust suppression usage in accordance with the *Public Health Regulation 2005* and *National Water Quality Management Strategy Australian Guidelines for Water Recycling: Managing Health and Environmental Risks 2006.*

The expected effluent quality discharges are shown in Table 3-2 below.

Table 3-2 Expected Effluent Quality Discharge

Parameter	Quality Required	Release Limit
pH	6.5-8.5	range
Turbidity	< 2 NTU	maximum
Suspended Solids	< 15mg/L	maximum
Biochemical Oxygen Demand	< 10 mg/L	maximum
Total Nitrogen	< 10 mg/L	maximum
Total Phosphorous	< 5 mg/L	maximum
Residual Chlorine	0.5-1.0 mg/L free chlorine	range
Escherichia coli	< 10 cfu/100ml*	Maximum

*cfu = colony forming units

The STP is to be designed with an emergency overflow/return valve so that treated effluent can be returned to the inlet if the quality of the treatment effluent fails to meet the quality criteria for disposal by land irrigation or for use as dust suppressant within the camp.

In the event that monitoring indicates inadequate treatment of wastewater, appropriately qualified service technicians are to be contacted to service and repair the STP equipment as necessary. Refer to Element 2 – ERA 63 of the SBMP for monitoring details.

3.4.3 Noise and Odour

The closest sensitive receptors are anticipated to be located at least 20m distance from the proposed location of the STP. The STP is not expected to generate noise or odour levels at a nuisance level due to the system being fully enclosed and the pumps submersible. In order to provide for mitigation of noise and odour it is anticipated the STP will be arranged in such a manner that appropriate noise reduction at the nearest sensitive residence will be achieved, and that visual screening will be provided to limit any potential for the perception of odour from the STP.

3.4.4 Waste Disposal

Wastes identified for the STP include the following.

> Sludge.

> Grit/Screenings.

> Waste water pumped out from wet weather storage tank.

Grit, screenings and sludge shall be removed from site and disposed of to an appropriately licenced facility.

Any waste water pumped out from the wet weather storage tank shall be collected by a licensed regulated waste transporter and disposed of at Council's STP. Refer to Element 4 – ERA 63 of the SBMP for waste management and monitoring details.

3.5 Irrigation System

Treated effluent from the STP is to be irrigated on landscaped communal open space and buffer areas located on the site. Based on Cardno's experience with similar sites for similar developments, the Total Land Application Area required is up to 4ha. Irrigation design will be confirmed using the MEDLI modelling tool at a later date.

Treated effluent shall be stored in the wet weather storage tank via a diversion valve during wet weather periods until conditions are appropriate for irrigation.

The proposed STP wet weather storage tank and irrigation areas will be located approximately 4km from Meinly creek located to the north, 9km from Diamond Creek located to the south and 10km from Grosvenor Creek located to the east of the site. Additionally an appropriate setback of 20m will be maintained from drainage lines, drainage swales in the design of the irrigation system and irrigation shall not occur during rainfall events (refer to Figure 2). Overflows are not expected from the activity due to the adequate storage capacity of the system, however off-site tankering will be retained as a contingency in the event that there is a risk of an overflow occurrence.

The potential impacts to groundwater have been considered as part of the irrigation management plan for the scheme. The management of potential groundwater impacts will occur through the confirmation of irrigation parameters, and the establishment of irrigation scheme in such a manner so as to prevent nutrient leaching.

Recycled water use will be carried out in accordance with the requirements of the *National Water Quality Management Strategy Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* in terms of the level of treatment, effluent quality, effluent monitoring and monitoring frequency and specified controls and requirements where appropriate.

Thus it is anticipated that under normal circumstances there would be no discharge to waters from the STP as the treated effluent generated would be irrigated to land with minimal run-off, used as recycled water or held in wet weather storage during wet weather conditions.

3.5.1 Wet Weather Storage and Emergencies

The proposed wet weather storage tank shall be lined, and sized to provide approximately 9 days treated effluent storage. Treated effluent shall be stored in the wet weather storage tank via a diversion valve during wet weather periods. When treated effluent levels reach 90% capacity (i.e. within 10% of the top of the storage tank), alarms will be triggered and will indicate the level where action is required to prevent a potential overflow. Effluent storage dimensions will be confirmed using the MEDLI modelling tool at a later date.

Notwithstanding, a contingency is in place for the unlikely event that an overflow from the wet weather storage tank could occur from extreme wet weather conditions (over 9 days). In this event an appropriately licensed tanker removal contractor will collect and dispose of treated effluent and dispose at a Council STP such as Moranbah or Clermont.

It should be noted that the wet weather storage capacity for treated effluent provided includes several storage tanks rather than a single tank. Hence in the unlikely event of a treatment plant failure it is proposed that an isolation valve be used to manually isolate an empty effluent storage tank which may be temporarily used to store untreated sewage in emergencies prior to vacuum truck removal.

4 Irrigation Activity Details

4.1 Proposed Irrigation Scheme

Sufficient land area is available on the site which is suitable for irrigation for the 400 EP STP. Suitable land areas which may be used for the irrigation scheme are shown in Figure 2.

The proposed irrigation areas and effluent storage dimensions will be confirmed following detailed design of the STP using the modelling tool MEDLI however for the purposes of approval a conservative irrigation area estimate of 100m^2 per person has been calculated and proposed.

In support of this proposal, the maximum flow possible to the plant from this development stage is estimated to be 80 kL/day under Average Dry Weather Flow (ADWF) conditions. The flow contribution from wet weather inflow and infiltration is expected to be negligible over the life of the STP as this is a temporary STP with a proposed life span of 2 years.

An effluent with a median TN concentration of 10 mg/L and TP concentration of 5 mg/L has been proposed and the irrigation scheme proposed is considered to be capable of recycling effluent at this concentration based on Cardno's experience with similar projects.

Under clay soil conditions an irrigation area of 4.0 hectares would be optimal for disposal of effluent, with a wet weather treated effluent storage volume of 720 kL (sufficient for approximately 9 days irrigation storage for wet weather).

With this area and storage volume, approximately 90% of the effluent would be recycled, and an insignificant leaching of nitrogen or phosphorus would be expected.

Irrigation is most likely to occur by subsurface drip. An automatic scheduling system with soil-moisture monitoring and automatic shut-off during rain periods is preferred for larger irrigation schemes by DEHP, however given the limited scale of this scheme, manual shutoff and management systems are considered appropriate. Irrigation should not occur during rain periods, and should be avoided in areas when and where ponding occurs.

The proposed irrigation parameters for the site are shown in Table 4-1 below. Implementation of the irrigation scheme will provide an average irrigation contribution required to irrigate landscaped areas at the site.

Table 4-1 Proposed Irrigation Parameters

Parameter	Clay
Irrigation Trigger	Soil water deficit >10mm
Irrigation Application	To Drained Upper Limit
Grass Species	Kikyiu
Nutrient Concentration (mg/L)	10:5 N:P
Holding tank size (kL)	720
Soil Type	Clay

4.2 Water Balance

Considering parameters such as irrigation scheduling, irrigation area, plant type and storage volumes, it is considered that the correct management of the activity in accordance with the SBMP would generate minimal overflows from the effluent storage tanks.

The combination that produced an acceptable outcome in terms of the above requirements is summarised below.

> Effluent Production: 29.2ML/year (plant caters 400 persons for 200L/person/day).

> Buffer Storage capacity: Approximately 9 days wet-weather storage.

> Application Rate: Up to 7.3 ML/ha/year over 4.0 ha (the system includes no contribution from infiltration and rainfall directly on the buffer storage as tank is enclosed).

> Vegetation Irrigated: Kikuyu (or equivalent grass or pasture). It would be assumed that occasional slashing and removal of the grass off-site would be practised.

> Irrigation schedule Irrigate to drained upper limit when soil water deficit 10mm. No irrigation occurs if soil is saturated, and/or rainfall is occurring.

Under the above conditions, approximately 90% of the effluent was recycled (thereby producing a 10% rate of overflow of the system which is acceptable).

According to NSW DECC guidelines for managing STP overflows, where medium strength treated effluent is used for irrigation (as in the case here), overflow of the buffer storage is acceptable, provided it occurs in less than 25% of years (i.e. is sufficient to prevent 75th percentile of years overflows), therefore the balance between the irrigation rate and the storage capacity of the system is considered acceptable.

4.3 Selection of Irrigation Areas and Irrigation Management

Proposed irrigation areas have been selected from suitable landscaped communal open space and suitable buffer areas around the site. (Refer to Figure 2). The irrigation storage facility will be co-located with the STP.

Potential impacts associated with the operation of the proposed effluent irrigation scheme may include the following.

> Contamination of the receiving environment (including land, groundwater and surface waters) as a result of an untreated or treated effluent spill.

> Contamination of the receiving environment (including land, groundwater and surface waters) as a result of failure of components used in the effluent irrigation scheme.

> Sedimentation of receiving waters as a result of the erosion and sediment wash-off from the irrigation area, as a result of degradation of the vegetation cover.

Mitigation of these impacts will be achieved through implementation of proposed management measures and periodic monitoring of the receiving environment.

Generally, management measures will consist of effluent quality and quantity monitoring, infrastructure inspection and environmental monitoring in order to minimise the environmental risk associated with the operation of the effluent irrigation scheme.

The following procedural requirements will be complied with during operation of the effluent irrigation scheme.

1. Irrigation shall be restricted to the maximum rate used in the analyses that are carried out to size the irrigation area.
2. Only treated effluent of the appropriate standard shall be used for irrigation. Should the quality of effluent be determined by testing to be unsuitable for land irrigation, the effluent is to be pumped back into the inlet balancing storage tank for re-treatment.
3. Adequate buffer distances to watercourses shall be maintained (not relevant for this development).
4. Meters will be installed in the area to determine the soil moisture at the commencement of irrigation, to eliminate the possibility of surface water ponding or runoff occurring where appropriate.
5. There is to be no effluent irrigation during rain events. Irrigation shall only re-commence a minimum of 4 hours following cessation of rainfall.
6. There is to be no ponding of effluent at the irrigation area. Should ponding occur, irrigation shall cease until such time as the soil moisture content has sufficiently reduced to eliminate further ponding.
7. Appropriate signage indicating that recycled water is not suitable for drinking shall be provided and maintained at every accessible outlet from the treated effluent distribution system. Signs shall be

easily visible and maintained regularly. Signage shall also be provided and maintained at the irrigation area informing of the use of treated effluent for land irrigation.

8. To avoid overflow of the wet weather storage, when and if the storage level rises to within 10% of its overflow level the contingency of possible offsite removal if necessary to increase freeboard will be activated.

9. The irrigation area shall be maintained in a well-grassed state to minimise the risk of erosion and sediment wash-off during storm events. Where necessary, turf, pasture grass or trees will be replaced to maintain the vegetation cover.

The Irrigation Management Element of the Site Based Management Plan (SBMP) discusses the implementation of this strategy in further detail.

5 Potential Environmental Impacts

There are potential environmental and public health impacts associated with the onsite treatment, storage and disposal of effluent and fuel storage activities as presented. The potential impacts associated with the operation of the ERAs are identified as follows:

> odour emissions and gaseous chemical release;

> noise from operation of equipment; and

> release of contaminants to land, surface water or groundwater due to effluent or sludge spill, fuel tanker rupture, tank leakage or diesel spill.

The potential impacts associated with the contaminant releases are identified below:

> contamination of land, surface water or groundwater due to poor effluent quality;

> contamination of land, surface water or groundwater due to incorrect effluent irrigation application rates;

> contamination of land, surface water or groundwater due to uncontrolled effluent and untreated stormwater discharge;

> contamination of land, surface water or groundwater due to tank leakage or rupture;

> contamination of land, surface water or groundwater due to diesel spills;

> sedimentation of receiving waters as a result of the erosion and sediment wash-off from the irrigation area, as a result of degradation of the vegetation cover;

> over nitrification or salination of soils through excessive nutrient loadings and salinity loadings;

> degradation of soil structure and increases in sodicity over time leading to reduction in agricultural/landscaping use value of the soils;

> odour emission from STP and irrigation areas;

> odour emission from fuel storage infrastructure and spilled fuels;

> public health risks due to uncontrolled access to plant and equipment, volatile organic compounds or solvents or exposure to irrigation spray aerosols; and

> public health risks due to fire from ignition or explosion of flammable liquids.

Environmental and public health impacts associated with release of untreated effluent and diesel or changes in the ambient environment will be minimised through adherence to the mitigation and control measures proposed in the SBMP for the ERAs (Section 7 onwards).

6 Site Based Management Plan

The following Sections discuss the site based management plan as appropriate to the various ERAs to be conducted onsite. This SBMP identifies the management strategies to be adopted to ensure the activity is managed in accordance with best practice environmental management (BPEM).

The purpose of this SBMP is to demonstrate that persons carrying out the ERAs have in place a structured framework to:

> set the environmental objectives or standards to be achieved;

> identify the potential environmental harm that may occur from the operation of the ERAs and establish and document control measures to prevent this harm as far as practicable;

> identify extraordinary factors that may cause environmental harm, and establish contingency plans to deal with these;

> ensure that all persons carrying out the activities are aware of the environmental risks, and are trained in the measures and contingency plans to deal with them;

> ensure the effectiveness of the measures and contingency plans as required, by implementing monitoring of environmental performance;

> ensure record keeping to assist in the communication of environmental performance throughout the organisation and to DEHP; and

> ensure periodic reviews of environmental performance and continual improvement.

The SBMP is to be adopted by Adani Mining Pty Ltd in the planning and management of the ERAs.

6.1 Preamble to the Site Based Management Plan

6.1.1 Legislation and Policy Framework

The primary environmental legislation relevant to this SBMP is the *Environmental Protection Act 1994* (EP Act) and subordinate legislation, specifically the *Environmental Protection Regulation 2008* (EP Reg) and the *Waste Reduction and Recycling Act 2011* and sub-ordinate legislation. The EP Act protects environmental values through the development and implementation of environmental protection policies, and regulates environmentally relevant activities prescribed in Schedule 2 of the EP Reg.

The *Environmental Protection (Air) Policy 2008* (EPP Air) ensures protection of ambient air quality and specifies indicators and air quality goals for control of the release of airborne contaminants.

The *Environmental Protection (Noise) Policy 2008* (EPP Noise) specifies an acoustic quality objective for protection of the well-being and amenity of individuals and the community in residential areas.

The *Environmental Protection (Water) Policy 2009* (EPP Water) ensures protection of environmental values from activities that may result in the release of contaminants to waterways or stormwater drains.

The Work Health and Safety Act 2011 ensures protection of all personnel and the environment when storing and handling dangerous goods.

6.1.2 Terminology

The term **Contractor** refers to any party of company performing works associated with the operation of an ERA and includes all employees of the Contractor and sub-contractors.

The term **Council** or **IRC** refers to the Isaac Regional Council.

The term **DEHP** or **Administering Authority** refers to the Department of Environment and Heritage Protection.

The term **Environmental Harm** refers to any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance.

The term **Operator** refers to The Adani Mining Pty Ltd or any party or company responsible for the operation of the ERAs to achieve compliance with this SBMP and for ensuring all statutory requirements are understood and permits obtained. It is anticipated that the Operator with respect to these ERAs will be the principal construction Contractor.

The term **Plant** refers to all matters associated with the operation of the sewage treatment plant (STP) and associated infrastructure.

The term **SBMP** refers to this Site Based Management Plan.

The term **Site** refers to the proposed development located on part of Lot 7 on SP233102.

The term **the Operation** refers to all matters associated with the operation of the ERAs at the proposed site.

6.2 SBMP Objectives

The objectives of this SBMP are to minimise adverse impacts on the environment by:

> Ensuring all environmental safeguards are carried out correctly; and

> Managing site activities effectively.

6.3 SBMP Structure

The components of this SBMP include strategies to manage the following elements.

> Air quality (odours and dusts)

> Noise management

> Storage and use of hazardous materials

> Stormwater control and water quality

> Waste management

> Environmental emergencies

> Complaints Management

> STP Operation

> Effluent Quality Management

> Irrigation Management

Each element of the SBMP includes the following key components.

> ***Rationale***: identification of the element to be managed and the potential environmental impact of activities associated with each element.

> ***Objective/Target***: identification of the environmental objective(s) and target(s) to be achieved in line with the rationale and in compliance with applicable legislation.

> ***Implementation Strategy***: management measures to be implemented in order to achieve the stated objectives and targets and to ensure impact mitigation.

> ***Performance Indicators***: measurable indicators and standards set to assess the efficiency of management measures and determine compliance with the SBMP.

> ***Monitoring***: monitoring requirements to measure compliance with the performance indicators and frequency of monitoring.

> ***Record Keeping***: details of record keeping requirements over the life of the SBMP.

> ***Reporting and Review***: the requirements for reporting of monitoring results and review of management measures where required.

> ***Corrective Action***: measures to be undertaken should monitoring indicate non-compliance with performance indicators

6.3.1 Environmental Commitment

Adani Mining Pty Ltd is responsible for ensuring that its activities are undertaken in an environmentally sustainable manner and aims to minimise environmental impacts and continuously improve its environmental performance.

The preparation of this SBMP forms an integral part of the commitment to minimise the environmental risks of its activities.

6.3.2 Responsibilities and Training

The Operator or representative assumes responsibility through its Operations Manager and other relevant line managers for the implementation of this SBMP.

All persons employed in the operation of the site shall be instructed as to Adani Mining Pty Ltd.'s corporate responsibilities and their individual responsibilities as set out in this SBMP and as provided by the EP Act, including:

> **General Environmental Duty** – whereby a person in the performance of their duties shall not do so in a manner which will cause, or is likely to cause, environmental harm unless the person takes all reasonable and practical measures to prevent or minimise such harm.

> **Duty to Notify Environmental Harm** – whereby if a person in the performance of their duties becomes aware that serious or material environmental harm is caused or may be caused by their activity or by someone else's' activity, that person must as soon as practicable report the nature and circumstances of the relevant event to the Operator whereupon the Operator must immediately notify DEHP.

> **Compliance with SBMP** – whereby a person in the performance of their duties shall do so in a manner that ensures that the provisions of this SBMP are complied with.

All personnel entering the site will be inducted as necessary, with particular emphasis on environmental control measures and emergency response.

6.3.3 Site Induction

It is the responsibility of the Operations Manager to ensure all site personnel receive appropriate awareness training and environmental induction prior to commencement of works.

The induction shall include instruction regarding the following environmental objectives and policies:

1. Due diligence, including:
    > development, establishment and operation of a pollution prevention system;
    > ensuring that people with ultimate responsibility receive reports;
    > ensuring those with the ultimate responsibility know the environmental laws; and
    > ensuring those with the ultimate responsibility deal personally with system failures.
2. Duty of Care:
    > all management and staff have an environmental duty of care. Where deemed appropriate for short term personnel and contractors, the Operations Manager may elect to provide a brief environmental explanation/induction and control access to the site.

The Operations Manager shall maintain a signed register of all inductees and monitor the existing workforce to ascertain whether additional training is required.

6.3.4 Environmental Audits and Reviews

Environmental performance shall be monitored throughout the project to determine if and when additional environmental auditing activities are required.

The SBMP shall be reviewed and updated as required on changes to the activity, with the updated copy kept onsite.

6.3.5 Environmental Records

The results of any monitoring from the operation of the development and any corrective actions taken in respect thereof shall be recorded in the environmental management records for the site pursuant to this SBMP.

A copy of the latest copy of the SBMP, relevant development approvals and environmental records shall be retained onsite in the site office.

All environmental records shall be kept for a period of five years.

Adani Mining Pty Ltd Group shall make all records available for inspection by relevant authorities upon request.

6.3.6 Environmental Non-Compliance with SBMP

Adani Mining Pty Ltd and its representatives shall assume responsibility for implementation of this SBMP. Where the Operator becomes aware of a site or operational condition that does not comply with stated performance indicator(s) of this SBMP, there is a requirement for corrective action to be undertaken.

A Corrective Action Request (CAR) form is to be completed and authorised where appropriate in general compliance with the example CAR form provided in Appendix A of this document. The Operator is also required to maintain a register of CARs, which shall demonstrate that appropriate actions have been completed within a suitable timeframe.

It is the responsibility of management to notify DEHP in the event of a notifiable incident/complaint (as defined in s320 of the EP Act).

In some instances, further investigation or monitoring may be required to establish whether the Operator has failed to adequately implement the SBMP, or has failed to comply with relevant legislation, guidelines and statutes. In these instances, an independent party, such as a Consultant, shall carry out the investigation or monitoring.

Any CAR registered in accordance with this SBMP shall be provided to the Local, State or Commonwealth Government Department, any statutory authority or other person, consensually or as lawfully required.

7 Environmental Management Measures ERA 8

7.1 ELEMENT 1: Air Quality (Odour and Emissions)

Rationale

Air emissions and associated odours from the site may be produced from vehicle movements, exhaust emissions, plant and equipment servicing, fuel storage and refuelling activities amongst others.

Objective/Target

To minimise activities resulting in the introduction of excessive fumes and dust to the local atmosphere as far as practicable, and comply with performance indicators.

Implementation Strategy

All vehicles and equipment shall be operated and maintained in accordance with the manufacturer's specifications.

Refuelling shall only occur in the defined area, and fuel and oil storage areas shall be maintained and operated to minimise emissions to the atmosphere via leakages or spills.

The fuel storage area shall be maintained in a neat and tidy condition at all times.

Spilt product shall be cleaned up using dry methods as quickly as practicable to prevent wind-blown materials and fumes.

Tank integrity shall be tested and maintained in accordance with the manufacturer's specifications.

Tank leak tests shall be conducted regularly in accordance with the manufacturer's specifications.

All chemicals to be stored as per the Material Safety Data Sheets (MSDS) requirements.

All refuelling areas are to be sealed with an impervious surface.

Performance Indicators

No air quality (odour, particulate matter, dust) complaints received from nearby sensitive places.

Compliance with the conditions of the DA.

Monitoring

At the request of the Administering Authority and in response to a complaint (other than a complaint which is frivolous or vexatious) being lodged about unreasonable air emissions, monitoring shall be undertaken for the relevant emission type (e.g. dust/volatile organic compounds/odour).

Record Keeping

The Operator shall maintain a record at the site office of:

> all complaints received in relation to air quality;

> all tank integrity testing and leak tests conducted; and

> any monitoring results undertaken including details of corrective actions and/or repairs undertaken.

The Operator shall make all records available for inspection to the Administering Authority upon request.

Reporting And Review

Environmental monitoring results shall be submitted to the Administering Authority within 14 days of completion of monitoring.

Corrective Action

In the event of non-compliance with performance indicators the following corrective actions are to be implemented:

- identification of the contaminant source(s);
- implementation of appropriate mitigation measures as determined by the Operator within an agreed timeframe;
- undertake validation monitoring of emission levels at nominated locations as required by the Administering Authority;
- provision of validation monitoring results to Administering Authority;
- notification of complete corrective actions; and
- review of implementation strategy to ensure sufficiency and prevention of recurrence.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

7.2 ELEMENT 2: Noise

Rationale

Operation of the STP and fuel storage facility will involve the use of equipment and vehicles that will produce noise (e.g. tanker refuelling, generator noise, alarms, pumps, etc.) which may have a potential impact on the acoustic environment through the emission of nuisance noise affecting surrounding noise sensitive receivers. The nearest residential land is located adjacent to the proposed development.

Objective/Target

To control noise generated by activities and to ensure acceptable levels of noise amenity at the closest sensitive receptors to prevent nuisance complaints.

No receipt of noise complaints from nearby noise sensitive receptors.

Implementation Strategy

All noise generating equipment shall be operated and maintained in accordance with the manufacturer's specifications to minimise noise emissions.

Ensure that silencers fitted to air compressors, pumps, fans and blowers and other noisy machinery are effective.

All vehicles are to be maintained in accordance with manufacturer's specifications to reduce noise emissions.

Should complaints about noise be received, the Operator is to undertake corrective actions as required. The Operator is committed to conduct noise monitoring should there be a complaint or a monitoring request by the administering authority.

Performance Indicators

No noise complaints received from nearby sensitive receptors.

Noise emissions from the activity must comply with the EPP (Noise) objectives. No noise complaints received from nearby sensitive receptors.

Compliance with the conditions of the DA.

The Operator's complaints procedure is to be complied with at all times.

Monitoring

At the request of the Administering Authority in response to a reasonable noise complaint, noise monitoring shall be undertaken.

Noise monitoring undertaken in accordance with the requirements of the Administering Authority and latest edition of DEHP's *Noise Measurement Manual*.

Record Keeping

The Operator shall maintain records at the site office of:

> all complaints received in relation to noise emissions; and

> any monitoring results undertaken including details of corrective actions and/or repairs undertaken.

The Operator shall make all records available for inspection by Administering Authority upon request.

Reporting And Review

Noise monitoring results are to be submitted to the Administering Authority within 14 days of completion of monitoring.

Corrective Action

In the event of non-compliance with performance indicators the following corrective actions are to be implemented:

> identification of the source(s) and timing of nuisance noise;

> implementation of appropriate mitigation measures to reduce nuisance issue as determined by the Operator within an agreed timeframe;

> liaise with the Administering Authority and/or complainant over remedial action;

> undertake noise validation monitoring of noise levels at nominated locations as required by the Administering Authority;

> provision of noise validation monitoring results to the Administering Authority;

> notification of complete corrective action(s); and

> review of implementation strategy to ensure sufficiency and prevention of recurrence.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

7.3 ELEMENT 3: Storage and Use of Hazardous Materials

Rationale

Hazardous materials are substances that, because of their chemical, physical or biological properties, can potentially cause harm to people, property and the environment.

Fuel and oil have the potential to enter the environment in a number of different ways including inappropriate use, leaks and spills. These substances require careful storage and handling to ensure no adverse impacts are caused to human health, property or the environment.

Other hazardous substances such as solvents, chemicals and oils may also be stored on site in small quantities and while these present a lesser risk, still need to be managed appropriately.

Objective/Target

To reduce the risk of potential environmental harm or incidence caused through the storage and use of hazardous materials.

To comply with the legislative requirements and relevant Australian Standards and Material Safety Data Sheets (MSDS) for the handling of hazardous materials.

Implementation Strategy

The type, quantity, Material Safety Data Sheet (MSDS) and storage location of all hazardous materials, along with all emergency contacts, shall be kept in a dedicated register onsite. Hazardous materials shall be used only in accordance with the manufacturer's instructions.

Tank integrity shall be tested and maintained in accordance with the manufacturer's instructions.

The aboveground tank refilling operations are to be supervised by a competent fuel supplier contractor at all times.

The handling and storage of dangerous goods shall be in accordance with standards contained in AS1940-2004 *Storage and Handling of Flammable and Combustible Liquids*. An up-to-date copy of AS1940-2004 and any tank operation and maintenance shall be kept onsite at all times.

The facility shall maintain absorbent materials, spill kits, fire extinguishers and other containment equipment in clearly identified and unobstructed positions for ready deployment in the event of a spill. Material used to clean spills shall be disposed of in appropriate lidded containers.

Bulk hazardous materials (including hazardous waste materials) in containers of 20L or greater are to be stored within bunded areas and only be disposed of by a licensed contractor and in accordance with relevant statutory approvals.

Performance Indicators

Hazardous materials are handled and stored in accordance with *AS1940-2004 Storage and Handling of Flammable and Combustible Liquids* and the *Work Health & Safety Act 2011* legislation.

No spills or leaks as a result of inappropriate handling and storage of hazardous materials.

No oil films or surfactants observed on any stormwater discharges from the site.

Monitoring

Regular inspections of stormwater discharges to identify oil films or surfactants following significant rainfall events.

Record Keeping

Records are to be maintained of routine inspections, inventory checks, discrepancies, investigations into any identified discrepancies and subsequent corrective actions.

The Operator is to keep copies of all waste tracking documents relating to regulated wastes removed from the site. Waste tracking documentation shall include the volume of regulated waste material removed and the final destination of the waste.

All records are to be made available for inspection by the relevant Administering Authority on request.

Reporting And Review

The Operator shall regularly evaluate procedures for fuel and hazardous materials storage and refuelling, and may implement further strategies to ensure significant problems do not emerge.

The Operator shall report to the Administering Authority at the time of an environmental audit the requirements to complete a CAR and the actions taken in respect of the CAR.

Corrective Action

Emergency response procedures shall be implemented in the event of an emergency in accordance with Element 6- ERA 8 (Environmental Emergencies) of this SBMP.

In the event of non-compliance relating to hazardous materials handling and storage the following corrective actions are to be implemented.

> Investigate details of the cause of the non-compliance, incident, or complaint.

> Response to complainant, if relevant, outlining procedure for corrective actions and proposed timeframe for implementation of corrective actions.

> Increase rate of inspections and maintenance of bunds and containment systems.

> Implementation of appropriate mitigation measures as determined through the CAR process and within the agreed timeframe noted on the CAR.

> Review of implementation strategy to ensure adequacy and prevention of recurrence.

> Conduct validation monitoring, as appropriate.

> Document non-compliance and any corrective and/or preventative actions taken.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

7.4 ELEMENT 4: Water Quality & Stormwater Control

Rationale

Management of stormwater runoff from the facility is necessary to ensure local receiving waters are not adversely impacted by contaminated stormwater. Impacts from the facility could include the release of contaminants through inappropriate or unauthorised activities, uncontrolled stormwater runoff, fuel or oil spills, damaged vehicles, accidental or emergency discharges during tank filling operations, inappropriate storage of wastes and waste disposal.

Objective/Target

To manage facility operations to ensure no contaminants are discharged or released from the site to any waters, or bed and banks of any waterways.

Implementation Strategy

Stormwater runoff that has been in contact with any contaminants at the site shall not be released (discharged) to any waters, roadside gutter or stormwater drains without appropriate treatment.

Activities with the potential to release contaminants are to be prevented from occurring near stormwater drains.

Spills and leaks are to be cleaned up as soon as practicable, and prevented from accessing any stormwater drains. Any leaks and bund integrity compromise must be fixed as soon as practicable.

Hardstand areas in the fuel storage area and tanker refuelling area are to be cleaned by sweeping rather than hosing where possible.

Fuel delivery and bulk tank filling activities shall be supervised and carefully conducted to prevent tank overfilling and spillage. Bulk tank filling activities and transport of dangerous goods must only be conducted by licensed persons.

Spill kits, absorbent material and other containment equipment must be maintained in clearly identified and unobstructed locations ready for use in the event of a spill.

Minor storages of solvents, oils, greases and other flammable liquids will be appropriately stored in bunded areas on site.

Any stormwater drains, sumps, pits and pipes must be clean and free from potential blockages (e.g. litter, sediments, organic matter, solids, etc.).

Visual inspections shall be carried out during significant rainfall events in order to identify any visible signs of hydrocarbon contaminated stormwater or contaminated run-off leaving the site.

All reasonable and practicable erosion protection measures and sediment control measures to be implemented and maintained to minimise erosion and the release of sediment. Reasonable and practicable measures are outlined in *Soil and Erosion Control. Engineering Guidelines for Queensland Construction Sites* (June, 1996) published by the Institution of Engineers, Australia, Queensland Division.

Erosion control and sediment control structures must be maintained at all times and must be checked, repaired or replaced as required after each rain event.

Performance Indicators

Compliance with EPP (Water) Policy 2009.

All stormwater conveyance and treatment devices are functioning appropriately.

No visible oil, grease or litter in stormwater discharges.

Discharge of stormwater from the site must achieve the following criteria:

> pH 6.5 – 8.5;

> suspended solid concentrations do not exceed 50mg/L;

> dissolved oxygen is maintained at >80% saturation; and

> no visible oil films and/or surfactants on any stormwater discharges from the site.

Compliance with the conditions of the DA.

Monitoring

Reviews shall be carried out at a frequency of not less than monthly to assess the effectiveness of the stormwater management system and shall include the following tasks.

> Visually inspect stormwater discharges to ensure no hydrocarbons or other contaminants are being discharged from the site.

> Monitoring of all treatment devices for maintenance requirements shall be undertaken as per the manufacturer's requirements but not less than monthly.

If required by the Administering Authority stormwater discharge shall be monitored at points of exit from site, and quality compared against the stated performance indicators.

Record Keeping

The Operator shall maintain records at the site office of:

> all complaints received in relation to water quality; and

> any monitoring results undertaken including details of corrective actions and/or repairs undertaken.

The Operator shall make all records available for inspection by Administering Authority upon request.

Reporting And Review

The Operator shall report to the Administering Authority at the time of an environmental audit any requirement to complete a CAR and the actions taken in respect of the CAR.

The Operator shall advise the Administering Authority of any significant pollution incident. A significant incident with respect to pollution would be an incident in which pollutants are released to the surrounding environment in quantities which cannot immediately (i.e. in less than 15 minutes) be recovered by emergency procedures outlined in Element 6 (Environmental Emergencies) of this SBMP.

Corrective Action

In the event of a fuel or oil spill, emergency procedures shall be implemented in accordance with Element 6 – ERA 8 (Environmental Emergencies) of this SBMP.

An incident and/or failure resulting in a corrective action may include:

> contaminated stormwater discharged from the site to receiving waters; and

> poorly maintained or damaged control devices.

Should non-compliance or an incident occur, any source(s) of contamination is to be located immediately, and the following measures implemented.

> Investigate details of non-compliance/incident.

> Isolation of contaminant, if possible, until remedial measures are fully implemented. Appropriate mitigation measures may require consultation with relevant experts (where required).

> Increase rate of inspections, maintenance and clean-outs as appropriate.

> Review of implementation strategy to ensure adequacy and prevention of recurrence.

> Conduct validation monitoring, as appropriate.

> Document non-compliance and any corrective and/or preventative actions taken.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

7.5 ELEMENT 5: Waste Management

Rationale

Appropriate storage and handling of all wastes associated with the ERAs conducted on site is required to ensure that environmental harm is not caused through the release of contaminants to the receiving environment.

Objective/Target

To ensure procedures are implemented during operations to minimise any adverse environmental impacts associated with the storage, management and disposal of waste materials.

Implementation Strategy

The Operator shall maintain a regular waste removal schedule and document all waste removed for disposal.

The Operator shall provide appropriate methods for the collection and lawful disposal of any wastes produced at the site during operations including:

> location of waste receptacles in designated areas suitable for collection by waste disposal vehicles;

> collection and disposal of all waste of by appropriately licensed contractors at appropriate intervals;

> location of waste containers in convenient locations to encourage use; and

> facilities for the reception of wastes shall include provision for a range of materials likely to be produced, specifically spilt fuel collection materials, and shall be well labelled and sign posted.

Implement the waste management hierarchy of avoidance, reuse, recycling, energy recovery and disposal.

Wastes are to be segregated as far as practicable for reuse and recycling (e.g. cardboard, plastics, metals, etc.).

All wastes are to be stored securely in roofed or sealed waste receptacles to prevent rainwater ingress.

Waste oil generated from spills, leaks and waste oil or contaminated stormwater water collecting in bunds is to be stored separately from other wastes and in a bunded container or area and recycled if practicable.

No burning of waste relating to the activity is to be conducted onsite or offsite.

All waste must be removed from the site by a suitably licensed waste removal contractor and transported to a suitably licensed disposal site.

All regulated waste removed from the site must be removed by a person who holds a current authority to transport such waste under the provisions of the *Environmental Protection Act 1994*.

Performance Indicators

No uncontrolled release of waste of any kind.

Compliance with the *Environmental Protection (Waste Management) Policy 2000*.

Compliance with the conditions of the DA.

Monitoring

Waste collection areas shall be inspected daily to ensure wastes are stored appropriately and waste pickups arranged as required.

Record Keeping

Copies are to be kept of all waste tracking documents relating to regulated wastes removed from the site. Waste tracking documents shall include the volume of material removed and final destination of waste.

All records are to be made available for inspection by the relevant Administering Authority on request.

Reporting And Review

Maintenance of waste tracking documentation will be as required by the *Environmental Protection (Waste Management) Regulation 2000*.

Maintain a register of all wastes removed from site, their quantity and type.

Corrective Action

In the event of non-compliance relating to waste management the following corrective actions are to be actioned:

> investigate details of non-compliance and/or incident;

> implementation of appropriate mitigation measures as determined in consultation with relevant experts (where required) and within the agreed timeframe noted on the CAR; and

> sign off and recording of the CAR.

7.6 ELEMENT 6: Environmental Emergencies

Rationale

The most likely environmental emergencies which may occur on site are fuel spills and fire. Operational and emergency procedures and safety management systems will minimise the potential health and safety risks associated with operating the facility.

Objective/Target

To minimise impacts to the natural and built environment and human health arising as a result of emergencies and/or incidents.

Implementation Strategy

Signs provided to inform staff of necessary actions in the case of a spill or fire.

Spill kits maintained on site.

In the case of a fuel spill to land:

1. immediately enclose the spill area with temporary bunding (containment socks, sand bags, etc.) to prevent spreading;
2. immediately block off any stormwater drains to prevent contamination of waters;
3. apply bulk absorbent over the spilt material;
4. let the absorbent material absorb the spilt material;
5. collect the absorbent spilt material using appropriate tools (e.g. shovel or vacuum truck). Remediation may include removal of topsoil layer for spills on unsealed surfaces;
6. place saturated absorbent into a container for disposal in an authorised land fill;
7. repeat points 3 to 6 until area is clean;
8. collect all contaminated materials and dispose of in a dedicated metal bin with tight fitting lid labelled accordingly for disposal in an authorised landfill; and
9. inspect and re-stock the spill kits as required.

In the case of fire:

> sound the alarm;
> ring 000: Notify the fire brigade and give your name, location, type of fire (explosion, fuel fire, etc.), and details of injuries, if any. Notify ambulance and/or police service, if necessary;
> notify all relevant staff;
> evacuate the site to the assembly point and count heads - ensure the safety and wellbeing of everyone, and notify a senior member of staff if anyone is missing;
> keep the public away at a safe distance;
> turn off computers, power, gas bottles, and fuel sources, if safe to do so;
> isolate the fire by shutting off doors and windows, closing hatches and/or vents, if safe to do so. Do not close off your means of escape;
> fight the fire, if the fire is small and you are not in immediate danger. DO NOT TAKE RISKS;
> if available, an extra staff member should be sent to the roadway to direct the fire brigade;
> take action to minimise or contain environmental damage, if safe to do so; and
> immediately after the fire is over, make diary notes detailing your involvement in the emergency.

As soon as practicable after becoming aware of any emergency or incident that results in the significant release of contaminants not in accordance with the conditions of the DA, the Operator, the Administering Authority must be notified of the release by telephone or facsimile. Details shall include:

> the name of the holder of the DA;

> the location of the emergency or incident;

> the development approval reference and/or Registration Certificate reference;

> the name and telephone number of the designated contact person;

> the time of the release;

> the time the holder of the DA became aware of the release;

> the suspected cause of the release;

> the environmental harm caused, threatened, or suspected to be caused by the release; and

> actions taken to prevent any further release and mitigate any environmental harm caused by the release.

Within 14 days following the initial notification of a significant emergency or incident written advice must be provided to the Administering Authority detailing:

> proposed actions to prevent a recurrence of the emergency or incident;

> outcomes/actions taken to prevent or minimise environmental harm; and

> results of environmental monitoring.

Accurate record keeping of daily procedures will be kept to ensure that communication lines are followed in regard to operational activities.

Performance Indicators

Environmental harm from emergency and incident situations is minimised through implementation of emergency procedures.

Compliance with the conditions of the DA.

Monitoring

Stocks of fire-fighting and spill management equipment shall be checked on a monthly basis, and re-stocked as required.

Staff induction and training shall be undertaken as necessary to ensure all staff are trained in appropriate emergency management procedures.

Emergency Plans must be maintained, periodically reviewed and fire/evacuation drills regularly conducted.

Record Keeping

A written record of all inspections and maintenance actions undertaken shall be maintained at the site office and provided to the Administering Authority upon request.

Accurate records shall be maintained of all monitoring results.

The Operator shall make all records available for inspection to the Administering Authority upon request.

Reporting And Review

Environmental emergencies and incidents must be reported to the Administering Authority as soon as practicably possible.

Any environmental monitoring results shall be submitted to the Administering Authority within 14 days of completion of monitoring.

Corrective Action

Following an environmental emergency event the following corrective actions are to be implemented.

> Investigate details of non-compliance and/or incident.

> Implementation of appropriate mitigation measures as determined in consultation with relevant experts (where required) and within the agreed timeframe noted on the CAR.

> Sign off and recording of the CAR.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

8 Environmental Management Measures ERA 63

8.1 ELEMENT 1: STP Operation

Rationale

This Element details the operational requirements of the STP to minimise environmental harm, minimise pollutant loads to land and minimise discharges to water during operation. Effluent irrigation management is addressed in a separate irrigation management element within this plan.

Operation of the STP and effluent disposal system will be conducted in accordance with the manufacturer's management and maintenance procedures to ensure operational standards are maintained and protection of environmental values is achieved. Maintenance and management measures are required to ensure no significant impacts occur to receiving environments.

Objective/Target

To ensure that the STP and effluent disposal system is operated in accordance with appropriate operations and management procedures and that the release criteria at are met.

Tasks/Actions

> The Operator shall hold a valid registration certificate pursuant to the EP Act.

> Operational staff shall be educated in the safe use of recycled water and procedures for the operation of the STP.

> The Operator shall provide an induction program for new employees, site visitors and contractors including risk management principles.

> Staff shall be informed of provisions of the *Workplace Health and Safety Act 1995*.

> The STP shall only be operated by persons who have undergone sufficient training to be capable of operating the facility safely and efficiently.

> An alarm system shall be installed as part of the STP to inform the Operator of the STP failure. In the event that the Operator is not present onsite a 24 hour on-call system shall be established to ensure alerts raised are addressed at the earliest opportunity.

> Only authorised persons shall be permitted to access the STP at all times.

> The wet weather storage tank shall be appropriately designed and sized to prevent infiltration, stratification and algal blooms.

> Stormwater quality at the STP is to comply with stormwater quality objectives for the development in accordance with the *Queensland Water Quality Guidelines 2008* and stormwater infrastructure is to be maintained in good working order as per ERA 8 and 63 Element 4.

> Fittings with connections to the effluent irrigation system shall be colour coded and be distinguished from those of the potable water system to prevent cross connection. The pipe colour coding system shall be as follows.

- recycled water = purple pipes;
- fire suppression water = blue pipes; and
- potable Water = steel or black PVC.

> Bursts within the irrigation system shall be isolated and repaired as soon as practicable.

Performance Indicators

Failure of the operation of the STP and impacts on receiving environments shall indicate non-compliance with this SBMP.

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Monitoring

Weekly inspections of the plant shall be undertaken for monitoring of plant operations and inspections of plant equipment and components. Weekly monitoring shall include visual inspections of all irrigation system infrastructure including all visible pipelines and fittings, the treated effluent storage tanks, all pumps infrastructure and connections and any stormwater diversion banks surrounding the irrigation area.

An annual audit of compliance on completion or decommissioning of the activity whichever is sooner, with conditions of development approval shall be undertaken.

Record Keeping

A written record of all equipment inspections and any repairs/maintenance actions undertaken shall be maintained and provided to the Administering Authority on request.

A written record of all complaints, monitoring and remediation measures shall be maintained and provided to the Administering Authority on request. This should include details of corrective actions and/or repairs undertaken.

Accurate records shall be maintained of all monitoring results. These monitoring results shall be forwarded to DEHP as part of the annual report.

Reporting and Review

The Operator shall report any non-compliance or emergency situations to DEHP as soon as practicable after the emergency situation occurs.

The Operator shall make all records available for inspection by relevant authorities on request.

Corrective Action

Non compliances with this element shall include:

> overflows, exfiltration and other effluent spill;

> consistent failure to reach the required effluent quality criteria; and

> STP offline due to equipment failure.

Should there be non-compliance with the stated performance indicator the following corrective actions are to be implemented.

> Identification of the cause of the non-compliance;

> Implementation of appropriate mitigation measures as determined by the Operator; and

> Relevant validation monitoring to confirm that the nominated corrective actions have been effective.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

8.2 ELEMENT 2: Effluent Quality Management

Rationale

The processes involved in treatment of effluent within the STP have the potential to cause environmental impacts to water where improperly managed. Spills and leakages may occur during operations of the STP which may result in release of contaminants to receiving water environments.

The storage and irrigation of treated effluent has the potential to impact on the quality of surface waters in the locality of the STP. While the intention is to reuse all treated effluent, there will be occasions when extended wet weather periods result in an overflow of wet weather storage. The water quality management and effluent disposal strategy for the STP is to provide a wet weather storage tank which is unlikely to overtop. This element identifies the requirements for managing the quality of effluent and preventing releases of contaminants to water.

Objective/Target

To minimise and manage impacts to receiving water environments as a result of contaminant/effluent release and ensure that Water Quality Objectives are met.

Tasks/Actions

> Effluent quality monitoring instrumentation shall be provided for determining the quality of the treated effluent for parameters. Laboratory tests shall be conducted for remaining effluent quality parameters which cannot be measured onsite.

> Stormwater diversion drains shall be constructed in such a manner as to prevent stormwater contact with areas of the site where potentially contaminating activities have occurred.

> The treatment facility shall be maintained in accordance with manufacturers requirements so that the highest quality of effluent is produced and to ensure minimal risk of failure.

> The Operator shall inspect all infrastructure over the facility on a weekly basis to ensure any defects are identified and actions can be taken promptly.

Performance Indicators

Quality of effluent released from the STP is to comply with the following target values.

Table 8-1 Expected Effluent Quality Discharge

Parameter	Quality Required	Release Limit
pH	6.5-8.5	range
Turbidity	< 2 NTU	maximum
Suspended Solids	< 15mg/L	maximum
Biochemical Oxygen Demand	< 10 mg/L	maximum
Total Nitrogen	< 10 mg/L	maximum
Total Phosphorous	< 5 mg/L	maximum
Residual Chlorine	0.5-1.0 mg/L free chlorine	range
Escherichia coli	< 10 cfu/100ml*	Maximum

*cfu = colony forming units

Monitoring

Monitoring of treated effluent shall be undertaken according to the following programme

Table 8-2 Water Quality Monitoring Programme

Parameters	Location	Frequency
Turbidity (NTU) and Residual Chlorine	Outlet of the STP	Continuous
BOD, DO, SS, pH, TN, TP and Faecal Coliforms	Outlet of the STP	Monthly
BOD, DO, SS, pH, TN, TP and Faecal Coliforms	Point of outtake from wet weather storage to irrigation system	Monthly
BOD, DO, SS, pH, TN, TP and Faecal Coliforms	Overflow point from the wet weather storage tank	During any overflow event
BOD, DO, SS TN, TP, Faecal Coliforms	Drainage lines adjacent to the irrigation areas (if applicable)	Monthly where there is sufficient rainfall in the preceding 24 hours to cause run-off from the irrigation area (minimum rainfall required to cause run-off should be 30mm or greater). where flows are occurring

Weekly monitoring of the condition of all infrastructure within the facility shall be undertaken to ensure any defects are identified and corrective actions undertaken. During the weekly inspection, visual inspection of the condition of all above ground distribution infrastructure over the site shall be undertaken including all visible distribution pipes and pump sheds on a weekly basis.

Record Keeping

The Operator shall maintain a record of any identified infrastructure detects or failure in relation effluent quality management including any corrective actions undertaken.

The Operator shall maintain a record of any monitoring results undertaken including details of corrective actions and/or repairs undertaken.

Reporting and Review

The Operator shall submit annual reports of all monitoring data to DEHP on annual basis or as specified in the development approval conditions.

Corrective Action

Non compliances of this element shall include:

> failure to reach the required effluent quality criteria;

> poorly maintained stormwater control devices; and

> contaminated waters discharging from the site to receiving waters.

Should there be non-compliance with the stated performance indicator the following corrective actions are to be implemented.

> Identification of the cause of the non-compliance.

> Implementation of appropriate mitigation measures as determined by the Principal and Consultant in consultation with the Operator.

> Relevant validation monitoring to confirm that the nominated corrective actions have been effective.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

8.3 ELEMENT 3: Odour and Noise

Rationale

Operation of the STP and effluent disposal system may result in emissions of odour and noise from plant and equipment. Such emissions may cause amenity impacts to surrounding land users. Adequate maintenance and management of the facilities will be required to ensure impact mitigation.

Objective/Target

To maintain and manage the STP and effluent disposal system to prevent emissions that may result in health or amenity impacts.

To comply with the stated performances indicators for noise and odour levels in the locality of the works.

Tasks/Actions

Odour

> All tanks within the STP facility shall be adequately sealed to minimise emission of odour.

> The effluent disposal areas shall be managed to prevent release of aerosols beyond the boundaries of the irrigation areas.

> Should complaints about odour be received, the operator of the STP shall investigate the cause of the odour and undertake corrective actions as required.

> Actions shall include visiting the complainant's locality to determine appropriate mitigation measures and the validity of the complaint. In the event of a dispute, an independent party such as a Consultant shall conduct odour monitoring if necessary.

Noise Emissions

> The proposed STP and associated equipment shall be fitted with noise minimisation equipment to minimise noise emissions if required. Equipment shall be securely fixed to mounting plates to prevent vibration.

> Should complaints about noise be received, the Operator of the STP shall investigate the cause of the noise and undertake corrective actions as required.

> Actions shall include visiting the complainant's locality to determine appropriate mitigation measures and the validity of the complaint. In the event of a dispute, an independent party such as a Consultant shall conduct noise monitoring if necessary.

Performance Indicators

Emissions of odour and noise shall not cause a nuisance at any sensitive place. In the event that complaints are received these will be investigated as soon as practicable and corrective actions identified.

Monitoring

Weekly inspections of the plant shall be undertaken for monitoring of plant operation and inspection of plant equipment and components.

Complaint driven noise monitoring shall be carried out at the request of the Administering authority only.

Record Keeping

The Operator shall maintain a record of all complaints received in relation to odour and noise disturbance including complainant details, nature of the complaint and corrective actions undertaken.

The Operator shall maintain a record of any monitoring results undertaken including details of corrective actions and/or repairs undertaken.

Reporting and Review

A written record of all inspections and maintenance actions undertaken shall be maintained and provided to regulatory authorities on request.

A written record of all complaints and subsequent odour monitoring and remediation measures shall be maintained and provided to regulatory authorities on request.

The Operator shall submit annual reports of all monitoring data to DEHP on annual basis or as specified in the development approval conditions.

Corrective Action

Should a complaint relating to excessive emission of noise or odour from the works site be received the following corrective actions are to be implemented:

> response to complainant outlining procedure for corrective action;

> identification of the source(s) of the excessive emission of noise or odour;

> implementation of appropriate mitigation measures as determined by the Consultant in consultation with the Operator;

> relevant validation monitoring of noise or odour concentrations at nominated locations; and

> notification of complainant that complaint has been closed out, with details of corrective actions undertaken.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

8.4 ELEMENT 4: Solid Waste Management from STP

Rationale

Waste management is to focus on appropriate methods to avoid, reuse, recycle and dispose of waste materials generated as a result of the works

Objective/Target

Comply with the provisions of the *Waste Reduction and Reuse Act 2011*.

Tasks/Actions

The Contractor shall have due regard for the waste management hierarchy detailed in the *EPP Waste.* The waste management hierarchy lists the types of waste management practices in preferred order of adoption, as detailed below.

1. Waste avoidance
2. Waste re-use
3. Waste recycling
4. Energy recovery from waste
5. Waste disposal

Grit and screenings shall be removed from site and disposed of to landfill.

Sludge materials shall be disposed of to an off-site facility and shall be collected by licensed regulated waste transporters.

Performance Indicators

Comply with the provisions of the EPP Waste.

Lawful disposal of all sludge, grit and screenings to a licenced waste management facility.

Record Keeping

Accurate records shall be maintained of the method of disposal of all waste. These records shall be made available to DEHP as required.

Records shall be maintained of removal of sludge and grit and screening materials and regulated waste certificates shall be kept at the site for the duration of the project and at Adani Mining Pty Ltd usual place of business for 3 years following project completion.

Reporting and Review

The Operator shall make all records available for inspection by relevant authorities on request.

Corrective Action

Should there be non-compliance with the stated performance indicator the following corrective actions are to be implemented:

> identification of the cause of the non-compliance;

> implementation of appropriate mitigation measures as determined by the Consultant in consultation with the Operator; and

> relevant validation monitoring to confirm that the nominated corrective actions have been effective.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

8.5 ELEMENT 5: STP Hazardous Material Storage and Handling

Rationale

Effluent treatment to achieve Class A effluent will involve disinfection by chlorine dosing. Maintenance of the STP will involve the storage of Hydrochloric Acid (UN No. 1789), Alum flocculent and Sodium Hypochlorite. The site is required to be managed to prevent impacts on human health and the receiving environment as a result of accidental release or spillage of hazardous substances.

Objective/Target

To effectively manage the safe storage, handling and disposal of dangerous or hazardous materials within the site in accordance with the *Work Health & Safety Act 2011.*

Tasks/Actions

Storage is in accordance with the product's Material Safety Data Sheets (MSDS), which are to be displayed with each hazardous substance.

A sufficient supply of sodium hypochlorite and other chemicals required for the operation of the STP is to be maintained.

Where hazardous substances are transferred into, or from, a container:

> spill containment is provided that can hold at least the quantity of the largest container;

> the transfer is done in a manner that avoids splashing or spillage of the substance;

> the place where the transfer occurs is set aside for that purpose, is not within the storage area, and free of obstructions;

> spill clean-up equipment is kept close by;

> the container receiving the substance cannot be damaged by the transferred substance; and

> the receiving container does not require marking.

Performance Indicators

Chemical storage areas are inspected and maintained accordingly to ensure no uncontrolled release from the storage area.

Record Keeping

A written record of all inspections and maintenance actions undertaken is maintained and provided to regulatory authorities on request.

The Operator shall make all records available for inspection by relevant authorities on request.

Reporting and Review

A register is maintained of all hazardous substances stored in a central location within the site. The register shall include a copy of all associated MSDS.

Corrective Action

Non-compliance with the element culminating in corrective action may include:

> inadequate storage of hazardous materials;

> chemical spills during transfer or unloading; or

> human health impacts from poor storage and ventilation and handling of hazardous materials.

The Contractor shall implement the corrective action as required within the agreed time frames noted on the CAR.

8.6 ELEMENT 6: Irrigation Management

Rationale

Effluent irrigation may result in the release of contaminants to soils surface waters and groundwater. Management measures are required to ensure no significant impacts occur to soils, surface waters or groundwater within the irrigation areas and the receiving environment. Class A treated effluent is to be irrigated into the designated irrigation areas in such a way as to prevent environmental harm to waters, including groundwater, soils or plant cover.

This Element provides requirements to ensure that efficient and appropriate application of treated effluent occurs within the bounds of the site and to ensure that the effluent irrigation system and irrigation area are maintained in a proper condition.

Objective/Target

To protect the environmental values of the receiving environment including of the soil, surface water and groundwater.

Tasks/Actions

> A system which restricts irrigation to land during unsuitable soil conditions shall be installed (i.e. manual or automated) which triggers or restricts irrigation from the irrigation management system and effluent storage tanks.

> Only treated effluent of the required standard shall be used for irrigation.

> All external stormwater runoff upslope of the land application area is to be diverted around the irrigation area via appropriate bunding and/or diversion drains.

> A buffer distance of 20m is to be applied and maintained from the effluent irrigation area to stormwater infrastructure (i.e. swales).

> Irrigation shall be limited to that which is sufficient to wet the soil to its undrained limit to prevent effluent runoff or ponding.

> Corrective actions shall be undertaken if the vegetation within the irrigation area is determined to be visibly degraded.

> Use of nitrogen fertiliser within irrigation areas shall be limited and applied only as required. Nitrogen deficiency shall be indicated by vegetation monitoring. Use of phosphorus based fertiliser shall be restricted.

> Erosion control measures shall be installed on areas of exposed soils.

> Irrigation shall be restricted to the maximum rate used in the analyses that are carried out to size the irrigation area.

> Visual inspection of the area will be undertaken to determine the soil moisture at the commencement of irrigation, to eliminate the possibility of surface water ponding or runoff occurring.

> There is to be no effluent irrigation during rain events. Irrigation shall only re-commence a minimum of 4 hours following cessation of rainfall. A rain sensor shall be installed to trigger the ceasing of irrigation during rainfall.

> There is to be no ponding of effluent at the irrigation area. Should ponding occur, irrigation shall cease until such time as the soil moisture content has sufficiently reduced to eliminate further ponding.

> Appropriate signage indicating that recycled water is not suitable for drinking shall be provided and maintained at every accessible outlet from the treated effluent distribution system. Signs shall be easily visible and maintained regularly. Signage shall also be provided and maintained at the irrigation area informing of the use of treated effluent for land irrigation.

> When and if the storage level rises to within 10% of its overflow level an alarm will sound which indicates the necessity for tanker removal.

> The irrigation area shall be maintained in a well-grassed state to minimise the risk of erosion and sediment wash-off during storm events. Where necessary, turf, pasture grass or trees will be replaced to maintain the vegetation cover.

Performance Indicators

Degradation of soil quality within irrigation areas shall indicate non-compliance with this SBMP.

Degradation of water quality within receiving environments shall indicate non-compliance with this SBMP.

Visible areas of soil erosion and poor vegetation health within irrigation areas shall indicate non-compliance with this SBMP.

Signs of soil erosion or sodicity shall indicate non-compliance with this SBMP.

Monitoring

Soil conditions shall be monitored at nominated sampling locations within each of the irrigation sites (refer to Figure 2). Samples from representative sites within the irrigation areas shall be collected from each of the topsoil and sub-soil strata every two years or on completion of the project, whichever is the sooner.

Soils monitoring shall include analysis of soil pH, Sodium Adsorption Ratio, Calcium/Magnesium Ratio, Exchangeable Cations, Total Cations, Electrical Conductivity, Nitrogen, Phosphorous, Calcium, Magnesium, Chloride and Sodium.

A daily recording of the volume of treated effluent released to the irrigation areas shall be recorded from the irrigation metering system.

Monthly monitoring shall include a visual inspection of the condition of the vegetation and evidence of soil erosion within irrigation areas.

Record Keeping

The Operator shall maintain accurate record of all effluent quality and quantity monitoring data and records shall be retained on the premises.

Accurate records shall be maintained of all monitoring results. These monitoring results shall be forwarded to DEHP as part of the annual report.

Any signs of soil erosion or deterioration of vegetation health shall be noted and appropriate corrective actions taken and recorded.

Records shall be maintained of any failure of irrigation system components and of any repairs or corrective actions undertaken.

Reporting and Review

The Operator shall make all records available for inspection by relevant authorities on request.

Corrective Action

Should there be non-compliance with the stated performance indicator the following corrective actions are to be implemented:

> identification of the cause of the non-compliance;

> implementation of appropriate mitigation measures as determined by the Consultant in consultation with the Operator; and

> relevant validation monitoring to confirm that the nominated corrective actions have been effective.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

Corrective action for this item may include the application of suitable soil amendments and ongoing monitoring of heavy metal accumulation in order to rectify deterioration associated with irrigation.

8.7 ELEMENT 7: Complaint and Incident Mitigation

Rationale

The operation of the STP and effluent disposal scheme has the potential to result in unplanned situations such as the uncontrolled release of effluent. Contingency procedures are required to provide for effective management of these situations.

Accidental spillage/leakage or release of contaminated material to receiving environments shall indicate non-compliance with this SBMP.

Objectives

To prevent degradation of the receiving environment.

To prevent the risk of health impacts on the public.

Tasks/Actions

Minor Effluent Spills

Should a minor effluent spill occur during the operation of the facilities the following response procedure shall be implemented.

1. An assessment of the size and origin of the spill is to be made by the Operator.
2. Actions shall be taken to safely stop further release of effluent from the process train. Actions may include the isolation of valves or pumps within the process train.
3. Actions shall be taken to safely contain the spilled effluent and prevent the release of the effluent to the receiving environment. Actions may include, for example, the use of sandbags or earth bunding.
4. Actions shall be taken to safely pump any captured effluent back into the balancing influent tank for treatment.
5. An assessment shall be made of the size of the spill and of the requirement to notify DEHP.

Major Effluent Spills

Should a major effluent spill occur during the operation of the facilities the following response procedure shall be implemented.

1. An assessment of the size and origin of the spill is to be made by the Operator.
2. If it is possible, actions shall be taken to safely stop any further release of effluent.
3. Actions shall be taken to notify DEHP of the effluent spill and an emergency spill response shall be co-ordinated in conjunction with DEHP.
4. Actions shall be taken to safely contain the effluent if this is possible. Actions may include, for example, the use of sandbags or earth bunding to aid in containing the effluent.

Clean-up of the site shall be undertaken as quickly as is practicable and appropriate actions shall be taken as instructed by DEHP.

Complaints Management

The Operator shall implement the following procedure should a community complaint be received which relates directly to the operation of the STP and effluent disposal scheme.

1. Complete a Complaint register form.
2. Determine if the complaint is valid and if further action is required.
3. Determine whether notification to DEHP is required.
4. The complainants shall be notified within 24 hours advising of actions that will be taken.
5. If the issue cannot be investigated and finalised within 24 hours, then information regarding the preliminary assessment of the complaint and a date when a full response will be available shall be provided within 24 hours.

6. The complaint response must be signed off by the Operator indicating that it has been dealt with satisfactorily.
7. Should the investigation of a complaint reveal a non-conformance with the requirements of DEHP, then a non-conformance is to be raised and the corrective action process initiated.

Environmental Incidents

The Operator shall make an assessment of any events that may be considered an environmental incident.

The Operator shall notify DEHP of any incidents that have cause of environmental harm.

An Environmental Incident Form shall be completed for any environmental incidents.

All Environmental Incident Forms shall be completed as non-conformances and corrective action initiated.

Performance Indicators

Complaints and incidents are dealt with expeditiously and in accordance with this procedure.

Reporting and Review

This SBMP element shall be continually reviewed and maintained to ensure that the best possible contingency situation management procedures are in place.

The Principal shall report any emergency situations to DEHP as soon as is practicable after the emergency situation occurs.

Corrective Action

Should there be non-compliance with the stated performance indicator the following corrective actions are to be implemented:

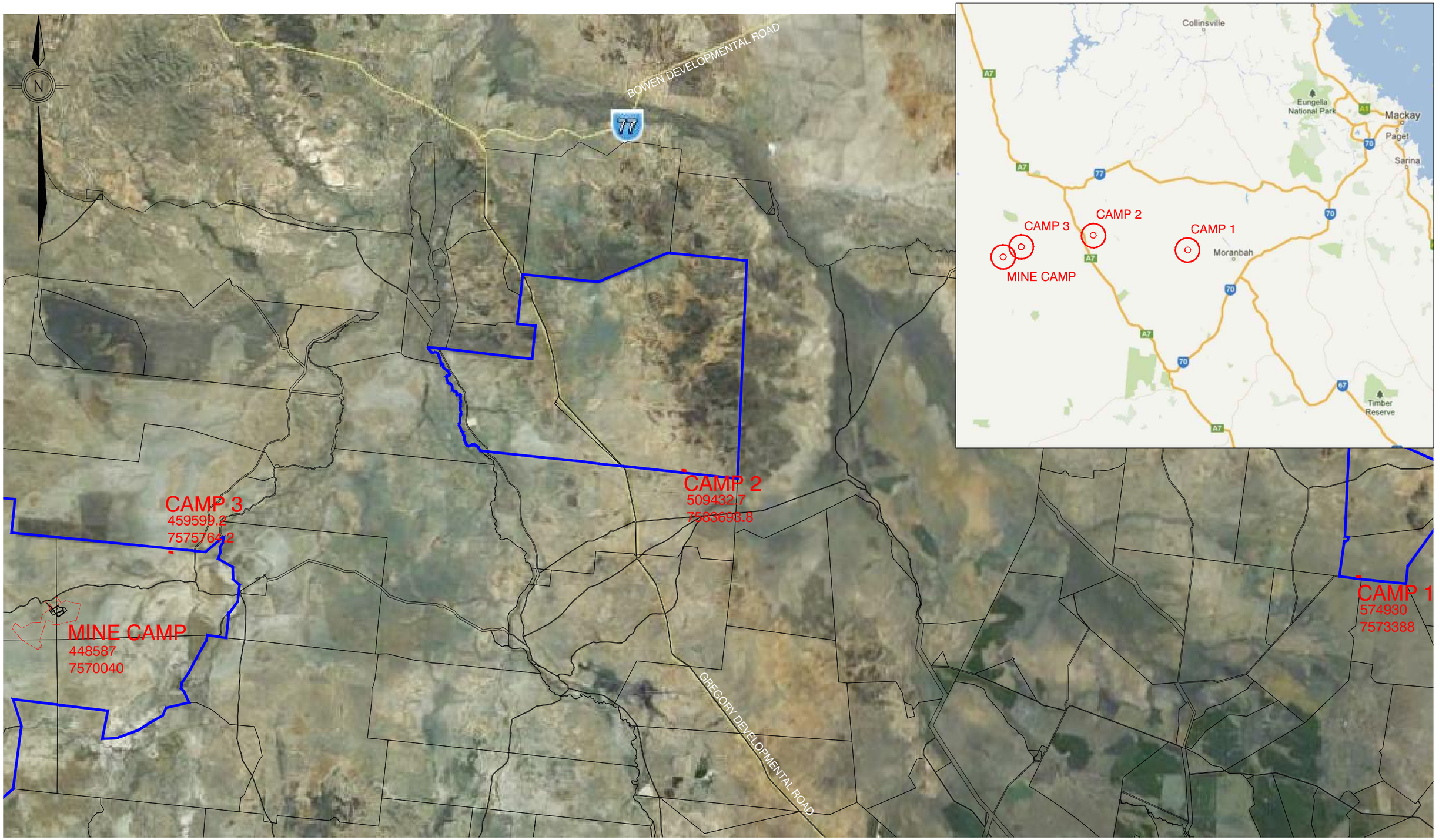
> identification of the cause of the non-compliance;
> implementation of appropriate mitigation measures as determined by the Consultant in consultation with the Operator; and
> relevant validation monitoring to confirm that the nominated corrective actions have been effective.

The Operator shall implement the corrective action(s) as required within the agreed time frame noted on the CAR.

Carmichael Coal Project Construction Camps

FIGURES

Cardno
Shaping the Future



3.5 0 3.5 7.0 10.5 14.0 17.50km
1:350,000

Scale 1:350,000 (A3)

FIGURE 1
CAMP SITE LOCATIONS

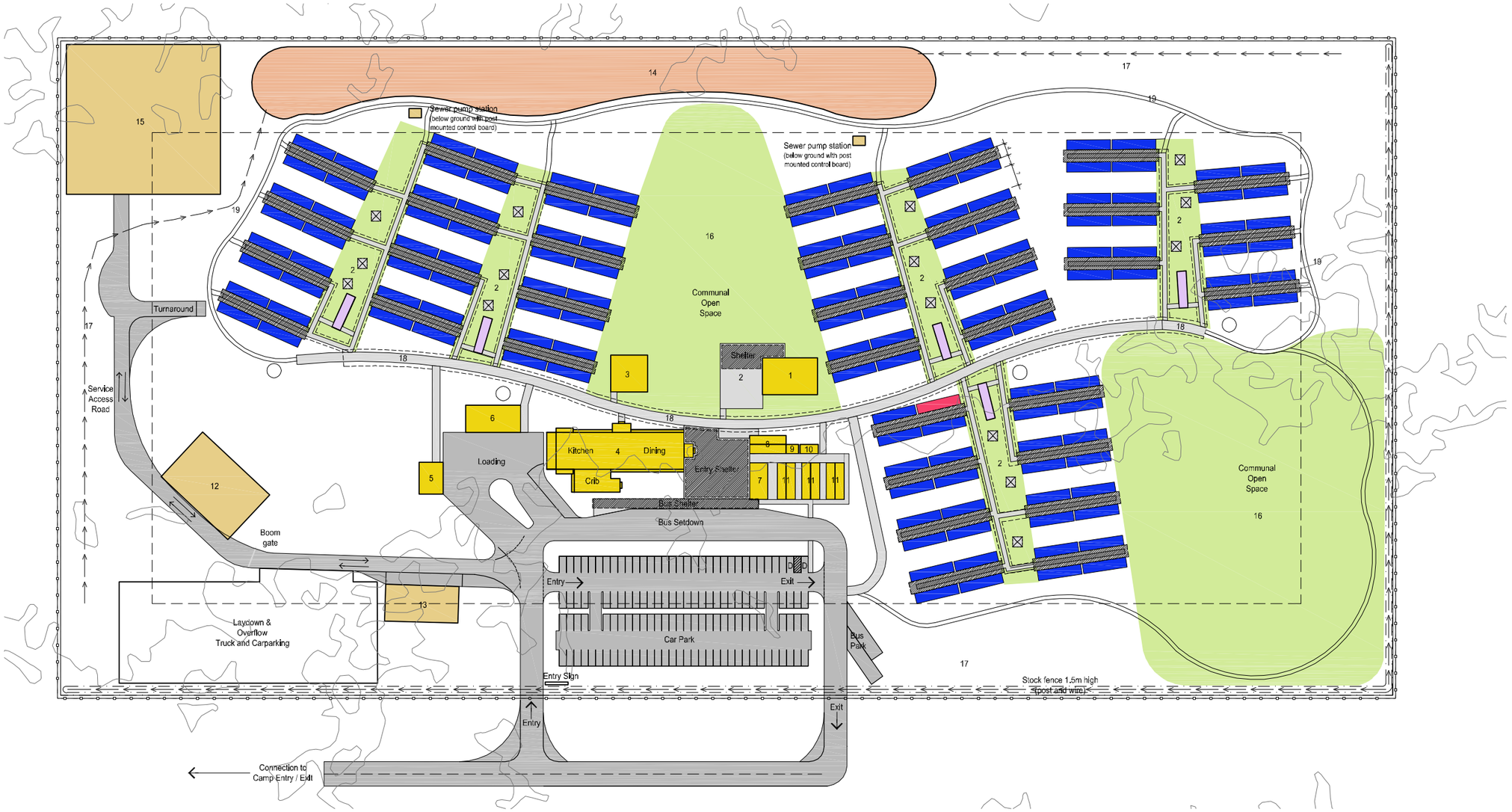
Rev: 0 | Drawn: J.M. | Checked: L.M. | Date: 16/10/2012

Project No.: 7508/90

Adani

CAD FILE: I:\7508-90 Adani\Acad\Misc\Camp locations.dwg
XREF's: DCDB

PRINT DATE: 23 October, 2012 - 8:25am



LEGEND

1 - Recreation Centre/ Wet Mess IT & Telephone

2 - BBQ & Shelter Areas

3 - Gym

4 - Kitchen/Dining

5 - Waste

6 - Maintenance / Linen Store

7 - Office

8 - Ablution M&F

9 - Ablution (Disabled)

10 - First Aid

11 - Lockers

12 - Water Treatment Plant

13 - Generator

14 - Detention Basin

15 - Sewerage Treatment Plant

16 - Communal Open Space

17 - Fire Break (30M wide)

18 - Central Path (3M wide) with Freestanding Awning

19 - Walking Track / Maintenance (1.2M - 2.5M wide)

Fire Tank Water

Catch Drain

Perimeter Bund

Perimeter Fence

ACCOMMODATION UNITS	405
DISABLED UNITS	2
CAR PARKING	125
DISABLED CARPARKING	2
BUS PARKING	2
EFFULENT DISPOSAL (based on 100m² per person)	4 ha
DETENTION BASIN	.42ha
TOTAL OPEN SPACE (including firebreak)	5.58 ha
TOTAL SITE AREA	9.38 ha

0 10 20 30 40 50 100

Scale 1:1500 @ A3 - Dimensions in metres

Issue	Date	Details	Approved
A	15.10.2012	For Discussion	DM
B	16.10.2012	For Discussion	DM
C	16.10.2012	For Discussion	DM
D	17.10.2012	For Client Approval	DM

- COMMUNAL BUILDING
- ACCOMMODATION UNIT
- DISABLED UNIT
- LAUNDRY
- PATH
- INFRASTRUCTURE
- COMMUNAL OPEN SPACE
- DETENTION BASIN

NOT FOR CONSTRUCTION

Cardno
landscape architecture
urban design
environmental management
Green Square Nth Tower:
515 St. Pauls Terrace,
Locked Bag 4006
Fortitude Valley Q 4006
T +61 7 3254 3277
F +61 7 3254 3299
splat@cardno.com.au
www.cardno.com.au/splat

Project:
RAIL CAMP

Drawing:
CAMP 1 - 400 PERSON

Client:
ADANI MINING PTY LTD

Consultants:

Designed by:	Drawn by:	Checked:	
DM	MJ	SP	

Drawing No.:	Project No.:	Sheet No.:	Issue:
	SP126801	01	D

Carmichael Coal Project Construction Camps

APPENDIX A

Corrective Action Request

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CORRECTIVE ACTION REQUEST

Report No: _____

Date: _____

DETAILS OF NON-CONFORMANCE: Inspected by:
DETAILS OF PROPOSED ACTION Passed to Principal (as applicable): y/n Date: Reply required by:
CONSULTANT/PRINCIPAL ADVICE (as required): Date action required by (if applicable): Signed (by Principal or Principal's representative): Date:
AUTHORITY TO PROCEED Sign: Date:
ACTION CARRED OUT Sign: Date:
ELEMENT RE-INSPECTED BY Sign: Date:
COPY ISSUED TO PRINCIPAL Date: Sign:

EXISTING SPECIES LIST PREPARED BY SAUNDERS HAVILL GROUP

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1.1.1 Camp 1 Area

Plant Species (D – Dominant; C – codominant; A – associated; S – Suppressed)

Rel. dom.	Scientific Name	Common Name	Conservation Status (NCA92)	EPBC Status
A	*Acacia farnesiana*	Mimosa Bush	Least Concern	Not Listed
A	*Acacia harpophylla*	Brigalow	Least Concern	Not Listed
A	*Archidendropsisbasalttica*	Dead Finish	Least Concern	Not Listed
A	*Aristidalatifolia*	Feathertop Wiregrass	Least Concern	Not Listed
A	*Astreblalappacea*	Curly Mitchell Grass	Least Concern	Not Listed
A	*Bothrichloabladhii*	Forest Bluegrass	Least Concern	Not Listed
A	*Capparislassiantha*	Wait-A-While	Least Concern	Not Listed
A	*Carissa ovata*	Currant Bush	Least Concern	Not Listed
A	*Chlorisvirgata*	Feathertop Rhodes Grass	Introduced	Introduced
A	*Dichanthium sericeum*	Queensland Bluegrass	Least Concern	Not Listed
A	*Enteropogonacicularis*	Curly Windmill Grass	Least Concern	Not Listed
A	*Eriocereusmartinii*	Harrisia cactus	Introduced	Introduced
A	*Panicumdecompositum*	Native Millet	Least Concern	Not Listed
A	*Partheniumhysterophorus*	Parthenium weed	Introduced	Introduced
D	*Pennisetumciliare*	Buffel Grass	Introduced	Introduced
A	*Seneciolautus*	Fireweed	Introduced	Introduced
A	*Sporobolus caroli*	Fairy Grass	Least Concern	Not Listed